SECTION 11 05 13

COMMON MOTOR REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes single- and three-phase motors for application on equipment furnished under other sections and for motors furnished loose to the Project.

1.2 REFERENCES
A. ABMA 9 (American Boiler Manufacturers Association) - Load Ratings and Fatigue Life for Ball Bearings.
B. NEMA MG 1 (National Electrical Manufacturers Association) - Motors and Generators.

1.3 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures.
B. Product Data: Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.
C. Test Reports: Indicate procedures and results for specified factory and field-testing and inspection.

1.4 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
B. Testing Agency: Company member of International Electrical Testing Association and specializing in testing products specified in this section with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Conform to manufacturer’s product storage and handling requirements.
B. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.
C. Protect products from weather and moisture by covering with heavy plastic or canvas and by maintaining heating within enclosure.

D. For extended outdoor storage, remove motors from equipment and store separately.

**PART 2 - PRODUCTS**

2.1 GENERAL

A. Provide premium efficiency motors. Motors shall be selected on the basis of “Guidelines for Life Cycle Cost Analysis”.

B. Motors connected to variable frequency drives (VFDs) shall be inverter duty, and compatible with the drive unit. Additionally, motors shall incorporate a design to prevent arcing through the motor bearings, such as: insulated bearings, grounded motor shafts or add-on devices such as those manufactured by AEGIS Ground Shafting Ring (SGR), Shaft Grounding Systems or approved equal. Whenever possible, the ring shall be factory-installed.

2.2 CONTROLLERS

A. Full voltage starters: Across-the-line, magnetic type, double-break silver alloy contacts, molded operating coil, and ambient compensating thermal overload relays on all phase conductors.

B. Manual Motor Starters: Fractional horsepower (HP), single phase motors shall be protected by thermal overload relay integral with the disconnect.

C. Motor protection shall be by thermal overload relays in each phase, and by motor circuit protector (MCP) in a combination starter or motor control center. MCP's shall be rated or set to properly protect the motor.

D. Reduced voltage starters (Autotransformer or Solid State) shall be provided on 208 volt motors larger than 30 HP and on 480 V motors larger than 75 HP, or as required by the application. Solid state starters shall be as specifically approved.

2.3 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT

A. Manufacturers:

1. US Motor 841 Series
2. Reliance

B. Motors 3/4 hp and Larger: shall be three-phase motor as specified below.

1. Motors Smaller Than 3/4 hp: may be single-phase motor as specified; motors less than 250 watts or 1/4 hp may be equipment manufacturer’s standard.
2. Motor: All cast iron construction
3. Insulation: “Inverter Grade” insulation system with “Pulse Resistant” magnet wire. Complies with the new NEMA MG-1, Part 31 specification for inverter duty and bake for added protection of a coil-to-coil short, additional phase paper to protect from a phase-to-phase arc. Insulation System Class F insulation materials with less than 80°C temperature rise at rated load providing longer motor life.
4. Adjustable frequency 5:1 constant torque or 10:1 variable torque.
5. Bearings: One bearing size on both ends of the motor; bearing life of 50,000 hrs belted or more than 130,000 hours of direct-coupled; fan end bracket allowing field adaptability to a standard Inpro/Seal.
6. Balancing: Precision Balanced Rotors 0.08in/sec vibration (1/2 NEMA standard).
7. Efficiency: Efficiency design must meet or exceeds the EPACT’92 federally mandated efficiency levels.
8. Foot Flatness Precision machined to less than 0.005” tolerance.
9. Oversized Conduit Box: Dual gasketed, rotatable conduit box and positions non-braided, non-wicking motor leads.
10. Oversized Bearings: 130,000 hour direct connected life and 50,000 hour minimum belted bearing life.

C. Single Phase Motors:
   1. Permanent split-phase type where available, otherwise use split-phase capacitor start or capacitor start/capacitor run motor.
   2. Voltage: 115/230 volts, single phase, 60Hz.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.4 THREE-PHASE MOTORS FURNISHED LOOSE

A. Manufacturers:
   1. US Motor 841 Series
   2. Reliance

B. Motors 3/4 hp and Larger: shall be three-phase motor as specified below.
   1. Motors Smaller Than 3/4 hp: may be single-phase motor as specified; motors less than 250 watts or 1/4 hp may be equipment manufacturer’s standard.
   2. Motor: All cast iron construction
   3. Insulation: “Inverter Grade” insulation system with “Pulse Resistant” magnet wire. Complies with the new NEMA MG-1, Part 31 specification for inverter duty and bake for added protection of a coil-to-coil short, additional phase paper to protect from a phase-to-phase arc. Insulation System Class F insulation materials with less than 80°C temperature rise at rated load providing longer motor life.
4. Adjustable frequency 5:1 constant torque or 10:1 variable torque.
5. Bearings: One bearing size on both ends of the motor; bearing life of 50,000 hrs belted or more than 130,000 hours of direct-coupled; fan end bracket allowing field adaptability to a standard Inpro/Seal.
6. Balancing: Precision Balanced Rotors 0.08in/sec vibration (1/2 NEMA standard).
7. Efficiency: Efficiency design must meet or exceeds the EPACT 2005 federally mandated efficiency levels.
8. Foot Flatness Precision machined to less than 0.005” tolerance.
9. Oversized Conduit Box Dual gasketed, rotatable conduit box and positions non-braided, non-wicking motor leads.
10. Oversized Bearings: 130,000-hour direct connected life and 50,000 hour minimum belted bearing life.

C. Single Phase Motors:
   1. Permanent split-phase type where available, otherwise use split-phase capacitor start or capacitor start/capacitor run motor.
   2. Voltage: 115/230 volts, single phase, 60Hz.

D. Wiring Terminations: Provide connection schemes in termination cover or motor.

2.5 SOURCE QUALITY CONTROL

A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests. Provide written report.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position. Provide thrust type bearing as required.

B. Provide engraved plastic nameplates as specified elsewhere in Electrical specifications.

C. Ground and bond motors as specified elsewhere in Electrical specifications.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.15.

END OF SECTION