

University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

SECTION 26 2717 - EQUIPMENT WIRING

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: The extent of electrical connections for equipment is as shown and scheduled, as indicated by the requirements of this Section, and as specified elsewhere in these Specifications.
- B. Types: The types of electrical connections required for the project include, but are not limited to, the following:
 - 1. Motors and equipment power connections.
 - 2. Kitchen equipment power connections.
 - 3. Contractor and Owner-furnished equipment power connections.
 - 4. Miscellaneous control power connections.
 - 5. Other equipment requiring power connections.
- C. Work of Other Sections:
 - 1. Refer to Section 26 2718 "Miscellaneous Electrical Controls and Control Wiring", for miscellaneous electrical controls and control wiring information.
 - 2. Refer to other Divisions of these Specifications for specific individual equipment electrical requirements.

1.3 QUALITY ASSURANCE

<Insert A/E Name>

AE Project #: <Insert Project Number>

Equipment Wiring
UH Master: 08.2020

26 2717 - 1

University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
 - 1. AMP, Inc.
 - 2. Burndy Corporation.
 - 3. Cadweld.
 - 4. Buchanan
 - 5. O. Z. Gedney Company.
 - 6. Ideal Industries, Inc.
 - 7. Mac Products, Inc.
 - 8. Minnesota Mining and Manufacturing Company (3M).
 - 9. Thomas & Betts Company.
- B. UL Label: All products shall be UL-labeled to the maximum extent possible.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. General: For each electrical connection indicated, provide a complete assembly of materials, including, but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete splices and terminations.
- B. Raceways: Refer to Sections 26 0533 "Electrical Raceways" and 26 0534 "Electrical Boxes."
- C. Cable, Wire, and Connectors: Refer to Section 26 0519 "Insulated Conductors, Cables, Wires and Terminations."
- D. Motor Starters and Safety Switches: Refer to Section 26 2913 "Enclosed Motor Controllers"
- E. Terminals: Provide electrical terminals as instructed by the terminal manufacturer for the intended application.

PART 3 - EXECUTION

3.1 MOTOR AND EQUIPMENT POWER CONNECTIONS

- A. All power connections to motors and equipment furnished by other Divisions shall be made by this Division unless noted otherwise on the Drawings. This Division shall provide and install all power wiring and shall make all final connections.
- B. Refer to the Drawings, approved Shop Drawings and other applicable Divisions for required power connections to equipment and motors.
- C. All motorized or electrically operated equipment will be set in place by the furnishing Division with all integrally mounted starters, controls and disconnect switches installed. The furnishing Division will furnish for installation and connection to this Division all starters, controllers and disconnect switches which are furnished with their equipment but not integrally mounted.
- D. This Division shall furnish, install, and connect all required starters and disconnect switches which are not provided with the served equipment. Where disconnect switches are not

<Insert A/E Name>

AE Project #: <Insert Project Number>

Equipment Wiring

UH Master: 08.2020

26 2717 - 2

University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

provided with served equipment and are required by the NEC or the local inspection department, then they shall be provided by the Electrical Contractor.

- E. This Division shall furnish and install all interconnecting power wiring and make all connections ready for operation between motors, starters and control devices, as required by wiring diagrams (on approved Shop Drawings) provided by the Division furnishing the Equipment.
- F. Unless otherwise indicated or specified, motors 1/2 hp and smaller shall be 120 or 277 volt, single phase, and shall be furnished with integral thermal overload protection. Provide manual disconnect switches as required. Where motors are not furnished with integral thermal overload protection, provide manual or magnetic starters as required.
- G. Unless otherwise indicated or specified, motors 3/4 hp size and larger shall be 480 VAC 3-phase.
- H. Motors 3/4 hp through 50 hp shall be furnished with "across-the-line", full-voltage non-reversing (FVNR) magnetic starters, unless otherwise indicated or specified.
- I. Motors 60 hp and larger shall be furnished with reduced voltage non-reversing (RVNR) magnetic starters of the type indicated.
- J. Where starters require disconnect switches in the immediate vicinity, combination motor starters shall be used. Where starters are mounted on equipment served, the switch shall not inhibit removal of any service panels or interfere with any required access areas.
- K. Motors that are being controlled by VFD's shall be powered via cables that are VFD rated. The motor shall be inverter duty rated. The VFD at a minimum shall be an 18 pulse drive to minimize the harmonics generated by the drive.

