Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format as described in *MasterFormat® 2020 Edition.*

This section should be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete any information and specifier notes below in Parts 1, 2 or 3 which are not required or relevant for the project.

Section numbers are from *MasterFormat 2020 Edition.*

**SECTION 26 05 33.16**

**BOXES AND COVERS FOR ELECTRICAL SYSTEMS**

1. **GENERAL**
   1. **SCOPE**
      1. This section includes
         1. Pre-fabricated metallic boxes and assemblies
         2. Metallic outlet boxes, device boxes, rings and covers
         3. Non-metallic outlet boxes, device boxes, rings and covers
         4. While-in-use and weatherproof outlet boxes and covers.
         5. Junction boxes and pull boxes
      2. Related sections:
         1. 01 81 16 Facility Environmental Requirements
         2. 26 05 19 Low-Voltage Electrical Power Conductors and Cables
         3. 26 05 26 Grounding and Bonding for Electrical Systems
         4. 26 05 29 Hangers and Supports for Electrical Systems
         5. 26 05 33.13 Conduit for Electrical Systems
         6. 26 05 33.23 Surface Raceways for Electrical Systems
         7. 26 05 53 Identification for Electrical Systems
         8. 27 05 28 Pathways for Communications Systems
   2. **REFERENCES**
      1. National Fire Protection Association (NFPA):
         1. NFPA 70 National Electrical Code (NEC)
      2. Underwriters Laboratories, Inc. (UL):
         1. UL 514A Metallic Outlet Boxes
         2. UL514C Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
         3. UL 514D Cover Plates for Flush-Mounted Wiring Devices
      3. SA Group
         1. CSA C22.1 Canadian Electric Code Part I
         2. CSA C22.2 No. 18.1 Metallic Outlet Boxes
      4. National Electrical Manufacturers Association (NEMA)
         1. OS-1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
         2. FB-1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
   3. **SUBMITTALS - FOR REVIEW/APPROVAL**
      1. The following information shall be submitted to the engineer.
         1. Manufacturer’s descriptive literature and technical specifications for each product or assembly component
         2. Manufacturer’s installation and maintenance document
         3. Manufacturer’s product drawings when requested, including:
            1. Floor plans indicating assembly location and identification for each provided device
            2. 3D Isometric drawing indicating routing pathways of all cables
            3. 2D Electrical circuitry drawing
            4. Final shop drawings shall indicate as built condition of electrical systems
   4. **QUALIFICATIONS**
      1. The supplier of the equipment specified must be the manufacturer of the major components within the assembly.
      2. For the equipment specified herein, the manufacturer must be ISO 9001 or 9002 certified.
      3. The manufacturer of this equipment must have produced similar electrical equipment for a minimum period of five (5) years. When requested by the engineer, an acceptable list of installations with similar equipment will be provided demonstrating compliance with this requirement.
      4. Products must be free of defects in material and workmanship
      5. Quarterly manufacturing inspection to verify compliance with product listing files
   5. **REGULATORY REQUIREMENTS**
2. All boxes and covers shall be UL Listed and CSA Certified

**1.06 DELIVERY, STORAGE, AND HANDLING**

* + 1. Store products in manufacturer’s unopened packaging until ready for installation

1. **PRODUCTS**
   1. **GENERAL**
      1. Boxes and Covers for Electrical Systems include the following product types
         1. Pre-fabricated Metallic Boxes and Assemblies
         2. Steel Outlet and Switch Boxes, including:
            1. 4" Steel Square Boxes
            2. 4-11/16" Steel Square Boxes
            3. 5" Steel Square Boxes
            4. Utility (Handy) Boxes
            5. Switch Boxes
            6. Gang Boxes
            7. Masonry Boxes
            8. Ceiling Pan Boxes
            9. Ceiling Boxes Octagon
            10. Ceiling fan and light fixture boxes and bar hangers
            11. Concrete Boxes Octagon
            12. Covers, brackets and accessories
         3. Iron, Aluminum and Stainless Steel Device Boxes and Covers
         4. Non-Metallic Outlet Boxes and Covers
         5. While-In-Use and Weatherproof Boxes and Covers
   2. **PERFORMANCE REQUIREMENTS**
      1. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
   3. **MANUFACTURERS**
      1. Basis of Design – Preferred Manufacturer:

The listing of manufacturers below does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed below are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer prior to bid date.

