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BuildingName
The Description of the Project
P00000000 0000

SPECIFICATION DIVISION 26

NUMBER SECTION DESCRIPTION

DIVISION 26 ELECTRICAL
SECTION 262900 - MOTOR CONTROLS

END OF CONTENTS TABLE

DIVISION 26 ELECTRICAL
SECTION 262900 - MOTOR CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section.

VERIFY ALL RATINGS, DIMENSIONS AND REQUIREMENTS SPECIFIED TO BE AS SHOWN ON THE DRAWINGS ARE CLEARLY SHOWN ON THE DRAWINGS.

IN 1 BELOW, SELECT PROPER COMMISSIONING SPEC SECTION NUMBER APPLICABLE TO THE PROJECT.

B. Related Sections:

1. Section 019100/019110 - Commissioning
2. Section 017823 - Operation and Maintenance Manual
3. Section 260513 - Medium, Low & Control Voltage Cables
4. Section 260526 - Grounding and Bonding for Electrical
5. Section 260533 - Electrical Materials and Methods
6. Section 260800 - Electrical Acceptance Tests

1.2 SUMMARY

A. Install the following equipment furnished by others.

1. Variable speed drives and variable speed motor controllers.
2. Motor controls that are shipped loose with packaged mechanical systems.

B. Provide the following equipment as shown.

1. Motor starters
2. Motor control centers (MCC's)
3. Disconnect switches
4. Motor control devices
5. Power factor correction capacitors

1.3 REFERENCES

A. Provide motor controls in conformance with NEMA Standard ICS 2, "Standards for Industrial Control Devices, Controllers and Assemblies."

B. Provide MCC's in conformance with UL Standard 845, "Motor Control Centers."

C. Install MCC's in accordance with NEMA Standard ICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of MCC's".

1.4 SUBMITTALS

A. Submit shop drawings for each MCC including dimensioned plans and elevations and component lists. Show ratings, including short time and short-circuit current ratings, and horizontal and vertical bus ampacities.

B. Submit schedule of features, characteristics, ratings, and factory settings of individual MCC units.

C. Submit interconnecting wiring diagrams of individual MCC units pertinent to the class and type specified for the MCC.

D. Submit schematic diagram of each type of controller unit indicated.

1.5 MOTOR CONTROL REQUIREMENTS

A. Motor starters and MCC's shall include motor short circuit and overload protection, and a motor disconnecting means as shown.

B. Reduced voltage or soft starters shall be provided for motors over 100 horsepower as shown.

1.6 POWER FACTOR CORRECTION CAPACITORS

A. Provide power factor correction capacitors for constant speed motors 50 horsepower and above. For two speed motors, provide capacitors for the low speed winding only.

1. Do not provide power factor correction capacitors for motors controlled by variable speed drives, variable speed motor controllers, or electronic soft starters.
2. Size capacitors to correct their motor full load power factors to at least 90 percent but not more than 96 percent.

PART 2 - PRODUCTS

2.1 MEDIUM VOLTAGE MOTOR STARTERS

INSERT CODE GAUGE NEMA TYPE 1, NEMA TYPE 3R OR OTHER ENCLOSURE TYPE IN THE BLANKS BELOW AS APPLICABLE.

A. Medium voltage motor starters shall be rated 5kV, of the fused disconnect switch, vacuum breaker contactor type, with 3 motor feeder CT's and overload relays, "hand-off-auto" selector switch, red "run" pilot light, 120 volt fused control transformer, 2 N.O. and 2 N.C. auxiliary contacts, and code gauge NEMA Type 1 enclosure indoors or a NEMA Type 3R enclosure outdoors. Terminals shall be identified as accepting copper and aluminum cables. Allen-Bradley, Eaton, GE, Siemens or Square D. Provide current limiting, medium voltage fuses sized in accordance with the motor nameplates.

2.2 COMBINATION MOTOR STARTERS

MODIFY PARAGRAPH BELOW TO INDICATE NUMBER AND TYPES OF CONTACTS REQUIRED.

A. Combination motor starters shall be of the voltage and NEMA type shown, horsepower rated for the motors shown, 3 pole, fusible disconnect switch type, with "hand-off-auto" selector switch, red "run" pilot light, 120 volt control transformer with 3 amp maximum fuses, 2 N.O. and 2 N.C. auxiliary contacts, and a NEMA Type 1 enclosure indoors or a NEMA Type 3R enclosure outdoors. Terminals shall be identified as accepting copper and aluminum cables. Provide fuse rejection kits, Class R dual element fuses and overload heaters sized in accordance with the motor nameplate. Allen-Bradley, Eaton, GE, Siemens or Square D.

