

SECTION 23 05 15**HVAC ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT****PART 1 - DESIGN DIRECTIVES****1.1 SUMMARY**

- A. This section specifies the basic requirements for electrical components that are an integral part of packaged mechanical equipment.

1.2 DESIGN CRITERIA

- A. The consultant shall schedule on the drawings the brake horsepower of all motors 1/2 horsepower and greater.
- B. Motor brake horsepower shall be no greater than 90% of the nameplate horsepower rating.
- C. Variable frequency drives shall be used in lieu of multi-speed motors.

1.3 QUALITY ASSURANCE

- A. Electrical components and materials shall be UL labeled.
- B. NEMA Standards MG 1: Motors and Generators
- C. NEMA Standards ICS 2: Industrial Control Devices, Controllers, and Assemblies
- D. NEMA Standard 250: Enclosures for Electrical Equipment
- E. NEMA Standard KS 1: Enclosed Switches
- F. NEMA Standard E: Energy efficient motors
- G. Comply with National Electrical Code (NFPA 70)

PART 2 - PRODUCTS**2.1 MOTORS**

- A. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
- B. All motors shall be temperature rated for 40° C environment with maximum 115° C temperature rise for continuous duty at full load (Class F Insulation). All motors shall be rated for VFD duty whether or not originally intended for such use.
- C. Motor sizes $\leq 1/2$ horsepower shall be single phase, $\geq 3/4$ horsepower shall be three-phase.
- D. All motors shall conform with the following service factors:

Phase	Motor HP	Service Factor
Three	All	1.15
Single	1/2 → 1	1.25
	1/6 → 1/3	1.35
	1/20 → 1/8	1.4

E. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Design "E"

F. Bearings:

1. Ball or roller bearings with inner and outer shaft seals.
2. For fractional horsepower, light duty motors, sleeve type bearings are permitted in non-belt drive applications.
3. Greaseable, except permanently sealed where motor is normally inaccessible for regular maintenance.
4. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.

G. Single speed NEMA design B motors shall have efficiency ratings based on ANSI/IEEE 112-1984, test method B, using NEMA MG 1-1993, with all current revisions. All motors shall conform to the following:

OPEN DRIP PROOF MOTORS (ODP)			
HP	1200 RPM	1800 RPM	3600 RPM
1	82.5%	85.5%	77.0%
1.5	86.5%	86.5%	84.0%
2	87.5%	86.5%	85.5%
3	88.5%	89.5%	85.5%
5	89.5%	89.5%	86.5%
7.5	90.2%	91.0%	88.5%
10	91.7%	91.7%	89.5%
15	91.7%	93.0%	90.2%
20	92.4%	93.0%	91.0%
25	93.0%	93.6%	91.7%
30	93.6%	94.1%	91.7%
40	94.1%	94.1%	92.4%
50	94.1%	94.5%	93.0%
60	94.5%	95.0%	93.6%
75	94.5%	95.0%	93.6%
100	95.0%	95.4%	93.6%
125	95.0%	95.4%	94.1%
150	95.4%	95.8%	94.1%
200	95.4%	95.8%	95.0%

TOTALLY ENCLOSED FAN COOLED EXPLOSION PROOF MOTORS (TEFC)			
HP	1200 RPM	1800 RPM	3600 RPM
1	82.5%	85.5%	77.0%
1.5	87.5%	86.5%	84.0%
2	88.5%	86.5%	85.5%
3	89.5%	89.5%	86.5%
5	89.5%	89.5%	88.5%
7.5	91.0%	91.7%	89.5%
10	91.0%	91.7%	90.2%
15	91.7%	92.4%	91.0%
20	91.7%	93.0%	91.0%
25	93.0%	93.6%	91.7%
30	93.0%	93.6%	91.7%
40	94.1%	94.1%	92.4%
50	94.1%	94.5%	93.0%
60	94.5%	95.0%	93.6%
75	94.5%	95.4%	93.6%
100	95.0%	95.4%	94.1%
125	95.0%	95.4%	95.0%
150	95.8%	95.8%	95.0%
200	95.8%	96.2%	95.4%

- H. All motors, 1 horsepower and larger, shall have a minimum 85% power factor rating
- I. The nameplate shall be embossed metal and shall indicate the full identification of manufacturer, ratings, characteristics, construction, special features, nominal full load motor efficiency and similar information. Provide nameplate data for each motor installed in the O&M Manual.
- J. Polyphase Motors:
1. Description: NEMA MG 1, Design B, medium induction motor.
 2. Efficiency: Premium energy efficiency and comply with local utility company rebate structure.
 3. Stator: Copper windings, unless otherwise indicated.
 4. Multispeed motors shall have separate winding for each speed for motor with other than 2:1 speed ratio.
 5. Rotor: Random -wound, Squirrel cage, unless otherwise indicated.
 6. Bearings: Double-shielded, pre-lubricated ball bearings suitable for radial and thrust loading.
 7. Temperature Rise: Match insulation rating, unless otherwise indicated. Insulation shall be Class F, unless otherwise noted.
 8. Motors 15 HP and Larger shall have code letter designation, NEMA starting Code F or G. Motors smaller than 15 HP shall have manufacturer's standard starting characteristic.
 9. Motors using variable frequency controllers, shall be equipped with Aegis grounding rings

2.2 STARTERS, ELECTRICAL DEVICES, AND WIRING

- A. Refer to DC Standards Division 26 29 00 - Low-Voltage Controllers, for requirements.

PART 3 - EXECUTION

3.1 NO SPECIAL REQUIREMENTS

END OF SECTION 23 05 15