

University of Houston Master Specification

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SECTION 26 0534 - ELECTRICAL BOXES

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

This Section uses the term "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts, State of Texas*, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide electrical box and fitting work as shown, scheduled, indicated, and as specified.
- B. Types: The types of electrical boxes and fittings required for the project include, but are not limited to, the following:
 - 1. Outlet boxes.
 - 2. Junction boxes.
 - 3. Pull boxes.
 - 4. Cabinets.
 - 5. Floor boxes.
 - 6. Fire-rated poke-thru boxes.
 - 7. Conduit bodies.
 - 8. Bushings.
 - 9. Locknuts.

1.3 STANDARDS

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- A. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
1. ANSI/NEMA OS 1 -Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
 2. UL 514A Metallic Outlet Boxes.
 3. NEMA 250 -Enclosures for Electrical Equipment (1000 Volts Maximum).
- 1.4 QUALITY ASSURANCE:
- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
1. Interior Outlet Boxes:
 - a. Appleton Electric Company.
 - b. Bowers.
 - c. O. Z./Gedney.
 - d. National Electric Products Company.
 - e. Raco; Hubbell
 - f. Star Sheet Metal.
 - g. Steel City; ABB Group.
 2. Weatherproof Outlet Boxes:
 - a. Appleton Electric Company.
 - b. Crouse-Hinds Company.
 - c. Raco; Hubbell, Inc.
 - d. Pyle-National Company.
 - e. Red Dot.
 3. Junction and Pull Boxes:
 - a. Appleton Electric Company.
 - b. Arrow-Hart, Inc.
 - c. O. Z. Gedney Company.
 - d. Hoffman Engineering Company.
 - e. Keystone Columbia, Inc.
 - f. Square D Company.
 - g. Unity.
 4. Cabinets:
 - a. Hoffman Engineering Company
 - b. Square D Company.
 5. Floor Boxes:
 - a. Hubbell, Inc., Hubbell Wiring Systems.
 - b. Steel City ABB Group.
 - c. Legrand-Wiremold.
 6. Fire-rated Poke-thru Boxes:

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- a. Hubbell, Inc.; Hubbell Wiring Systems
 - b. Steel City ABB Group.
 - c. Legrand-Wiremold.
 7. Conduit Bodies:
 - a. Appleton Electric Company.
 - b. Crouse-Hinds Company.
 - c. Killark Electric Manufacturing Company.
 - d. Pyle-National Company.
 8. Bushings, Knockout Closures and Locknuts:
 - a. Allen-Stevens Conduit Fittings Corporation.
 - b. Allied Metal Stamping, Inc.
 - c. Appleton Electric Company.
 - d. Carr Company.
 - e. Raco; Hubbell
 - f. Steel City ABB Group.
 - g. Thomas and Betts Company, Inc.
 - B. UL Label: All electrical boxes and fittings shall be UL-labeled.
- 1.5 SUBMITTALS
- A. Shop Drawing submittals shall include, but not be limited to, the following:
 1. The Contractor shall submit to the Engineer for review, a list of proposed manufacturers of electrical boxes and fittings selected from the manufacturers listed herein. The Contractor may install electrical boxes and fittings furnished by any manufacturer listed on the approved submittal.
 2. Cut sheets of electrical boxes and fittings.
 3. Cut sheets on cabinets.
 4. Drawings of any special boxes which must be fabricated, including construction details.
 5. Additional information as required in Section 26 0001 "Electrical General Provisions".
- 1.6 STORAGE AND HANDLING
- A. Handle electrical boxes and fittings carefully to avoid damage, breaking, denting, and scoring. Damaged equipment or materials shall not be installed.
 - B. Store electrical boxes and fittings in a clean dry space and protect from weather.
- PART 2 - PRODUCTS
- 2.1 FABRICATED MATERIALS
- A. Interior Outlet Boxes: Provide galvanized steel interior outlet wiring boxes, of the type, shape, and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Provide "gang" boxes where devices are shown to be grouped.
 1. Type for Various Locations:

