

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Single- and three-phase motors for application on equipment provided under other sections and for motors furnished loose to Project.
- B. Related Sections:
 - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 2. Section 26 05 53 - Identification for Electrical Systems.

1.02 REFERENCES

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. Underwriter's Laboratory.

1.03 SUBMITTALS

- A. Division 01 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit catalog data for each motor furnished. 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.
- D. The motor nameplate and connection diagram shall be stainless steel and contain the following information:
 - 1. Manufacturers' name

2. Rated volts and full load current
 3. Rated frequency and number of phases
 4. Rated full load speed
 5. Rated temperature rise and rated ambient temperature
 6. Time rating
 7. Rated horsepower
 8. Locked rotor code letter
 9. Motors starting on wye connection and running on delta, shall be marked with the code letter corresponding to the wye connection.
 10. Dual voltage motors which have a different locked rotor KVA on the two voltages, shall be marked with the code letter for the voltage giving the highest locked rotor KVA.
 11. NEMA design letter
 12. Service factor
- E. In general, motors shall be furnished integrally mounted on all items of mechanical equipment.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. All motors shall be UL approved and listed.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Division 01 - Product Requirements: Product storage and handling requirements.
- B. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.
- C. Protect products from weather and moisture by covering with plastic or canvas and by maintaining heating within enclosure.
- D. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 - PRODUCTS

2.01 REQUIREMENTS FOR MOTORS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
 - 1. Cooper Industries Inc.
 - 2. Baldor Electric Co.
 - 3. General Electric Co.
 - 4. Emerson Electrical
 - 5. Substitutions: Division 01 - Product Requirements.
- B. All motors shall be premium efficiency type.
- C. All motors which are to operate with variable frequency drives (VFD or VSD), shall be inverter duty type and suitable and certified for operation with VFD, shall match voltage, characteristics of VFD.
- D. Motors 1/2 hp and Larger: Three-phase motor as specified below.
- E. Motors Smaller Than 1/2 hp: Single-phase motor as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer's standard.
- F. Three-Phase Motors: NEMA MG 1, Design B, premium-efficient squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds as indicated on Drawings.
 - 1. Voltage: 230/460 volts, three phase, 60 Hz or as indicated on Drawings.
 - 2. Service Factor: 1.15 unless indicated otherwise on Drawings.
 - 3. Enclosure: Meet conditions of installation unless specific enclosure is indicated on Drawings or specified. Enclosure for pump motors or motors exposed to weather shall be totally enclosed fan-cooled type.
 - 4. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
 - 5. Insulation System: NEMA Class F.
 - 6. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

7. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
 8. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
 9. Sound Power Levels: Conform to NEMA MG 1.
 10. Efficiency: Premium efficiency motors conforming to NEMA. Motor efficiencies shall meet the requirements for financial rebates from local utility company.
 11. Inverter Duty Rated for motors controlled by VFD. Fan motors controlled by VFD shall be equipped with shaft grounding rings.
 12. Motor weight exceeding 25 pounds shall have lifting eyes.
 13. Motor efficiencies shall meet minimum requirement for local utility company rebates.
- G. Single Phase Motors:
1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
 2. Voltage: 115 volts, single phase, 60 Hz.
- H. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.
- I. All motors which are to operate with Variable Frequency Drives (VFD) shall be inverter duty type.

2.02 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.

PART 3 - EXECUTION

3.01 EXISTING WORK

- A. Disconnect and remove abandoned motors
- B. Maintain access to existing motors and other installations remaining active and requiring access. Modify installation or provide access panel.

- C. Clean and repair existing motors to remain or are to be reinstalled.

3.02 INSTALLATION

- A. Install motor in alignment with shaft of the drive. Alignment test must be done prior to operating the equipment.
- B. Install engraved plastic nameplates in accordance with Section 26 05 53.
- C. Ground and bond motors in accordance with Section 26 05 26.
- D. Coordinate two-speed motor installation with Division 26.
- E. Provide motor shaft grounding ring (SGR) for motors controlled by Variable Frequency Drive.

3.03 FIELD QUALITY CONTROL

- A. Division 01 - Quality Requirements and Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.15.

END OF SECTION