1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
   1. Eaton Crouse-Hinds series
   2. Engineer-approved equal
   3. **PRE-FABRICATED BOXES AND ASSEMBLIES (RUFF-IN™)**
      1. Multi-Conductor Cables
         1. Must comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire or Type MCI-A
         2. Shall comply with the requirements of NFPA 70
         3. Cables must be by Underwriters Laboratories Inc. as suitable for the purpose indicated.
         4. Unless specifically indicated to be excluded, provide all required conduit, boxes, connectors, etc. as required for a complete operating system.
         5. Conductor material shall be copper only. Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
         6. Insulation: Type THHN, THHN/THWN or THHN/THWN-2
      2. Connectors and Splices
         1. Connectors must be push-in wire type. Acceptable manufacturers include Wago Corporation, NSI Industries, or equal.
      3. Boxes, Enclosures, and Cabinets
         1. Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations
         2. Sheet metal outlet and device boxes shall comply with NEMA OS1 and UL 514A
         3. Luminaire outlet boxes shall be nonadjustable and designed for attachment of luminaire weighing 50 lb. or less. Outlet boxes designed for attachment of luminaires weighing more than 50 lb. shall be listed and marked for the maximum allowable weight.
         4. Paddle fan outlet boxes shall be nonadjustable and designed for attachment of paddle fan weighing 70 lb. or less
         5. Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
         6. Small sheet metal pull and junction boxes shall comply with NEMA OS1
         7. Box extensions used to accommodate new building finishes shall be of the same material as recessed box.
         8. Device boxes shall have dimensions of a minimum 4-inches square by 2-1/8 inches deep.
      4. Support, Anchorage and Attachment Components
         1. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly. Acceptable manufacturers include Eaton’s B-Line series
         2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
         3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
         4. Painted Coatings: Manufacturer's standard painted coating applied according to   
            MFMA-4.
         5. Channel Dimensions: Selected for applicable load criteria
      5. Wiring Devices
         1. Manufacturers subject to compliance with requirements. Acceptable manufacturers that may be incorporated into Pre-fab work include Eaton Wiring Devices (formerly Cooper Wiring Devices)
         2. Shall comply with the requirements of NFPA 70
         3. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
         4. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
            1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
            2. Devices shall comply with the requirements in this Section.
      6. System Description
         1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
         2. Shall comply with NFPA 70.
   4. **STEEL OUTLET AND SWITCH BOXES, COVERS AND ACCESSORIES**
      1. General Design and Performance Requirements
         1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
            1. UL514A (boxes)
            2. UL514D (covers)
         2. Standard Features:
            1. Shall be made from pre-galvanized steel of .0625 inch thickness to meet application and certification requirements.
            2. Brackets on boxes shall be pre-galvanized steel or zinc plated cold roll spring steel.
            3. Shall have standard trade size knockouts to support attachment of cable and conduit connectors compliant with UL 514A knockout requirements.
            4. Shall have a 10-32 tapped hole at the bottom for attaching a separate ground wire or inclusion of a ground screw by the manufacturer.
            5. Shall have pre-installed screws in raised position to support cover installation.
            6. Shall have concentric or eccentric knockouts suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250V.
            7. Shall be available with factory installed ground screw and pigtail lead
      2. 4” Steel Square Outlet Boxes, Covers and Extension Rings
         1. Basis of Design – Preferred Manufacturer:

The listing of manufacturers below does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed below are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer prior to bid date.

* + - 1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Boxes shall be designed for use with [conduit] [non-metallic cable] [armored and metal clad cable and HCF cable]
         2. Boxes shall be available in red for fire alarm applications
         3. Outside box dimensions shall be 4” (101.6mm) wide x 4” (101.6mm) high
         4. Boxes shall be available in 1-1/4” (31.75mm), 1-1/2” (38.1mm), 2-1/8” (53.97mm) and 3” (77.8mm) depths to accommodate differing cubic capacity requirements
         5. Box construction shall be [welded] [drawn] to match customer preference
         6. Mounting/Attachment Features:

For Cut-In Mounting: 2 holes minimum (0.16 in (4.0 mm) diameter) on each side

For Back Support Mounting: 6 holes (0.266 in (6.75 mm)) on back

For Box Support Bracket Installation: 4 tabs with tapped holes (8-32) on front of box with 2-¾ in (69.85 mm) between both sets of plate mounting screws.

