PIP ELSMT01
Specification for AC Induction Motors Up to and Including 500 HP (370 kW)
PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

This Practice is subject to revision at any time.

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PUBLISHING HISTORY

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<tr>
<td>September 1997</td>
<td>Issued</td>
</tr>
<tr>
<td>June 2004</td>
<td>Complete Revision</td>
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<td>Complete Revision</td>
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Data Form

PIP ELSMT01D - Data Sheet for AC Induction
    Motors Up to and Including 500 HP
    (370 kW)
1. **Scope**

This Practice describes the requirements for design, construction, and testing for NEMA premium-efficiency, horizontal or vertical, polyphase squirrel cage induction motors that are 4000 volts and below, including hazardous (classified) areas.

2. **References**

Applicable parts of the following Practices and industry codes and standards shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles are used herein where appropriate.

**Industry Codes and Standards**

- American Society of Civil Engineers (ASCI)
  - ASCE/SEI 7 - Minimum Design Loads for Building and Other Structures
- Institute of Electrical and Electronics Engineers (IEEE)
  - IEEE 841 - Standard for Petroleum and Chemical Industry – Premium Efficiency Severe Duty Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors - up to and including 370 kW (500 hp)
  - IEEE 1349 - IEEE Guide for the Application of Electric Motors in Class I, Division 2 and Class I Zone 2 Hazardous (Classified) Locations
- National Electrical Manufacturers Association (NEMA)
  - NEMA MG 1 - Motors and Generators
- National Fire Protection Association (NFPA)
  - NFPA 70 - National Electrical Code (NEC)
- Underwriters Laboratories (UL)
  - UL 674 – Electric Motors and Generators for Use in Hazardous (Classified) Locations

3. **Definitions**

- **owner**: The party who owns the facility wherein the motor will be used.
- **purchaser**: The party who awards the contract to the supplier. The purchaser may be the owner or the owner’s authorized agent.
- **supplier**: The party responsible for providing the motor.

4. **Requirements**

4.1 **General**

4.1.1 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, this Practice describes induction motors with the following requirements:

a. Rated 1 HP through 500 HP
b. Rated for 3 phase 60 Hz electrical services
c. Rated 2 pole (3600 RPM), 4 pole (1800 RPM), 6 pole (1200 RPM), or 8 pole (900 RPM)
d. Voltage ratings of 200 V, 460 V, 575 V, 2300 V, or 4000 V
e. Enclosure types of TEFC (Totally Enclosed Fan Cooled), TENV (Totally Enclosed Non Ventilated), DP (Drip Proof), or Explosion Proof

4.1.2 The motor and accessories shall be suitable for the operating conditions specified on purchaser’s PIP ELSMT01 Data Sheet, and shall have a minimum service life of 25 years and at least a five year uninterrupted continuous operation, except for bearing maintenance.

4.1.3 When ammonia or H2S is listed as an environmental condition on the purchaser’s PIP ELSMT01 Data Sheet, there shall be no exposed copper or alloys with copper free parts.

4.1.4 Specific application and other requirements for each motor shall be in accordance with purchaser’s PIP ELSMT01 Data Sheet.

4.1.5 Motors specified for use in Class I Division 2 and Class I Zone 2 areas shall be in accordance with normal application guidelines as denoted by IEEE 1349. The manufacture shall supply descriptive data for accessories (thermal protectors, space heaters, etc.) use in motors specified for use in hazardous (classified) locations.

4.1.6 Unless otherwise specified on purchaser’s PIP ELSMT01 Data Sheet, the induction motor supplied shall be UL listed or other owner approved NRTL.

4.1.7 When specified on the purchaser’s PIP ELSMT01 Data Sheet, electrical components and their support to the site’s structure shall meet the seismic design requirements of ASCE/SEI 7 for nonstructural components. Unless specified otherwise on the purchaser’s PIP ELSMT01 Data Sheet the following shall apply when seismic design is required:

a. Risk Category IV
b. Component Importance Factor (I_P) of 1.5
c. Site Class D

4.2 Electrical Design

4.2.1 Unless otherwise specified on purchaser’s PIP ELSMT01 Data Sheet, motors shall be NEMA premium efficiency, severe duty, NEMA Design B, continuous duty cycle squirrel cage, induction type in accordance with IEEE 841.

4.2.2 Unless otherwise specified on purchaser’s PIP ELSMT01 Data Sheet, motors shall be capable of accelerating a load with 80% of rated voltage at the motor terminals where the load torque requirement varies with the square of the speed and the full-load torque requirement is equal to or less than the rated full-load torque of the motor. The load inertia for this condition shall be less than or equal to the maximum inertia given within NEMA MG 1 for four-pole and slower motors, and less than or equal to one half the inertia listed for two-pole motors.