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- a. Ceilings: 4 inches square, 2-1/8 inches deep.
 - b. Standard Partitions, Where 1/2 inch and 3/4 inch Conduits are employed: 4 inch square by 2-1/8 inches deep boxes with one-gang or two-gang plaster covers shall be used.
 - c. Thin Partitions Measuring 3-1/2 inches or less: 4 inch square by 2-1/8 inches deep boxes with one-gang or two-gang covers shall be used.
 - d. Standard Partitions, Where Conduits of a Size Greater than 3/4 inch are employed: 4-11/16 inches square by 2-1/8 inches deep boxes with one-gang or two-gang plaster covers shall be used.
 - e. Masonry Walls: Galvanized switch boxes made especially for masonry installations; depths of boxes must be properly coordinated for each specific installation.
 - f. Poured Concrete: Provide plenum type boxes without any holes and with reset knockouts. Where extension rings are used to offset conduit between wall reinforcing steel, joint between extension ring and box shall be sealed to prevent concrete from entering box during pour.
 - g. Return Air Ceiling Plenum Boxes: In return air ceiling plenums, where 1/2 inch and 3/4 inch conduits are employed, 4 inches square by 2-1/8 inches deep plenum boxes shall be used.
 - h. Surface: Type "FS" or Type "FD" box with surface cover.
 - i. Special: Where above types are not suitable, furnish boxes to suit the use taking into account space available, appearance, and Code requirements.
2. Switch Boxes:
- a. One-gang/Two-gang Switch Boxes in Standard Walls or Partitions: If able to mount to stud, then 4 inch x 4 inch x 2 1/8 inches; if not, shall be 3 inches x 2 inches square corner boxes by 2-1/2 inches deep with appropriate mounting bracket for attachment to studs.
 - b. One-gang/Two-gang Switch Boxes in Thin Walls or Partitions: If able to mount to stud, then 4 inches x 4 inches x 1 1/2 inch, if not shall be 3 inches x 2 inches square corner boxes by 1-1/2 inches deep with appropriate mounting bracket for attachment to studs.
 - c. Three-gang and Up Switch Boxes in Standard Walls or Partitions: Shall be 4-1/2 inches wide solid gang boxes, with appropriate "gang" plaster covers as required.
3. Interior Outlet Box Accessories: Provide outlet box accessories as required for each installation, including proper covers or wall device plates, mounting brackets, wallboard hangers, extension rings, plaster rings for all boxes in plaster construction, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used, and meeting requirements of individual wiring situations.
- B. Weatherproof Outlet Boxes: Provide hot-dipped galvanized cast iron weatherproof outlet wiring boxes, of the type, shape, and size, including depth of box, with threaded conduit ends, cast metal cover plate with spring-hinged waterproof caps suitably configured for each application, including face plate gasket and corrosion resistant fasteners.

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- C. Junction and Pull Boxes: Provide galvanized sheet steel junction and pull boxes, with screw-on covers and welded seams with stainless steel nuts, bolts, screws and washers, of the type, shape, and size, to suit each respective location and installation.
1. Type for Various Locations:
 - a. 100 Cubic Inches in Volume or Smaller: Standard outlet boxes with NO stamped knockouts.
 - b. 150 Cubic Inches in Volume or Larger: Code gauge steel with sides formed and welded, screw covers unless shown to have hinged doors. Hinged doors with locking device same as furnished on panelboards. Formed in field with a cutting tool to provide a clean symmetrically-cut hole.
 - c. Exterior or Wet Areas: Weatherproof galvanized or stainless steel construction with proper gaskets and corrosion resistant fasteners. A parking garage is considered a wet area.
- D. Cabinets: Provide cabinets of size and style noted on the Drawings.
1. Cabinet fronts shall be steel. Other sheet metal for boxes shall be galvanized or stainless steel. Details of construction and methods of assembly shall meet the requirements of the Underwriters' Laboratories, Inc.
 2. The panel doors of cabinets shall be provided with locks. Single panel doors of cabinets shall have a lock with ring pull. Single doors 48 inches or longer and pairs of doors shall have a lock with vertical bolt operation, 3-point locking. Locks shall be keyed alike. Two keys shall be supplied for each cabinet.
 3. Cabinets shall have concealed hinges.
 4. Flush-mounted trim shall be fastened to cabinet with adjustable trim clamps. Fasteners for cabinets in concealed areas shall be concealed, and cabinet doors shall be hinged type.
 5. Each voice/data cabinet shall be equipped with 3/4 inch plywood backboard covering entire inside rear surface and painted matte white with fire resistant paint.
 6. Trims and doors shall have a suitable primer coat and a finish coat of the manufacturer's standard color.
- E. Floor Boxes: Provide fully adjustable floor boxes for installation in concrete floors as indicated. Boxes shall be adjustable both before and after the concrete pour. Unless otherwise noted on the Drawings, provide the following:

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1. Waterproof Membrane Floors - Flush Boxes: Concrete tight cast iron floor box with brass trim and service fittings to suit device shown and floor finish.
 2. Non-waterproof Membrane Floors (Above Grade) - Flush Boxes: Concrete tight steel floor box with brass trim and service fittings to suit device shown and floor finish.
- F. Fire-rated Poke-Thru Boxes: Fire-rated, UL-listed poke-thru boxes for installation through concrete slabs. Boxes shall be suitable for the slab thickness of the building and shall have UL-listed abandon plates for use where boxes are removed. Provide poke-thru boxes to suit devices shown and as scheduled **[below:] [on the Drawings.]**

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- G. Conduit Bodies: Provide galvanized cast Malleable Iron Form 7, clip on gasket covers conduit bodies, of the type, shape and size, to suit each respective location and installation, constructed with threaded conduit ends, removable cover, and corrosion resistant screws.
- H. Bushings, Knockout Closures, and Locknuts: Provide corrosion resistant no stamp knockouts, box knockout closures, conduit locknuts, gasketed locknuts, insulated conduit bushings and insulated grounding conduit bushings of the type and size to suit each respective use and installation.

