262000 Low Voltage Electrical Transmission

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1.1 PANEL BOARDS/SWITCHBOARDS

A. Covers shall be “door in door” type.

B. Busses shall be copper.

C. All panels shall be installed “readily accessible” without having to remove anything. Panels that may be concealed due to location shall require signage to indicate the presence of the panel.

D. Acceptable vendors: Cutler Hammer, General Electric, Square D, and Siemens.

E. Stub and cap three each ¾ inch empty conduits to above ceiling from each recessed mounted panel board. These conduits shall be accessible for future circuit installations.

F. GENERAL: Switchgear and switchboards shall be equipped with a Main Breaker, unless protected by an upstream circuit breaker. In that case, provide a non-automatic disconnect switch and/or MLO panel.

G. All main switchboards and switchgear shall be of the circuit breaker design, unless written permission for fusing has been granted by PPD. If fusing, provide 10% spare fusing with a minimum of three spare sets (one set incorporates provisions for all the phases) of each size. Spare fusing shall be provided in weatherproof containers for long-term storage (such as in ammo cans). Spray paint container with the wording ‘Spare Fuses’ on the side.

H. ACCEPTABLE MANUFACTURERS: General Electric; Square D; Cutler – Hammer; Siemens.

PART 2 - PRODUCTS

2.1 GENERAL

A. Motors shall conform to applicable portions of NEMA Standard MG-1, Motors and Generators.

B. Motors shall be sized for the application such that when the driven equipment is operated at rated capacity the motor current will not exceed the full-load nameplate current. Service factor shall not to be used in normal operation.

C. Disconnects suitable for the location shall be provided at a safe distance from moving parts, or external to any housing around moving parts.

2.2 MOTOR DESIGN

A. INTEGRAL HORSEPOWER MOTORS

1. Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings.

2. Motors shall have cast iron frames with cast mounting feet.

3. Motors shall be three phase, 60 hertz, 1800 rpm, rated at 200 volts for 208-volt systems, 230 volts for 240-volt systems and 460 volts for 480-volt systems. 230/208-volt motors shall not be permitted on 208-volt systems.

4. Motors shall be NEMA Design B and shall have 1.15 service factor at 60 hertz.

5. Insulation Systems

   a. In fixed speed applications, motors shall have Class B insulation with 80°C rise over 40°C ambient.

   b. For variable frequency drive (VFD) applications, motors shall have Class B insulation with 80°C rise over 40°C ambient. Motor manufacturer shall be notified if a motor is being purchased for VFD application and motor nameplate shall be marked "Suitable for Variable Frequency Drive."

6. Motor Efficiencies:

   a) Horizontal Foot-Mounted NEMA Frame Motors: Motor efficiencies shall be based on IEEE-112, 1984, Test Method B, as specified in NEMA Standard MG1-12.53. Motor efficiencies and power factors shall meet or exceed the following values at rated voltage.

MOTOR EFFICIENCY AND POWER FACTOR REQUIREMENTS		
HORSEPOWER	EFFICIENCY	POWER FACTOR
1 hp	85.5 pct.	78.0 pct.
1.5 hp	86.5 pct.	78.0 pct.
2 hp	86.5 pct.	83.0 pct.
3 hp	89.5 pct.	80.0 pct.
5 hp	89.5 pct.	80.0 pct.
7.5 hp	91.7 pct.	81.0 pct.
10 hp	91.7 pct.	82.0 pct.
15 hp	92.4 pct.	82.0 pct.
20 hp	93.0 pct.	86.0 pct.
25 hp	93.6 pct.	84.0 pct.
30 hp	93.6 pct.	83.0 pct.
40 hp	94.1 pct.	86.0 pct.
50 hp	94.5 pct.	87.0 pct.
60 hp	95.0 pct.	86.0 pct.

75 hp	95.4 pct.	87.0 pct.
100 hp	95.4 pct.	90.0 pct.
125 hp	95.8 pct.	88.0 pct.
150 hp	96.2 pct.	86.0 pct.
200 hp	96.2 pct.	87.0 pct.
over 200 hp	96.2 pct.	87.0 pct.

b) Specialty Motors: Specialty motors such as C-Face, multi-speed, and vertical pump motors shall meet the above efficiency requirements where possible. If motors meeting these efficiencies are not available, "Premium Efficiency" motors shall be provided.

7. Motors 25 hp and larger which are to be installed outdoors or in other high humidity areas shall be equipped with silicone rubber space heaters. Space heaters shall be energized when motor is de-energized.

8. Provide reduced voltage starters for all motors that are 15 horsepower and larger.

B. FRACTIONAL HORSEPOWER MOTORS ONE-HALF HP AND ABOVE

1. Motors shall be open drip-proof or totally enclosed fan cooled.

2. Motors shall be three phase, 60 hertz, 1800 rpm, rated at 200, 230 or 460 volts.

3. Motors shall be NEMA Design B with class B insulation.

C. FRACTIONAL HORSEPOWER MOTORS LESS THAN ONE-HALF HP: Motors shall be single phase, 60 hertz, rated at 120 volts with integral thermal protection.

2.3 OVERLOAD PROTECTION

Overload protection shall be provided for each motor. This protection may be an integral part of the motor or may be part of the motor controller and shall interrupt each ungrounded conductor. Three-phase motor protection shall insure that all three phases are interrupted with the loss of any one phase. Solid-state overloads shall be provided for poly phase motors. Builder to set overloads at start-up.

PART 3 - EXECUTION

3.1 MOTOR SIZE AND LOCATION

A. Builder shall verify actual size and location prior to installing and connecting wiring.

B. Builder shall verify and make any necessary adjustments to service, branch circuit wiring, branch circuit protection, overload protection, disconnect and controller (starter) based on actual nameplate data of the motors supplied.

3.2 MOTOR NAMEPLATE DATA SHEET

A. Builder shall provide required copies of nameplate data sheet for each motor.

B. Nameplate data sheets shall be typed or neatly printed and shall include all data on the motor nameplate plus a unique motor description such as "AHU-3 Fan Motor", "Distribution Pump

#1" or similar description.

3.3 MOTOR VOLTAGES

A. Builder shall field verify system voltage prior to ordering or installing any motors.

END OF SECTION