4.2.3 When the motor speed-torque curve at the conditions specified in Section 4.2.2 is plotted over the load speed torque curve, the motor developed torque shall
exceed the load torque by a minimum of 10% (motor rated torque as base) at all locations throughout the speed range up to the motor breakdown torque point.

4.2.4 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, the motor voltage rating shall be 460 volts, 3 phase, 60 Hz.

4.2.5 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, dual voltage specified motors shall have six power leads.

4.2.6 The motor synchronous speed at 60 Hz shall be specified on purchaser’s PIP ELSMT01D Data Sheet as 3600 rpm, 1800 rpm, 1200 rpm, or 900 rpm. Other speed or frequency requirements shall be identified on purchaser PIP ELSMT01D Data Sheet.

4.2.7 If specified on purchaser’s PIP ELSMT01D Data Sheet, the motor shall be multispeed.

4.2.7.1 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, two speed motors shall have two windings.

4.2.7.2 The motor nameplate shall have additional information showing wiring diagrams and connection for each voltage and/or speed.

4.2.8 The insulation system of the motor shall be a minimum of Class F and comply with IEEE 841.

4.2.9 The temperature rise of motor shall be less than or equal to 80°C (176°F).

4.2.10 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, the motor shall be designed for operation at a Service Factor of 1.0. In applications that require overload capacity, a higher NEMA MG 1 base rating shall be used. When approved by the owner, the motor may be nameplated at a Service Factor of 1.15, however this service factor rating shall not be used for overload capacity.

4.2.11 Adjustable Speed Drive (ASD) applications shall be described on the purchaser’s PIP ELSMT01D Data Sheet.

4.2.12 Terminal Leads

4.2.12.1 Terminal leads shall be in accordance with NEMA MG 1.

4.2.12.2 Except for larger motors where two conductors per phase may be required for larger conductor sizes that will allow for flexibility, one terminal per phase, per conductor shall be provided.

4.3 Mechanical Design

4.3.1 Bearings and Lubrication

4.3.1.1 Bearings shall be re-greaseable without disassembly of fans or fan covers in accordance with IEEE 841.

4.3.1.2 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, bearings shall be suitable for and provided with rust-inhibiting grease compatible with polyurea grease.

4.3.1.3 Grease fittings shall only be provided on motors with re-greaseable bearings. Grease fitting shall be zerk type fitting unless otherwise indicated on the purchaser’s PIP ELSMT01D Data Sheet.
4.3.1.4 When oil is used as the lubricant, the bearing shall be equipped with constant level oilers. “Bulls-eye” sight glasses shall not be used to indicate oil level.

4.3.1.5 Bearing protection shall be in accordance with *NEMA MG 1*

### 4.3.2 Rotor and Shaft

4.3.2.1 Shaft runout shall be in accordance with *IEEE 841*.

4.3.2.2 Rotors shall be dynamically balanced at rated speed. The use of solder or similar deposits for balancing is not acceptable, balance washers are acceptable. The removal of rotor parent material to achieve dynamic balance is acceptable to the extent that the structural integrity of the rotating element is not comprised.

### 4.3.3 Enclosure

4.3.3.1 Unless otherwise specified on purchaser’s *PIP ELSMT01D Data Sheet*, motors shall be TEFC. Section 4.5 defines additional requirements for explosion proof motors.

4.3.3.2 Unless otherwise specified on purchaser’s *PIP ELSMT01D Data Sheet*, the motor shall be horizontally mounted. Section 4.4 defines additional requirements for vertically mounted motors.

4.3.3.3 Unless otherwise specified on purchaser’s *PIP ELSMT01D Data Sheet*, the motor frame, end shield, and fan cover construction and corrosion resistant treatment shall be in accordance with *IEEE 841*.

4.3.3.4 Shouldered eye bolts or cast provisions within the motor frame shall be provided for lifting and handling of the motor.

4.3.3.5 Motors shall have drain openings in compliance with *IEEE 841*.

4.3.3.6 Motor nameplates:
   a. Shall be mounted on the enclosure with stainless steel fastening pins.
   b. Shall have, as a minimum, all information as describes in *NEMA MG 1*.
   c. Motor bearing numbers shall be included on the nameplate.

