



SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - DESCRIPTION

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Requirements Division 01, Division 23 Specification Sections, and Common Work Requirements for HVAC apply to the work specified in this Section.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and poly- phase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on AC power systems up to 600V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
- B. Section also includes the adjustable speed drive requirements.
- C. Efficiency of the motors for the HVAC shall be in compliance with provisions of California Energy Code, Table 100-A and the latest edition of the Building Energy Efficiency Standards, Title 24.

1.3 COORDINATION

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

PART 2 - MATERIALS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.



2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 104 degrees F 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 motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1, including applications of premium efficiency motors.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1) For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2) For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. 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.
- K. 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) 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.

2.5 ADJUSTABLE SPEED DRIVES

- A. Manufacturer: **Magna Drive** or approved equal.
- B. Components:
 - 1) Copper Conductor Rotor Assembly directly connected to the motor (input) shaft.
 - 2) The Magnet Rotor Assembly and the Actuation Components are directly connected to the load (output) shaft. Magnets to be rare-earth type.
 - 3) The ASD's output is controlled by an actuator. The actuator allows the process control signal to modulate the speed or torque output of the drive. Actuator to be 110 VAC with a 4 to 20 mA control signal.
 - 4) Hubs and shrink discs.
 - 5) Oil lubricated gear box and output shaft assembly.
 - 6) Vertical applications to have oil lubricated thrust bearings with AFBMA 40,000 hour life and with 25,000 pounds of vertical down-thrust capacity
- C. Suitable mounting kits shall be provided depending on mounting orientation (vertical or horizontal).
- D. Connect power to meet application requirements.

2.6 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.



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- 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 (NOT USED)

END OF SECTION 23 05 13