3.2 KITCHEN EQUIPMENT POWER CONNECTIONS

- A. All power connections to kitchen equipment furnished by under other Divisions shall be made by this Division unless noted otherwise on the Drawings. This Division shall provide and install all power wiring and shall make all final connections.
- B. Refer to the Drawings, approved Shop Drawings and other applicable Divisions, for required power connections to equipment and motors.
- C. All kitchen equipment will be set in place by the furnishing Division with all integrally mounted starters, controls and disconnect switches installed. The furnishing Division will furnish for installation and connection to this Division all starters, controllers and disconnect switches which are furnished with their equipment but not integrally mounted.
- D. This Division shall furnish, install and connect all required starters and disconnect switches which are not provided with the served equipment. Where disconnect switches are not provided with served equipment and are required by the NEC or the local inspection department, then they shall be provided by the Electrical Contractor.
- E. This Division shall furnish and install all interconnecting power wiring and make all connections ready for operation between equipment, starters and control devices, as required by wiring diagrams (on approved Shop Drawings) provided by the other Divisions.
- F. All connections to kitchen equipment shall be weatherproof. All flexible connections shall be made using liquidtight flexible conduit. All boxes for hardwired connections shall be gasketed FS type. All starters and safety switches installed in the kitchen area shall have NEMA 4 stainless steel enclosures.

<Insert A/E Name>

AE Project #: <Insert Project Number>

Equipment Wiring
UH Master: 08.2020

26 2717 - 3

University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- G. Where starters, disconnect switches, conduit boxes or other items are mounted directly on the equipment served, the mounting location shall not inhibit removal of any required service panels or interfere with any required access areas.
- H. All receptacles mounted below counter height or in wet areas shall have weatherproof coverplates.
- I. Plug types on cord connected equipment shall be coordinated with the receptacle to provide compatibility. Where the installed plug and receptacle are not compatible, then this contractor shall be responsible for changing either the plug or receptacle as required for compatibility.
- J. All conduits shall terminate in conduit boxes on equipment or wiring compartment. A piece of liquidtight flexible conduit not less than 24 inches long, shall be connected between the conduit and the equipment. Where equipment is not provided with conduit boxes, terminate the conduit in a suitable manner at the equipment.
- K. Outlets of various types have been shown at equipment locations, but no indications of exact locations or scope of work is intended on the accompanying Drawings. The Contractor shall determine the exact location of all items:
 - 1. From the applicable Drawings and Specifications and Shop Drawings of other Divisions.
 - 2. From the Contractors responsible for the equipment involved.
 - 3. By actual measurements at the site.
 - 4. From Other Divisions.
 - 5. By direction from the Owner.
- L. Prior to installation, coordinate power and control provisions for kitchen equipment with approved kitchen equipment shop drawings. Where power and control provisions are significantly different than those shown, notify the Engineer in writing of the requirements. Where minor modifications to provisions are required, they shall be made at no cost as a matter of job coordination.

3.3 CONTRACTOR AND OWNER-FURNISHED EQUIPMENT POWER CONNECTIONS

- A. All power connections to motors and equipment furnished by other Divisions or by Owner shall be made by this Division unless noted otherwise on the Drawings. This Division shall provide and install all power wiring and shall make all final connections.
- B. Refer to the Drawings, approved Shop Drawings, other applicable Divisions and Owner-furnished equipment drawings for required power connections to equipment and motors.
- C. All motorized or electrically operated equipment will be set in place by the furnishing Division with all integrally mounted starters, controls, and disconnect switches installed. The furnishing Division will furnish for installation and connection to this Division all starters, controllers, and disconnect switches which are furnished with their equipment but not integrally mounted.
- D. This Division shall furnish, install, and connect all required starters and disconnect switches which are not provided with the served equipment. Where disconnect switches are not provided with served equipment and are required by the NEC or the local inspection department, then they shall be provided by the Electrical Contractor.