### 4.3.4 Fans

4.3.4.1 Unless otherwise specified on the purchaser’s *PIP ELSMT01D Data Sheet*, all fans shall be bidirectional.

4.3.4.2 If unidirectional fans are specified, the direction of rotation shall be shown by permanent, legible markings.

4.3.4.3 Fans construction shall be compliant with *IEEE 841*.

### 4.3.5 Terminal Boxes

4.3.5.1 Motor terminal boxes shall be in accordance with *IEEE 841*.

4.3.5.2 Unless otherwise specified on purchaser’s *PIP ELSMT01D Data Sheet*, the location of terminal housing shall be as shown in *NEMA MG 1-2016*, Figure 4-6, assembly symbol F-1 (i.e., on the right-hand side, as seen from the non-drive end).
4.3.5.3 If specified on purchaser’s PIP ELSMT01D Data Sheet, an oversized terminal box shall be provided.

4.3.5.4 If specified on purchaser’s PIP ELSMT01D Data Sheet, an accessory terminal box shall be supplied.

4.3.5.5 If specified on purchaser’s PIP ELSMT01D Data Sheet, the motor terminal box shall be provided with inspection windows to facilitate online infrared thermography of the connections.

4.3.6 **Airborne Sound**

Sound pressure levels for motors shall be compliant with *IEEE 841*.

4.3.7 **Vibration**

Vibration levels for motors shall be compliant with *IEEE 841*.

4.4 **Requirements for Vertical Motors**

4.4.1 The bottom ventilating openings provided in the enclosure of vertical motors shall be guarded by baffles or by location to prevent the direct entrance of liquids that might be released by a pump seal failure.

4.4.2 Motor base type shall be as specified on purchaser’s PIP ELSMT01D Data Sheet, and have dimensions according to *NEMA MG 1*.

4.4.3 Bearing thrust loads shall be as specified on purchaser’s PIP ELSMT01D Data Sheet.

4.4.4 If specified on purchaser’s PIP ELSMT01D Data Sheet, anti-reversing ratchets shall be acceptable for use in Class I, Division 2 and Zone 2 area classifications. The design shall be approved by Owner.

4.4.5 Drip covers shall be provided on the non-drive end of vertical motors with totally enclosed fan-cooled enclosures. Covers shall prevent entrance of rain into the motor interior. Covers shall also block entrance of snow and sleet to prevent freeze-up of external fans on non-operating motors.

4.4.6 Unless specified otherwise on purchaser’s PIP ELSMT01D Data Sheet, all vertical motors shall have solid shafts.

4.5 **Requirements for Explosion Proof Motors**

4.5.1 Explosion-proof motors shall comply with the following:

4.5.1.1 *UL 674* and bear the UL listing mark or owner approved NRTL.

4.5.1.2 The design practices of *IEEE 841* to the extent allowed by *UL 674*.

4.5.2 Explosion-proof motors shall be supplied with stainless steel combination breather and drains or separate breather and drains. The drain and breather shall be UL listed.

4.5.3 Nameplates for explosion-proof motors shall include Temperature Class (T code) numbers as specified in the *NFPA 70*. 
4.6 Accessories

4.6.1 Space Heaters

4.6.1.1 If specified on purchaser’s PIP ELSMT01D Data Sheet, space heaters shall be provided for the motor, the main terminal box, and the accessory terminal box.

4.6.1.2 Space heaters and design shall be in accordance with IEEE 841.

4.6.1.3 Space heater leads shall be terminated in a housing separate from the motor terminal leads.

4.6.1.4 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, space heaters shall be 120 volts.

4.6.1.5 An engraved nameplate that contains the following statement shall be provided on the front of the terminal box containing space heater leads:

| CAUTION: |
| SPACE HEATERS MAY BE ENERGIZED |

4.6.1.6 The exposed surface of space heaters shall not be greater than 80% of the auto-ignition temperature specified on purchaser’s PIP ELSMT01D Data Sheet when operated at rated voltage.

4.6.2 Winding Temperature Detectors

4.6.2.1 If specified on purchaser’s PIP ELSMT01D Data Sheet, stator winding resistance temperature detectors (RTDs) shall be supplied.

4.6.2.2 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, RTD elements shall be platinum, three-wire elements with a resistance of 100 ohms at 0 °C (32 °F). The leads shall meet the requirements of NFPA 70.

4.6.2.3 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, a minimum of two sensing elements per phase shall be installed and distributed around the circumference in the stator winding slots.

4.6.3 Bearing Temperature Detectors

4.6.3.1 If specified on purchaser’s PIP ELSMT01D Data Sheet, bearing RTDs shall be supplied.

4.6.3.2 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, RTD elements shall be platinum, three-wire elements with a resistance of 100 ohms at 0 °C (32 °F). The leads shall meet the requirements of NFPA 70.

