

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

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.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and three-phase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
- B. The mechanical contractor is to provide motor, motor controllers, fused disconnect switches and VFD's. The mechanical contractor to install motor, motor controllers, disconnect switches and VFD's. The Electrical contractor is to wire all motors, fused disconnect switches, motor controllers and VFD's. Electrical contractor to furnish and install all fuses in disconnect switches.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers and fused disconnect switches.
 - 2. Variable frequency motor controllers/drives.
 - 3. Torque, speed, and horsepower requirements of the load.
 - 4. Ratings and characteristics of supply circuit and required control sequence.
 - 5. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 BASE BID MANUFACTURERS

- A. Motors: Toshiba, Lincoln Motors.
- B. Motor controllers and disconnect switches:
 - 1. Division 260000-"Enclosed Switches and Circuit Breakers" and "Enclosed Controllers".

2.2 MOTORS

- A. Motors shall be in accordance with NEMA, IEEE, UL and ANSI C50 standards with minimum indicated horsepower and the ability to operate the drive device under all conditions without overload. Motors shall be of the same manufacturer, except those provided integrally with equipment.
- B. Motors shall be designed for continuous load to operate in ambient temperature of 104 deg F and service factor of 1.15.
- C. Efficiency of motor shall be IEEE standard 112, 1978 Test Method B. Unless noted otherwise motors shall be of high efficiency, in order to qualify for the local utility company rebate program for New Construction.

- 1. All motors shall have guaranteed minimum efficiencies as follows or the minimum efficiencies for a rebate, whichever is greater:

<u>HP</u>	<u>GUARANTEED MIN. EFFICIENCY</u>	<u>HP</u>	<u>GUARANTEED MIN. EFFICIENCY</u>
1	85.5%	1-1/2	86.5%
2	86.5%	3	89.5%
5	89.5%	7-1/2	90.2%
10	91.7%	15	91.7%
20	93%	25	93%
30	94.1%	40	94.1%
50	94.5%	60	95%
75	95%	100	95.4%
125	95.4%		

- D. Except as noted, motors below ½ hp shall be 120 volts, 60 Hertz, single phase and motors ½ hp and larger shall be 460 volts, 60 hertz, 3 phase.
- E. Except as noted, motors shall be squirrel-cage induction type, open dripproof, 1750 rpm Class B insulation. Motors mounted on equipment outdoors shall be totally enclosed fan cooled (TEFC), weatherproof, 1750 rpm, class F insulation.
- F. Motor mounted outdoor and in areas where condensation can occur shall be with electrical heaters.
- G. Provide, sealed, permanently lubricated bearings for motors.
- H. Except as noted, multispeed motors shall be variable torque type.

- I. Coordinate all motor types and sizes with motor controller types and sizes. Coordinate size and location of terminal box with electrical work. Terminal box shall be clear of ventilation openings and shall be of size to receive electrical circuit wiring.
- J. Provide foundation slide base and shaft for belt-connected motors as required for aligning pulleys.
- K. Fractional horsepower motors shall be furnished with built in overload protection, where respective controllers are without overload protection.

2.3 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. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.4 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: Prelubricated, 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

3.1 FIELD QUALITY CONTROL

- A. Test all motors for proper operation after installation and wiring.

END OF SECTION