PHYSICAL FACILITIES

2020 Consultant’s Handbook
Division 23 HVAC
0513 Common Motor Requirements

1 Standards

1.1 General-Duty Motor specifications shall be based on the following standards.

- Have a precision balanced rotor of 0.0003” peak to peak.
- Motors > 3 hp. should have cast iron frames with grounding lugs
- Motors ≤ 3 hp. may be constructed of rolled steel.
- Be totally enclosed fan cooled
- Have shaft slingers on the drive end of the motor (when outside or in harsh environments).
- Motors > 5 hp shall use grease-able bearings with Mobil Polyrex or EM equivalent grease. Note: Each motor shall have a factory tag applied identifying what type of grease was installed at the factory.
- Have specified proper alignment
- An minimum insulation rating of Class F with a maximum Class B temperature rise at 1.15 Service Factor
- For all motors, motor frame, rotor, windings and bearings shall have the manufacturer’s standard warranty but no less than 18 months on PWM power, against manufacturers defect.
- Belted Designs for motors 404T frame and up and will utilize Roller bearings.

1.2 Inverter-Duty Motor specifications shall meet all the requirements of General-Duty Motors above or as superseded by the additional following standards:

- Be wound with inverter spike resistant copper wire rated at a minimum of 2000 volt CIV (Corona Inception Voltage Capability).
- An minimum insulation rating of Class H with a maximum Class B temperature rise at 1.15 Service Factor
- For motors controlled by VFD’s, be coordinated and rated for VFD use to prevent premature failure
- For motors controlled by VFD’s, either the motor rotors shall be grounded with a manufacturer’s supplied ground kit (e.g. AEGIS SGR Bearing protection kits) or motor shall be supplied with Inductive Absorbers (e.g. CoolBLUE Inductive Absorbers).

2 Horsepower, Voltage and Phases

2.1 Motors ≤ 1/2 Hp can be single phase, 120 volt AC.
2.2 Motors > 1/2 Hp should be three phase AC.
2.3 The three phase voltage shall be selected dependent on building power availability.
2.4 Single phase 240VAC motors should only be used when replacing equipment already serviced with this voltage or when it is the only available service voltage in the building.

Exception: Direct drive blower motors one half horsepower and less than can be single phase, 120 volt AC.

3 Efficiency

3.1 Design and specify motors that are labeled with a NEMA Premium label.

4 Preferred Speed, RPM

4.1 Standard motor speed is 1800 RPM.

Exception: Special speed motors can be used if reviewed and approved by the University engineers.

5 Motor Starter Controls and Variable Frequency Drives

5.1 Provide a motor starter control diagram for each motor.

Note: Control Function tables or columns in the Mechanical Equipment schedule sheets are not acceptable in lieu of the control diagrams.

5.2 Include all functions specified for the VFD control panel in the control diagram, including the manual start stop function.

6 Motor Nameplate Voltage Table

<table>
<thead>
<tr>
<th>Nominal System Voltage</th>
<th>Motor Nameplate Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>208</td>
<td>200</td>
</tr>
<tr>
<td>240</td>
<td>230*</td>
</tr>
<tr>
<td>480</td>
<td>460*</td>
</tr>
</tbody>
</table>

* Dual rated Motors – 230/460