

SECTION 23 0514 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Single phase electric motors.
- B. Three phase electric motors.

1.2 REFERENCES

- A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.
- B. ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) Standard 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

- A. See Section 01300 (013000) - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
- D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- E. Operation Data: Include instructions for safe operating procedures.
- F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.4 QUALITY ASSURANCE

- A. Conform to NFPA 70.

- B. Motors shall comply with ASHRAE Standard 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings current edition.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.6 WARRANTY

- A. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 - PRODUCTS

2.1 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 40 degrees C environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- B. Provide motors with phase loss protection.
- C. Mechanical Contractor shall provide all motors that are required. Each motor shall be the correct service type and have a horsepower rating that is adequate for the device it is intended to drive. Motors shall not exceed their full load rating, including the service factor rating, whenever the driven equipment is operating at the specified capacity under normal operating conditions.
- D. Motors shall be comparable to GENERAL ELECTRIC Tri/Clad, Type K, NEMA "T" rated units or substitute equipment that is approved by the Architect/Engineer. Insulation shall be Class B. Motors shall be dripproof in dry, non-hazardous locations, weather protected where exposed to the weather or dampness, and totally enclosed, fan cooled where specified. Dripproof and totally enclosed fan cooled motors, fractional and integral horsepower, shall have service factor ratings of 1.15 and 1.0 respectively. Fractional horsepower motors shall have sealed, permanently lubricated, ball bearings unless sleeve bearings are standard with a manufacture of equipment which utilized direct driven fans. Integral horsepower motors shall have ball bearings with grease zerk fittings and drain ports. All motors shall be rated for

continuous duty. Maximum temperature rise shall not exceed 40 degrees C. for dripproof frame motors and 55 degrees C. for totally enclosed motors in a 40 degree C. ambient condition. Motors shall be suitable for the electrical service specified, scheduled or shown.

- E. Motors shall have been tested and approved by the Underwriters' Laboratories, Inc. Motors shall be manufactured and classified in accordance with the current NEMA Standard Publication No. Mg 1 entitled "Motors and Generators."
- F. Motors shall be dynamically balanced and tested at the factory before shipment. They shall be relatively quiet while running. Connections to direct driven devices shall be made with a flexible coupling. Motors for V-belt drive service shall be furnished with a steel base and a screw device for adjusting belt tension.
- G. Motors shall be mounted so that they are readily accessible for maintenance. Motor terminal boxes shall be accessible. Covers shall not be blocked by other equipment. Watertight terminal boxes shall be provided on those motors in wet locations or where they are exposed to the weather. Motor mounting arrangement shall be such that the motor mounting bolts are accessible in order to facilitate its removal.
- H. Explosion-Proof Motors: UL approved and labelled for hazard classification, with over temperature protection.
- I. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- J. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.2 ELECTRICAL CONNECTIONS

- A. All electrical connections shall be made by the Electrical Contractor. Motors and controls for equipment furnished by each Contractor shall be furnished and set by the Contractor furnishing the equipment. Where electrical work is specifically indicated to be performed by the Plumbing, Fire Protection or Heating Contractor, this Contractor shall perform the work in conformance with Electrical Specifications for this projects.

2.3 MOTOR CONTROLLERS

- A. Mechanical Contractor shall provide motor controllers. The items shall be products of one manufacturer, Allen-Bradley, Square D, General Electric or Westinghouse, and shall meet latest N.E.M.A. and IEEE Specifications. Starters and contactors shall be horsepower rated. Starters shall include the proper size heater elements
- B. Magnetic starters used with pressure or float switches, thermostats or similar maintained contact switches shall be provided with "On-Off-Auto" switches on the starter.
- C. Unless otherwise noted, control and pilot devices such as electric thermostats, alternators, float controls, aquastats, etc., shall be furnished and installed by the Mechanical Contractor. Each device shall be provided with all auxiliary features and accessories which may be required for correct operation of the associated equipment.
- D. Magnetic starters shall be provided with start-stop pushbuttons on the starters unless remote control pushbuttons or other methods of starting are specified elsewhere.
- E. Unless otherwise noted elsewhere, all magnetic motor starters controlled with a remote pilot device shall contain a control circuit transformers, as an integral part of the controller, providing control power at a maximum 120 volts for the pilot device. The exact control circuit voltage shall be coordinated with the ATC supplier prior to the purchase of any motor controllers.
- F. Starters and protective devices which are provided as an integral part of the equipment furnished under the Mechanical Contracts, shall be supplied.
- G. For use in manual starting of fractional horsepower motors up to but not including 1/2 horsepower, the Mechanical Contractor shall furnish a thermal manual toggle switch type starter with pilot light specifically designed for this purpose. Each starter shall be provided with proper size heater element for the motor to be controlled. Heater elements shall be readily removable and interchangeable. Starters shall be arranged for flush or surface mounting as indicated or as required.
- H. Controllers and wiring diagrams shall be delivered to the Electrical Contractor.

2.4 MOTOR DISCONNECTS:

- A. Unless otherwise noted, motors located out of sight of their respective electric panels shall be provided with disconnect switches at the motors by the Electrical Contractor.
- B. All exhaust and supply fans on the roof shall be provided with disconnecting means at the motors as an integral part of the equipment.

2.5 ENCLOSURES:

- A. Motor controllers and disconnects shall be provided with standard approved enclosures to suit the locations in which they are installed and the conditions under which they are to operate.

2.6 MOTOR CONTROL WIRING:

- A. The Electrical Contractor shall run the power wiring system from the various supply panels indicated, to the motors and motor controllers and shall make final connections unless otherwise noted on the Drawings. The Mechanical Contractors shall run all control wiring from the motor controllers to the pilot devices.
- B. Starters, and protective control devices which are provided as integral part of the motors or motor-operated equipment shall be prewired at the factory.
- C. After final connections are completed, the Mechanical Contractor shall test each motor for proper rotation. Before applying current to the motor, the Mechanical Contractor shall check the motor for alignment, oil, etc. The Mechanical Contractor shall make any necessary adjustments to the starter and control equipment for proper starting and overload protection.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION