

SECTION 15030 – ELECTRICAL PROVISIONS OF MECHANICAL WORK

Project Number 14-5006-39

Project Title Kansas City Area Transportation Authority
Service Line Reversal (FOR INFORMATION ONLY)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to Work of this Section.
- B. This Section is a Division 15 Basic Mechanical Requirements Section, and is a part of each Division 15 section making reference to mechanical related Work specified herein.

1.2 DESCRIPTION OF WORK:

- A. Electrical provisions to be provided as mechanical Work is indicated in other Division 15 Sections, on drawings, and as specified in this Section.
- B. Types of Work normally recognized as electrical but provided as mechanical, specified or partially specified in this Section, include but are not necessarily limited to the following:
 - 1. Motors for mechanical equipment.
 - 2. Starters for motors of mechanical equipment.
 - 3. Wiring from motors to disconnect switches or junction boxes for motors of mechanical equipment, but only where specifically indicated to be furnished integrally with equipment.
 - 4. Wiring of field-mounted float control switches, flow control switches, and similar mechanical- electrical devices provided for mechanical systems, to equipment control panels.
- C. Refer to other Division 15 Sections for control system wiring.
- D. Refer to other Division 15 Sections for specific individual mechanical equipment electrical requirements.
- E. Refer to Division 16 Sections for junction boxes, disconnect switches, and cable/conductors required for motors and other electrical units of mechanical equipment where not indicated to be provided with mechanical equipment.

1.3 QUALITY ASSURANCE:

- A. Coordination with Electrical Work: Wherever possible, match elements of electrical provisions of mechanical Work with similar elements of electrical Work specified in Division 16 Sections. Comply with applicable requirements of Division 16 Sections for electrical Work of this Section which is not otherwise specified.
- B. Standards: For electrical equipment and products, comply with applicable NEMA standards, and refer to NEMA standards for definitions of terminology herein. Comply with National Electrical Code (NFPA 70) for workmanship and installation requirements.

1.4 SUBMITTALS:

- A. Listing, Motors of Mechanical Work: Concurrently with submittal of mechanical products listing (Basic Mechanical and Division 1 requirements), submit separate listing showing rating, power characteristics, application (connected equipment), and general location of every motor to be provided with mechanical Work. Submit updated information promptly when initial data is revised.
 - 1. Include in listing of motors, notation of whether motor starter is furnished or installed integrally with motor or equipment containing motor.
 - 2. Submit manufacturer data for all starters including starter accessories.
- B. Whenever the motors furnished by this Contractor exceed the scheduled amperage rating of the listed nominal horsepower, this Contractor shall be responsible for the increase in size required for wire, conduit, breakers, starters, fuses, and disconnects, and shall reimburse the Electrical Contractor for this cost.

PART 2 - PRODUCTS

2.1 MOTORS:

- A. Manufacturers: Except where an item of mechanical equipment (which otherwise complies with requirements) must be integrally equipped with motor produced by another manufacturer, provide motors for mechanical equipment manufactured by one of the following:
 - 1. Allis-Chalmers Corp.
 - 2. Baldor Electric Co.
 - 3. Century Electric Div., Inc.
 - 4. General Electric Co.
 - 5. Gould
 - 6. Marathon Electric Mfg. Corp.
 - 7. Reliance Electric Co.
 - 8. Westinghouse Electric Corp.
- B. Motor Characteristics: Except where more stringent requirements are indicated, and except where required item of mechanical equipment cannot be obtained with fully complying motor, comply with the following requirements for motors of mechanical Work:

1. Temperature Rating: Rated for 40°C environment with maximum 50°C temperature rise for continuous duty at full load (Class A Insulation).
 2. Starting Capability: Provide each motor capable of making starts as frequently as indicated by automatic control system, and not less than 5 starts per hour for manually controlled motors.
- C. Phases and Current Characteristics: Furnish squirrel-cage induction polyphase motors for 1/2 HP and larger. Furnish capacitor-start single-phase motors for 1/3 HP and smaller, except 1/6 HP and smaller may be split-phase type. Coordinate electrical characteristics with power indicated on electrical drawings, and with individual equipment requirements.
- D. Service Factor:
1. Open drip proof - 1.15 for polyphase motors and 1.35 for single-phase motors.
 2. TEFC - 1.0 for both single and polyphase.
 3. Explosion proof - 1.15 for polyphase, 1.0 for single phase.
- E. Motor Construction: Provide general purpose, continuous duty motors, Design "B" except "C" where required for high starting torque.
- F. Frames: NEMA No. 48.
- G. Bearings: Ball or roller bearings with inner and outer shaft seals, regreasable except permanently sealed where motor is normally inaccessible for regular maintenance. Where belt drives and other drives produce lateral or axial thrust in motor, provide bearings designed to resist thrust loading. Refer to individual Sections of Division 15 for fractional-hp light-duty motors where sleeve-type bearings are permitted.
- H. Enclosure Type: Except as otherwise indicated, provide open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation, and provide guarded drip-proof motors where exposed to contact by employees or building occupants. Provide weather-protected Type I for outdoor use, Type II where not housed. Refer to individual Sections of Division 15 for other enclosure requirements if any.
- I. Overload Protection: Provide built-in thermal overload protection and, where indicated, provide internal sensing device suitable for signaling and stopping motor at starter.
- J. Noise Rating: Provide "Quiet" rating on motors located in occupied spaces of building.
- K. Efficiency: All open drip-proof motors, 3/4 HP and above, except where noted otherwise, to be "Energy Efficient" with motors having minimum efficiency in accordance with IEEE Standard 112, test method B. Nominal motor efficiency shall be not less than the following:
- | | |
|---------------------|-----|
| 1. 3/4 and 1 HP | 80% |
| 2. 1½ through 5 HP | 85% |
| 3. 7½ through 15 HP | 90% |
| 4. 20 through 60 HP | 92% |
| 5. 75 HP and larger | 95% |

- L. Name Plate: Provide metal name plate on each motor, indicating full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

2.2 MOTOR STARTERS:

- A. Manufacturers: Except where item of mechanical equipment must be integrally furnished with motor starter produced by another manufacturer, provide motor starters for mechanical equipment manufactured by one of the following:
 - 1. Allen-Bradley Co.
 - 2. Cutler-Hammer, Inc.
 - 3. Furnas Co.
 - 4. General Electric Co.
 - 5. Square D Co.
 - 6. Westinghouse Electric Co.
- B. Motor Starter Characteristics: Comply with NEMA standards and NEC. Provide Type I general purpose enclosures with padlock ears, and with frames and supports for mounting on wall, floor or panel as indicated. Provide type and size of starter recommended by motor manufacturer and equipment manufacturer for applicable protection and start-up condition. Refer to individual equipment sections for basic load requirements.
 - 1. Fractional HP Manual Controllers: Provide single-phase fractional HP manual motor controllers, of sizes and ratings required. Provide controllers with manually operated quick-make, quick-break toggle mechanisms, and one-piece melting alloy type thermal units. Controllers shall become inoperative when thermal unit is removed. Provide controllers with double break silver alloy contacts, visible from both sides of controller. Provide controllers with green pilot light. Enclose controllers in NEMA Type 1 general purpose enclosures suitable for flush mounting.
 - 2. Magnetic Starters: Provide magnetic starters for three-phase motors, and for single-phase motors where interlock or automatic operation is indicated. Include the following:
 - a. Hand-off-auto selector switch and pilot lights, properly arranged for single-speed or multi-speed operation as indicated.
 - b. Trip-free thermal overload relays, each phase.
 - c. Interlocks, auxiliary relays, pneumatic switches and similar devices as required for coordination with control requirements of other Division 15 Sections.
 - d. Built-in 120-volt control circuit transformer, fused from line side, where service exceeds 240 volts (where required).
 - e. Externally operated manual reset.

2.3 DISCONNECTS:

- A. Disconnect switches shall be rated for the load required. Disconnects shall be type I, general purpose enclosures complying with NEMA Standards and NEC.

2.4 EQUIPMENT FABRICATION:

- A. General: Fabricate mechanical equipment for secure mounting of motors and other electrical items included in Work. Provide permanent alignment of motors with equipment, or adjustable mountings as applicable for belt drives, gear drives, special couplings and similar indirect coupling of equipment. Provide safe, secure, durable, and removable guards for motor drives, arranged for lubrication and similar running-maintenance without removal of guards.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install motors on motor mounting systems in accordance with motor manufacturer's instructions, securely anchored to resist torque, drive thrusts, and other external forces inherent in mechanical Work. Secure sheaves and other drive units to motor shafts with keys and Allen set screws, except motors of 1/3 hp and less may be secured with Allen set screws on flat surface of shaft. Unless otherwise indicated, set motor shafts parallel with machine shafts.
- B. Provide motor starters and disconnects, including all relays, control transformers, switches, etc., as required, to ensure equipment performance as specified or indicated on the drawings. Deliver starters to Division 16 Contractor for installation. Division 16 shall provide all power wiring and conduit, and shall mount the starter.
- C. Install power and control connections for motors to comply with NEC and applicable provisions of Division 16 sections. Install grounding except where non-grounded isolation of motor is indicated.
- D. Confirm that thermal overload relay size for starters matches motor amperage. Change as required prior to motor operation.

END OF SECTION 15030

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