2.3 MANUAL MOTOR STARTERS

A. Manual motor starters shall be of the voltage shown, horsepower rated for the motors shown, single-pole, double-pole or three-pole as shown, single throw, toggle operated. Terminals shall be identified as accepting copper and aluminum cables. Provide a red "run" pilot light, motor overload heater(s), padlock provision and a NEMA Type 1 enclosure indoors or a NEMA Type 3R enclosure outdoors. Allen-Bradley, Eaton, GE, Siemens or Square D.

2.4 MOTOR CONTROL CENTERS

A. Manufacturers: Subject to compliance with requirements, provide products by Allen-Bradley, Eaton, General Electric, Siemens, or Square D.

B. Wiring Classification: Class I, Type A, as defined in NEMA ICS 2. Bus and switch terminals shall be identified as accepting copper and aluminum cables.

C. Enclosure: Freestanding modular steel cabinets, NEMA Type 1.

D. Compartments: Modular, with individual doors with concealed hinges and quick-captive screw fasteners.

E. Interchangeability: Construct compartments so it is possible to remove units without opening adjacent doors, disconnecting adjacent compartments, or disturbing the operation of other units in the control center. Units requiring the same size compartment shall be interchangeable, and compartments shall be constructed to permit ready rearrangement of units.

F. Wiring Gutters: Provide each vertical section of structure with horizontal and vertical wiring gutters for wiring to each unit compartment in each section. When aluminum feeder cables are being used, oversize the wiring gutters for aluminum cables. Provide supports to hold wiring rigidly in place.

G. Short-Circuit Current Rating for Each Section shall be 22,000-amperes rms, symmetrical amperes.

H. Bus Ampacity Ratings: Confirm ampere ratings 600 amperes for horizontal and 300 amperes for the vertical main buses. Install bus and bus accessories, as needed, to install additional starters in the future in locations currently marked (or shown) as 'spaces'.

I. Horizontal Bus Arrangement: Extend main phase and ground buses with same capacity the entire length of the MCC, with provision for future extension at select either one end or both ends both ends by means of bolt holes and captive bus splice sections or approved equivalent.

J. Short-Circuit Withstand Rating: Same as short-circuit current rating of section.

K. Motor Controller Units: Combination controller units as specified in "Combination Starters" above; of types and with features, ratings, and circuit assignments as indicated. Provide units with full-voltage, across-the-line, magnetic controllers up to and including Size 3 installed on drawout mountings with connectors that automatically line up and connect with vertical section buses while being racked into their normal energized positions. Units shall have short-circuit current ratings, equal to or greater than, the short-circuit current rating of the MCC section.

L. Overcurrent Protective Devices: Provide types of devices with features, ratings, and circuit assignments indicated, as specified in "Combination Starters" above. Individual feeder tap units through 225 ampere rating shall be installed on drawout mountings with connectors that automatically line up and connect with vertical section buses while being racked into their normal energized positions.

M. Spaces and Blank Units: Compartments fully bussed and equipped with guide rails or equivalent, ready for insertion of drawout units.

N. Spare Units: Provide type, sizes, and ratings as indicated, and install in compartments indicated "spare."

O. Identification Products: Provide nameplates as specified in Section 260500, "Basic Electrical Materials and Methods."

P. Finishes: Manufacturer's standard finish suitable for the environment in which installed.

2.5 DISCONNECT SWITCHES

A. Disconnect switches shall be of the voltage and amperage shown, horsepower rated for motor applications, fusible or non-fusible as shown, 3 pole, NEMA Type HD heavy duty, in a NEMA Type 1 enclosure indoors or NEMA Type 3R enclosure outdoors. Terminals shall be identified as accepting copper and aluminum cables. Provide fuse rejection kits and Class R dual element fuses in fusible disconnect switches. Provide early break auxiliary contacts in motor disconnect switches used with variable frequency drives. Disconnect switches shall be lockable in the open and closed positions. Allen-Bradley, Eaton, GE, Siemens or Square D.