PART 3 - EXECUTION

3.1 INSTALLATION OF BOXES AND FITTINGS

- A. Install electrical boxes and fittings as shown, in compliance with NEC requirements, these specifications, or in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that the boxes and fittings serve the intended purposes. Where boxes are concealed in exterior walls, the continuity of the vapor barrier shall be maintained behind the box.
- B. Use outlet and switch boxes for junctions on concealed conduit systems except in utility areas where exposed junction or pull boxes may be located.
- C. Determine from the Drawings and by actual determination on the site, the exact location of each outlet. The outlet locations shall be modified from those shown to accommodate changes in door swings or to clear other interferences that may arise from job construction details, as well as modification to center them within room spaces. These modifications shall be made with no change in contract price and shall be a matter of job coordination. Check these conditions throughout the entire job and notify the Engineer of discrepancies, as they may occur, to verify the modifications, if any, before proceeding with the installation of the work. Set wall boxes in advance of wall construction, blocked in place and secured. Set all wall boxes flush with the finish and install extension rings as required to extend boxes to the finished surfaces of special furring or wall finishes.
- D. Install outlet boxes at heights as specified in Section 26 0501 "Electrical Basic Materials and Methods".
- E. On exposed conduit systems, provide pull boxes, junction boxes, wiring troughs, and cabinets wherever necessary for proper installation of various electrical systems.
- F. Provide weatherproof boxes for interior and exterior locations exposed to weather or moisture.
- G. Provide knockout closures to cap unused knockout holes where blanks have been removed. Maintain 48 inches minimum clearance in front of branch box circuitry.
- H. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring. Never set junction boxes above lights on lay-in ceilings.
- I. Secure boxes rigidly to the substrate upon which they are being mounted, or solidly imbed boxes in concrete or masonry. Boxes shall not be permitted to move laterally. Boxes shall be secured between two studs. Two gang (single or double device) boxes may be connected to one stud using an approved bracket, except where specific dimensioned locations must be met. Box recessing depths shall comply with Article 314.24 of the National Electrical Code.
- J. Boxes for any conduit system shall not be secured to the ceiling system, HVAC ductwork, or mechanical piping.

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- K. Provide junction and pull boxes for feeders and branch circuits where shown and where required by the NEC, regardless of whether boxes are shown or not.
- L. Coordinate locations of boxes in fire rated partitions and slabs so as to not affect the fire rating of the partition or slab. Notify the Engineer in writing where modifications or additional construction are required to maintain the partition or slab fire rating.
- M. All junction boxes in accessible locations shall be marked with a permanent marker to identify the circuit(s) including voltage level within the box and on box cover.
- N. Junction boxes utilized for emergency circuits shall be painted red in color.
- O. Do not locate wall outlet boxes back-to-back in the same stud wall cavity. Ensure that communications and electrical outlet boxes are placed at least one stud or 16 inches apart when located on opposite sides of a partition wall.
- P. The following requirements shall apply to exposed as well as concealed conduit systems when "gang" boxes shall be used. These "gang" boxes shall have dimensions which are not smaller than those shown in the following table:

<u>NUMBER IN GANG</u>	<u>SIZE</u>
3	4-1/2 inches by 8-5/8 inches
4	4-1/2 inches by 10-1/2 inches
5	4-1/2 inches by 10-1/2 inches
6	4-1/2 inches by 14 inches

- Q. Switch boxes shall not be used as junction boxes. They should only contain the wiring pertaining to the circuit.
- R. Install boxes in walls without damaging wall insulation.
- S. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- T. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
- U. Outlet boxes supporting fixtures shall be securely anchored in place in an approved manner. Support outlet boxes and fixtures in acoustic ceiling areas from building structures, not from acoustic ceilings. Light fixture outlets shall be coordinated with mechanical and architectural equipment and elements to eliminate conflicts and provide a workable neat installation. Also, stabilize box hanger with use of caddy T-bar.
- V. Set floor boxes level and flush with floor. Install nonrated floor boxes as detailed on the Drawings.
- W. Locate pull boxes and junction boxes in easily accessible area, above accessible ceilings or in unfinished areas.
- X. Where outlet or switch boxes are not supported from studs or joists directly, they shall be supported by expandable clip type bar hangers, Appleton Catalog No. SX-18 or SX-26. In no case shall conduit be used to support switch or outlet boxes or caddy adjustable box bracket.
- Y. Outlet boxes in plaster partitions shall be "shallow-type" set flush in wall so there is at least 5/8 inch plaster covering back of box. 4 inches x 4 inches x 2 1/8 inches or 1 1/2 inches depending on depth.

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- Z. Refer to Section 26 0553 "Identification for Electrical Systems" for applicable painting and marking of electrical boxes.

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