<Insert A/E Name>

AE Project #: <Insert Project Number>

Equipment Wiring

UH Master: 08.2020

26 2717 - 4

University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- E. This Division shall furnish and install all interconnecting power wiring and make all connections ready for operation between equipment, starters and control devices, as required by wiring diagrams (on approved Shop Drawings) provided by the Division furnishing the Equipment.
- F. All connections to Contractor and Owner-furnished equipment shall be made in a suitable manner.
- G. Plug types on cord connected equipment shall be coordinated with the receptacle to provide compatibility. Where the installed plug and receptacle are not compatible, then this contractor shall be responsible for changing either the plug or receptacle as required for compatibility.
- H. Where starters, disconnect switches, conduit boxes, or other items are mounted directly on the equipment served, the mounting location shall not inhibit removal of any required service panels or interfere with any required access areas.
- I. All conduits shall terminate in conduit boxes on equipment in wire compartment. A piece of flexible or liquidtight flexible conduit (Refer to Section 26 0533 "Electrical Raceways") 24 inches long shall be connected between the conduit and the equipment. Where equipment is not provided with conduit boxes, terminate the conduit in a suitable manner at the equipment.
- J. Outlets of various types have been shown at equipment locations, but no indications of exact locations or scope of work is intended on the accompanying Drawings. The Contractor shall determine the exact location of all items:
 - 1. From the applicable Drawings and Specifications and Shop Drawings of the Divisions furnishing the equipment.
 - 2. From the Contractors responsible for the equipment involved.
 - 3. By actual measurements at the site.
 - 4. By direction from the Owner.
- K. Prior to installation, coordinate power, rough-in and control provisions shown on the drawings for radiology equipment with the provisions shown on approved Shop Drawings for the furnished radiology equipment. Where the power, rough-in and control requirements are less than or equal to those shown, then modifications to power, rough-in and control provisions shown shall be made at no cost as a matter of job coordination. Where power and control requirements are in excess of those shown, notify the Engineer in writing of the requirements.
- L. Prior to installation, coordinate power and control provisions for Contractor and Owner-furnished equipment with approved equipment shop drawings. Where power and control provisions are significantly different than those shown, notify the Engineer in writing of the requirements. Where minor modifications to provisions are required, they shall be made at no cost as a matter of job coordination.

3.4 INSTALLATION OF ELECTRICAL CONNECTIONS

- A. General: Install electrical connections as shown, in accordance with applicable portions of the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended functions.

<Insert A/E Name>

AE Project #: <Insert Project Number>

Equipment Wiring
UH Master: 08.2020

26 2717 - 5

University of Houston Master Specification

<Insert Project Name>

<Insert Issue Name>

<Insert U of H Proj #>

<Insert Issue Date>

- B. Conductors: Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Wherever possible, match conductors of the electrical connection for proper interface between the electrical supply and the installed equipment.
- C. Splice Insulation: Cover splices with electrical insulation equivalent to, or of a higher rating than, insulation on the conductors being spliced.
- D. Appearance: Prepare cables and wires by properly cutting and stripping covering, jacket and insulation to ensure a uniform and neat appearance where cables and wires are terminated.
- E. Routing: Trim cables and wires to be as short as practicable and arrange routing to facilitate inspection, testing, and maintenance.
- F. Polyvinyl Chloride (PVC) Coated Conduit: Provide PVC-coated rigid steel conduit and fittings where required for highly-corrosive atmospheres.
- G. Flexible Conduit: Provide flexible conduit, minimum 18 inches for connection of lighting fixtures and other electrical equipment connections, where subject to movement and vibration.
- H. Liquidtight Conduit: Provide liquidtight flexible conduit, minimum 18 inches/maximum 36 inches for connection of all motors and for other electrical equipment where subject to movement and vibration, and also where subjected to one or more of the following conditions:
 - 1. Exterior location.
 - 2. Moist or humid atmosphere where condensate can be expected to accumulate.
 - 3. Corrosive atmosphere.
 - 4. Subjected to water spray.
 - 5. Subjected to dripping oil, grease, or water.
 - 6. Kitchens.
- I. Conduit Location: All horizontal runs of conduit (not strapped to walls) shall be at a minimum 8 feet above finish floor, with a vertical drop to equipment. Conduit blocking walk and service space will not be acceptable and will require relocation. Conduit on and adjacent to equipment shall be located to allow free access to all removable panels for equipment service.
- J. Motor Connections: Where possible, terminate conduit in motor junction box as supplied if not motor junction box is installed, terminate conduit in conduit boxes at motors. All conduit passing through the housing on connected equipment shall pass through a cleanly cut hole protected with an approved grommet.
- K. Coordination: Coordinate installation of electrical connections for equipment with equipment installation work.
- L. Identification: Refer to Section 26 0553 "Identification for Electrical Systems" for identification of electrical power supply conductor terminations with markers approved as to type, color, letter, and marker size by the [Engineer] [Architect]. Affix markers at each point of termination, as close as possible to each point of connection.

END OF SECTION 26 2717

<Insert A/E Name>

AE Project #: <Insert Project Number>

Equipment Wiring

UH Master: 08.2020

26 2717 - 6