2.6 MOTOR CONTROL CIRCUIT DEVICES

A. Motor control circuit devices shall be heavy duty, rated for operation at 120 volts AC, and contained in a NEMA Type 1 enclosure indoors or a NEMA Type 3R enclosure outdoors. Pilot lights shall be "push-to-test" transformer type. Allen-Bradley, Eaton, GE, Siemens or Square D.

2.7 POWER FACTOR CORRECTION CAPACITORS

A. Power factor correction capacitors shall be unitized with metallized electrodes, polypropylene dielectric, biodegradable fluid, pressure activated circuit interrupters, and shall be self-healing. Capacitors shall be equipped with discharge resistors, replaceable current limiting fuses, and blown fuse indicators. Terminals shall be identified as accepting copper and aluminum cables. Eaton, General Electric, Myron Zucker, Siemens, Square D.

1. When MCC's are provided, locate the power factor correction capacitors within the MCC structures.
2. Label each capacitor as "Power Factor Correction Capacitor" and indicate the load served and the capacitor KVA rating.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Anchor MCC assemblies to steel channel sills arranged and sized in accordance with manufacturer's recommendations. Attach by tack welding or bolting. Level and grout sills flush with MCC mounting surfaces. Provide 4-inch high concrete housekeeping pads where indicated.

B. Tighten MCC bus joint bolts and electrical connector and terminal bolts in accordance with manufacturer's installation instructions and torque-tightening values. Where manufacturer's torque values are not stated, use those specified in UL 486A and UL 486B.

C. Motor starter hand-off-auto switches shall be wired so that in the "hand" position, the motor runs independently of automatic start/stop controls. Only the safety and modulating controls shall remain active. In the "auto" position, all start/stop controls shall be active.

D. High temperature detectors (firestats), smoke detectors, low temperature detectors (freezestats), flow switches and other safety controls shall be energized and operational whenever the equipment they protect is operating.

E. Motor starters shall be wired so that the motors automatically restart after a power disruption. Time delay relays shall be provided for large pumps and fans so that they can coast down before restarting after a momentary outage, and to prevent all of the large motors from restarting simultaneously.

F. Motor controls installed below piping or in areas with fire protection sprinklers shall be protected by drip shields.

G. Connect power factor correction capacitors between the motor starter contacts and the overload relays.

3.2 FIELD QUALITY CONTROL

A. Prior to any testing, perform visual inspections to verify the following:

1. The equipment is properly installed and anchored.
2. The equipment is free from damage and defects.
3. Shipping blocks and restraints have been removed.
4. Electrical terminations have been properly tightened.
5. The equipment has been properly aligned.
6. The equipment has been properly lubricated.
7. The ventilation louvers are open and unobstructed.
8. The equipment has been thoroughly cleaned inside and outside.
9. The equipment is properly labeled and labels are correct.
10. The equipment is ready to be tested.

B. Perform the following testing and submit a test report.

1. Verify proper phasing of power circuits.
2. Perform a 1,000-volt Megger test on buses, motor starters and disconnect switches. This test may be combined with the power cable Megger test by testing the equipment and terminated cables together.
3. Perform a continuity check on motor control circuits and control panel internal wiring.
4. Perform an operational test on the controls and alarms.

3.3 COMMISSIONING

A. Perform Commissioning activities per Related Sections above.

DELETE THE FOLLOWING SECTION UNLESS THE PROJECT INCLUDES UNUSUAL MOTOR CONTROLS UNFAMILIAR TO MAINTENANCE ELECTRICIANS.

3.4 TRAINING

A. Provide a qualified service technician from the Manufacturer's staff to provide training.

REVISE THE TRAINING REQUIREMENTS BELOW TO BE PROJECT SPECIFIC. SAMPLE TRAINING LANGUAGE IS PROVIDED, EDIT TO SUIT PRODUCT OR SYSTEM, INCLUDING DURATION. TRAINING IS NOT REQUIRED UNLESS THE PRODUCT OR SYSTEM IS COMPLEX, UNIQUE, OR NEW TO THE U-M PLANT MAINTENANCE DEPARTMENT. BECAUSE OF THE COST INVOLVED IN TRAINING DO NOT INDISCRIMINATELY SPECIFY TRAINING

B. Train Owner's maintenance personnel on equipment operation, start-up and shutdown, trouble-shooting, servicing and preventative maintenance procedures. Review the data contained in the Operating and Maintenance Manuals with Owner's personnel. Training shall occur separate from startup activities. Provide 2 hours of training minimum.

END OF SECTION 262900