

ROSEWOOD MIDDLE DEMOLITION

SECTION 230513 – HVAC EQUIPMENT MOTORS

PART 1 - GENERAL

1.1. SUMMARY

- A. Section includes general requirements for all HVAC motors

1.2. QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: UL listed and labeled as defined by NFPA 70, the National Electric Code, or equivalent by a qualified testing agency marked for the intended location and application and accepted by the Authority Having Jurisdiction and Engineer.
- B. Mechanical Equipment and Materials: UL listed and labeled as defined by State Building Codes or equivalent by a qualified testing agency marked for the intended location and application and accepted by the Authority Having Jurisdiction and Engineer.
- C. Testing and listing laboratories of mechanical and electrical equipment shall be accredited by the North Carolina Building Code Council (NCBCC).

PART 2 - PRODUCTS

2.1. GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.
- B. Comply with IEEE 841 for severe-duty motors.
- C. Motors for fans and pumps shall be selected for the maximum brake-horsepower listed in the equipment schedules and no more than 85% of the nominal rated horsepower excluding the service factor.

2.2. MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea-level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3. POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motors.
 - 1. General Use: Open drip-proof (ODP) motors.
- B. Efficiency: All motors shall be Premium Efficiency conforming to the requirements of NEMA MG1 Part 31. Conform to 10 CFR Part 431 published by the US Department of Energy - Efficiency standard for integral horsepower motors.

1. Minimum efficiency shall meet the requirements of the State Energy Conservation Code and ASHRAE 90.1.
- C. Service Factor: 1.15.
 1. Multispeed Motors: Variable torque.
 2. For motors with 2:1 speed ratio, consequent pole, single winding.
 3. For motors with other than 2:1 speed ratio, separate winding for each speed.
- D. Rotor: Random-wound, squirrel cage.
- E. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Class B.
- G. Insulation: Class F.
- H. Code Letter Designation:
 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4. POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 2. Inverter-Duty Motors: Motors shall be "Inverter-Duty" rated according to NEMA MG 1 Part 31, "Requirements for Definite Purpose Inverter-Fed Polyphase Motors", with minimum Class F temperature rise and Class H insulation. NEMA duty rating code on motor nameplate shall indicate "Inverter-Duty". Other duty rating code markings such as "Inverter-Ready" are not acceptable.
 3. Shaft Grounding Rings (SGR): Motors 5 hp and larger shall have solid or split type shaft grounding rings designed to prevent bearing damage due to adjustable speed drive induced currents. SGR shaft diameter shall match the motor's standard NEMA "u" dimension.
 4. Shaft Grounding Rings (SGR): Multi-phase motors shall have solid or split type shaft grounding rings designed to prevent bearing damage due to adjustable speed drive induced currents. SGR shaft diameter shall match the motor's standard NEMA "u" dimension.
 5. Over-Speeding: Variable frequency drives shall not be set above 60 Hz.
 - a. Exceptions:

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- 1) Air Handling Units with Setback Schedules: Variable frequency drives shall not operate over 85 Hz and motors shall not operate over 3,000 RPM for direct-drive fans used in air handling units.
6. Under-Speed Operation: Motors shall be capable of continuous operation at minimum design operating speed indicated on the drawings. Where minimums are not indicated, motors shall be capable of continuous operation at the following minimum speeds.
 - a. Fans: 18 Hz (30-percent).
 - b. Pumps: 12 Hz (20-percent).
- C. Electronically-Communicated (EC) Motors
 1. Electronically-communicated (EC) motors, also known as brushless DC electric (BLDC) motors, shall be NEMA MG 1, totally enclosed fan cooled (TEFC), inverter-use, motors with integrated microprocessor speed controller designed for variable speed and torque fan and pump applications.
 - a. Speed controller shall be programmed with safeties to avoid damaging conditions and unstable fan / pump operation. Firefighter's safety override mode shall allow bypass of most speed controller safeties.
 - b. Speed controller shall comply with requirements of Section 230514.

2.5. SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 1. Permanent-split capacitor.
 2. Split phase.
 3. Capacitor start, inductor run.
 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Pre-lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513