* + - * 1. Shall have concentric or eccentric knockouts suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250V.
        2. Shall be available with factory installed ground screw and pigtail lead.
        3. Covers for boxes shall be attachable directly to box, suitable to mount into screws holes already in place
        4. Covers for boxes shall be provided screws that are self-tapping for 100% thread engagement and have combination slotted/Phillips heads
        5. Covers for boxes shall provide both a mounting device plate and a box support, reducing installation time and material handling.
        6. Box covers, also called “mud rings” or “plaster rings”, shall have minimum dimensions of 4” (101.6mm) wide x 4” (101.6mm) high.
        7. Extension rings shall be available in 1-1/2” (38.1mm) and 2-1/8” (53.97mm) depths to accommodate differing cubic capacity requirements
        8. Extension rings shall be attachable directly to 4” square boxes, with 4 screw slots suitable to mount on screws that are already in place.
        9. Extension rings shall have at least 2 faceplate mounting tabs, with tapped holes (6-32) to receive faceplate screws
    1. 4-11/16” Steel Square Outlet Boxes, Covers and Extension Rings
       1. Basis of Design – Preferred Manufacturer:

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* + - 1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Outside box dimensions shall be 4-11/16” (119mm) wide x 4-11/16” (119mm) high and 3” (77.8mm) deep.
         2. Box volume shall be [60 cubic inches (983.22 CM3)] [66 cubic inches (1081.55 CM3)]
         3. Box construction shall be welded at 14 points (minimum) or drawn.
         4. Mounting/Attachment Features:

For Cut-In Mounting: 2 holes minimum (0.16 in (4.0 mm) diameter) on each side

For Back Support Mounting: 6 holes (0.266 in (6.75 mm)) on back

For Box Support Bracket Installation: 4 tabs with tapped holes (8-32) on front of box with 2-¾ in (69.85 mm) between both sets of plate mounting screws.

* + - * 1. Shall have concentric or eccentric knockouts suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250V.
        2. Shall be available with factory installed ground screw and pigtail lead
        3. Blank box cover dimensions shall be 4-3/4” (120.65mm) wide x 4-3/4” (120.65mm) high
        4. Blank box cover construction shall be stamped fabrication
        5. Blank box cover shall be attachable directly to box, with 4 screw slots (2 straight and at least 2 angled), suitable to mount on screws that are already in place
        6. Box covers, also called “mud rings” or “plaster rings”, shall have dimensions of 4-11/16” (119mm) wide x 4-11/16” (119mm) high
        7. Extension rings construction shall be stamped/drawn fabrication
        8. Extension rings shall be attachable directly to 4-11/16” square boxes, with 4 screw slots suitable to mount on screws that are already in place.
        9. Extension rings shall have at least 2 faceplate mounting tabs, with tapped holes (6-32) to receive faceplate screws
        10. Extension rings shall be reversible, allowing them to be mounted in multiple orientations
    1. 5” Steel Square Boxes
       1. Basis of Design – Preferred Manufacturer:

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* + - 1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Outside dimensions shall be 5” (127mm) wide x 5” (127mm) high and 2-7/8” (73mm) deep.
         2. Box volume shall be 67 cubic inches (1097.93 CM3)
         3. Box construction shall be welded at 14 points (minimum)
         4. Mounting/Attachment Features:

For Cut-In Mounting: 2 holes (0.16 in (4.0 mm) diameter) on each side

For Back Support Mounting: 2 holes (0.266 in (6.75 mm)) on back

For Box Support Bracket Installation: 4 tabs with tapped holes (8-32) on front of box with 2-¾ in (69.85 mm) between both sets of plate mounting screws.

