

## SECTION 26 05 05 – ELECTRIC MOTORS

### PART 1 - GENERAL

#### 1.1 THE REQUIREMENT

- A. General: The CONTRACTOR shall provide electric motors, accessories, and appurtenances complete and operable, in conformance with the specifications and the Contract Documents.
- B. The provisions of this Section apply to constant torque AC squirrel cage induction motors throughout the Contract Documents, except as indicated otherwise.
- C. The CONTRACTOR shall assign to the equipment supplier the responsibility to select suitable electric motors for the equipment. The choice of motor manufacturer shall be subject to review by the ENGINEER. Such review will consider future availability of replacement parts and compatibility with driven equipment.

#### 1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with MASS Section 10.05 Article 5.6.
- B. Complete motor data shall be submitted. Motor data shall include:
  - 1. Motor manufacturer.
  - 2. Motor type or model and dimension drawing. Include motor weight.
  - 3. Nominal horsepower.
  - 4. NEMA design.
  - 5. Enclosure.
  - 6. Frame size.
  - 7. Winding insulation class and temperature rise class.
  - 8. Voltage, phase, and frequency ratings.
  - 9. Service factor.
  - 10. Full load current at rated horsepower for application voltage.
  - 11. Full load speed.
  - 12. Torque characteristics.
  - 13. Guaranteed minimum full load efficiency. Also nominal efficiencies at 1/2 and 3/4 load.
  - 14. Type of thermal protection or overtemperature protection, if included.
  - 15. Wiring diagram for devices such as motor leak detection, temperature, or zero speed switches, as applicable.
  - 16. Bearing data. Include recommendation for lubricants of relubricatable type bearings.
  - 17. Power factor at 1/2, 3/4 and full load.

## **PART 2 - PRODUCTS**

### **2.1 DESIGN REQUIREMENTS**

- A. General: Electric motors shall comply with NEMA MG-1 - Motor and Generator.
- B. NEMA Design: Electric motors shall be NEMA Design B unless otherwise indicated. In no case shall starting torque or breakdown torque be less than the value in NEMA MG 1. Motors shall be suitable for the indicated starting method.
- C. Insulation: Three phase motors shall be provided with Class F insulation, rated to operate at a maximum ambient temperature of 40 degrees C and at the altitudes where the motors will be installed and operated, without exceeding Class B temperature rise limits stated in NEMA MG 1-12.44. Motors shall be provided with insulation systems to withstand 1600 volt spikes, with dV/dt as defined in NEMA MG 1-31.
- D. Motors shall be totally enclosed, fan-cooled (TEFC) with a Service Factor of 1.15, unless otherwise indicated.

### **2.2 ACCESSORY REQUIREMENTS**

- A. General: Motors shall have split-type cast metal conduit boxes.
- B. Lifting Devices: Motors weighing 265 lb (120 Kg) or more shall have suitable lifting eyes for installation and removal.
- C. Grounding Lugs: Provide motor grounding lug suitable to terminate ground wire, sized as indicated.
- D. Nameplate: Motors shall be fitted with permanent stainless steel nameplates indelibly stamped or engraved with NEMA Standard motor data, in conformance with NEMA MG-1-10.40.

### **2.3 MOTOR THERMAL PROTECTION**

- A. Thermostats: Winding thermostats shall be snap action, bi-metallic, temperature-actuated switch. Thermostats shall be provided with one normally closed contact for each phase. The thermostat switch point shall be precalibrated by the manufacturer.

### **2.4 MOTOR BEARINGS**

- A. Motors shall have bearings designed for 100,000 hours (coupled) L-10 life.
- B. Motors that are indirectly coupled and are controlled by VFD's shall have provisions to limit bearing currents.

## **2.5 MANUFACTURERS**

- A. **U.S. Motors, Reliance Electric**, or equal.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Motor installation shall be performed in accordance with the motor manufacturer's written recommendations and the written requirements of the manufacturer of the driven equipment.
- B. Motors shall be installed as required by the existing field conditions, including coupling and shims.
- C. Related electrical WORK involving connections, controls, switches, and disconnects shall be performed in accordance with the applicable sections of Division 26.

### **3.2 FIELD TESTING**

- A. The CONTRACTOR shall perform the following field tests:
  - 1. Inspect each motor installation for any deviation from rated voltage, phase, frequency, and improper installation.
  - 2. Visually check for proper phase and ground connections. Verify that multi-voltage motors are connected for proper voltage.
  - 3. Check winding and bearing temperature detectors and space heaters for functional operation.
  - 4. Test for proper rotation prior to connection to the driven equipment.
  - 5. Test insulation (megger test) of new and re-used motors in accordance with NEMA MG-1. Test voltage shall be 1000 VAC plus twice the rated voltage of the motor.

**END OF SECTION 26 05 05**