* + 1. Switch Boxes
       1. Basis of Design – Preferred Manufacturer:

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         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall have notched ears to provide clearance for screws when attaching switches
    1. Ceiling Fan and Light Fixture Boxes and Bar Hangers
       1. Basis of Design – Preferred Manufacturer:

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* + - 1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall have a fixture weight limit rating of 50 lbs. at 24” and 90 lbs. at 16” appropriate for the desired end use requirements
         2. Shall have a UL Listed rating of 35 or 70 pounds depending on the style and span
         3. Bar hangers shall be expandable from 16” to 24”
  1. **IRON, ALUMINUM AND STAINLESS STEEL DEVICE BOXES AND COVERS**
     1. General Design and Performance Requirements
        1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
           1. UL514A (Standard for Metallic Outlet Boxes)
           2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
     2. Iron and Aluminum Device Boxes and Covers
        1. Basis of Design – Preferred Manufacturer:

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         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall be made from [iron alloy] [malleable iron] [copper-free aluminum] to meet application and certification requirements.
         2. Boxes shall be available with optional external and internal epoxy powder coat paint finish for additional corrosion protection
         3. Shall be provided with internal green ground screw
         4. Shall be manufactured with tapered NPT threaded hubs with integral bushing
         5. Shall be suitable for use in wet location when used with gasketed covers
         6. Shall be available [with mounting lugs for surface mounting] [without mounting lugs for flush mounting] to match customer preference
         7. Shall be available in both shallow and deep configurations to accommodate depths of devices to be enclosed.
         8. Shall be available in single-gang, multi-gang, and tandem-gang configurations with hubs, and as blank bodies for drilled and tapped openings
         9. Hot dip galvanized finish shall be available for added corrosion protection and durability
         10. Covers shall be constructed from [steel] [aluminum] [iron alloy] [malleable iron] to meet application and certification requirements.
         11. Covers shall be individually bagged and supplied with screws.
    1. Stainless steel Device Boxes and Covers
       1. Basis of Design – Preferred Manufacturer:

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         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall be constructed from 316 stainless steel
         2. Shall be provided with internal green ground screw
         3. Shall be manufactured with tapered NPT threaded hubs with integral bushing
         4. Shall be raintight when installed with cover and gasket
         5. Covers shall be constructed from stainless steel and include gaskets and mounting screws
  1. **NON-METALLIC OUTLET BOXES AND COVERS**
     1. PVC Ceiling and Ceiling Fan Boxes
        1. Basis of Design – Preferred Manufacturer:

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         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall be constructed from heavy-duty polyvinyl chloride compound (PVC)
         2. PVC ceiling boxes shall have a fixture weight limit rating of 50 lbs.
         3. PVC ceiling fan boxes shall be suitable for supporting fans weighing up to 35 lbs.
         4. Box entry points shall provide integral wire clamps, eliminating requirement to mechanically secure wire to box
  1. **WHILE-IN-USE AND WEATHERPROOF BOXES AND COVERS**
     1. While-In Use Boxes and Covers
        1. Basis of Design – Preferred Manufacturer:

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         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall be rated Extra Duty in accordance with NEC section 406.9(B)
         2. Shall be constructed from [UV-rated polycarbonate] [die-case aluminum]
         3. Shall be NEMA 3R rated when cover is closed
         4. Shall be designed with ball-joint corner hinge or other mechanism that allows box to be vertically or horizontally mounted without disassembly
         5. Shall be available in multiple colors, including gray, transparent gray, white and bronze
         6. Shall be available in a low profile design that eliminates cord bending when plugged into device and cover closed
         7. Shall be available in single gang and double gang configurations
         8. Shall be provided with adapters for installing decorator and GFCI devices, duplex receptacles, switches and round receptacles
         9. Cover shall provide means for locking to eliminate unauthorized access to internal devices
    1. Weatherproof Boxes and Covers
       1. Basis of Design – Preferred Manufacturer:

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* + - 1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Boxes and covers shall be constructed from die cast aluminum and include a powder paint finish as standard
         2. Weatherproof boxes and covers shall have a NEMA 3R rating
         3. Shall be manufactured with tapered NPT threaded hubs
         4. Boxes shall include a pre-installed ground screw
         5. Boxes shall include mounting hardware, lugs and closure plugs
         6. Boxes shall be available in single gang, two-gang and round configurations
         7. All covers shall be self-closing with gaskets to provide weatherproof protection when device not in use
    1. Wet Location Covers
       1. Basis of Design – Preferred Manufacturer:

The listing of manufacturers below does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed below are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer prior to bid date.

* + - 1. Preferred Manufacturers: Subject to compliance with these specification requirements, provide products by the following:
         1. Eaton Crouse-Hinds series
         2. Engineer-approved equal
      2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following:
         1. UL514A (Standard for Metallic Outlet Boxes)
         2. UL514D (Cover Plates for Flush-Mounted Wiring Devices)
      3. Standard Features:
         1. Shall comply with NEMA standards WD-1 (straight blade) and WD-5, 1982 (locking type)
         2. Shall be constructed from die cast copper-free aluminum
         3. Cover hinge spring shall be stainless steel for durability and resistance to corrosion
         4. Covers shall be self-closing to provide protection of wiring devices at all times
         5. One-piece, integral gasket to be provided with cover for environmental protection

**PART 3 EXECUTION**

* 1. **GENERAL INSTALLATION**
     1. Installation shall be in accordance with NEC Article 314, CEC and any local codes and manufacturer’s instructions.
     2. Conductor Material Applications
        1. Branch Circuits: Copper. Solid for [No. 10] [No. 12] AWG and smaller; stranded for [No. 8] [No. 10] AWG and larger, except VFC cable, which shall be extra flexible stranded.
     3. Installation of Conductors and Cables
        1. Typical units are to be installed in an identical manner (where possible).
        2. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
        3. Cable shall be pre-connected to assembly in factory prior to shipment to jobsite.
        4. Cable shall be connected to box such that flanges of MC cable shall pull easily through pre-drilled studs.
        5. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems”.
     4. Connections
        1. Neutral and ground wires shall be terminated to devices in the production facility. “Hot” wires shall be field terminated
        2. Make splices, terminations, and taps that are compatible with conductor material [and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors].
        3. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack

**3.02 PRE-FABRICATED ASSEMBLIES INSTALLATION**

* + 1. Identification of Pre-fabricated Boxes and Assemblies (Ruff-IN™)
       1. Manufacturer shall provide adhesive label connected to each assembly containing the following information:
          1. Job Name
          2. Room Number
          3. Device Number
          4. Device Fed From
          5. Wire Type
          6. Assembly Cable Type, Length, and Path
          7. Assembly Mounting Height
          8. Circuit ID
          9. Wire Color
          10. Device Style
          11. UL Listing
    2. Installation of Pre-fabricated Boxes and Assemblies (Ruff-IN™)
       1. Equipment shall be installed and handled in accordance with the manufacturer’s recommendations contained provided installation and maintenance sheet
       2. Remove assembly from shipping carton and perform visual checks to make sure components have not been loosened or damaged during shipping.
       3. Refer to shop drawing for installation locations, wiring, etc.
       4. After visually inspecting framing members (previously inspected by AHJ) to be sure they are properly constructed, using #8 x 3/4" long self-tapping screws (or similar) screw assembly to framing member - using at least two (2) screws in each framing member. Assemblies may be mounted in various configurations dependent on bracket type. Assemblies can be mounted between framing members, directly to a framing member, or mounted on a "stud-rail" near the floor using a "kick-in" type bracket. Verify that mounting to framing member is as intended based on bracket type.

1. If cable is attached to assembly, cut binding tie and unroll cable. Perform visual inspection of cable and connector to make sure components have not been loosened or damaged during shipping.
2. Install cable through framing members to appropriate assembly, light fixture, equipment, etc. Support appropriately in accordance with N.E.C and AHJ requirements.
3. Connect wires as branch circuitry as required per plans and in accordance with N.E.C. and AHJ requirements using UL listed wire connectors. Ensure that device(s) and junction box are properly bonded per N.E.C. and AHJ requirements.
4. Perform visual inspection of entire assembly and cable(s) to ensure they are properly installed and fastened to framing members.
   * 1. Field Quality Control
        1. Perform the following tests and inspections
           1. Wire terminations shall be tested in production facility prior to shipment to job-site.
           2. Perform visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.