4.6.3.3 Bearing sensing element quantities shall be as specified on purchaser’s PIP ELSMT01D Data Sheet.

4.6.4 Vibration Detectors

If specified on purchaser’s PIP ELSMT01D Data Sheet, seismic vibration sensors or provisions for such shall be supplied and of the type specified.
4.7 Inspection and Testing

4.7.1 Unless otherwise specified on purchaser’s PIP ELSMT01D Data Sheet, the motor shall be tested in accordance with applicable requirements in IEEE 841.

4.7.2 If specified on purchaser’s PIP ELSMT01D Data Sheet, additional testing shall be performed.

4.8 Documentation

4.8.1 Certified copies of all test results shall be provided.

4.8.2 Documentation of the type and quantity shown in Table 1 and purchaser’s PIP ELSMT01D Data Sheet shall be provided for each type of motor.

4.8.3 If specified on purchaser’s PIP ELSMT01D Data Sheet, motor performance submittals as shown in Table 2 shall be provided for each type of motor.

<table>
<thead>
<tr>
<th>A With Bid</th>
<th>B For Review</th>
<th>C Final Certified</th>
<th>Description</th>
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<tbody>
<tr>
<td>X</td>
<td>X</td>
<td></td>
<td>Completed purchaser’s PIP ELSMT01D Data Sheet and location of motor manufacture</td>
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<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Dimensional outline drawing showing weight, location of terminal boxes, and all accessories</td>
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<tr>
<td></td>
<td>X</td>
<td></td>
<td>Certified test reports</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td></td>
<td>Installation, operation, and maintenance manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>Recommended priced spare parts list</td>
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</tbody>
</table>

NOTES:
A. These documents shall be provided with proposal.
B. These documents shall be provided for purchaser’s review and authorization to proceed before fabrication.
C. These documents shall be provided as part of the final certified document submittal.
### Table 2. Motor Performance Submittal

<table>
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<tr>
<td></td>
<td>X</td>
<td>X</td>
<td>Torque vs. RPM curves for 80% &amp; 100% nominal line voltage</td>
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<tr>
<td>X</td>
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<td>Motor performance: %Efficiency, Power Factor, Torque, RPM, Power (Watts), Current (Amps), vs. Percent of rated power output (HP) curves</td>
</tr>
<tr>
<td>X</td>
<td></td>
<td>X</td>
<td>Motor performance percent change: %Efficiency, Power Factor, Torque, RPM, Power (Watts), Current (Amps), vs. Percent of rated power output (HP) curves</td>
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<tr>
<td>X</td>
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<td></td>
<td>Motor derating factor vs. voltage percent unbalance curve</td>
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<td>X</td>
<td>X</td>
<td></td>
<td>Motor thermal damage curve</td>
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<td>Harmonic Derating Factor vs. Harmonic Voltage Factor curve based on typical ASD input line distortion</td>
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<td>a. ASD and motor of matched performance type</td>
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<td>X</td>
<td>b. ASD and motor same manufacture</td>
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<td>X</td>
<td>Recommended power factor correction capacitor kVAR rating</td>
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<td>X</td>
<td>Motor equivalent circuit with parameter values</td>
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<td>Induction motor time constants:</td>
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<td></td>
<td>a. Open circuit time constant for power transfer switching surge analysis</td>
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<tr>
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<td>X</td>
<td>X</td>
<td>b. Short circuit time constant and X/R ratio for power system fault current analysis</td>
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</table>

**NOTES:**
A. These documents shall be provided with proposal.
B. These documents shall be provided for purchaser’s review and authorization to proceed before fabrication.
C. These documents shall be provided as part of the final certified document submittal.

### 4.9 Conflict Resolution

Any conflicts between the following documents shall be identified to the purchaser in writing for resolution. If resolving conflicts, the following order of precedence shall apply:

a. Purchase order
b. *PIP ELSMT01D* Data Sheet(s)
c. This Practice, *PIP ELSMT01*
## SERVICE CONDITIONS:

**Ambient Temperature:**
- Max: _______ °C
- Min: _______ °C
- Humidity: _______ %

**Altitude:** _______ M
- Other:

**Area Classification:**
- Non-Classified
- Classified

**Class:** _______  
**Division:** _______  
**Group:** _______  
**Auto Ignition Temp:** _______ °C

**Seismic Design:**
- Required
- Not Required

**Site Location:**
- Latitude: _______  
- Longitude: _______

**Other:**
- Risk Category: X IV III Other:
- Component Importance Factor (I_b): X 1.5 Other:
- Site Class: X D Other:
- Seismic Certificate: Required Not Required
- Other:

- Exposed to a moist/moderate corrosive environment
- Site environmental data sheet attached
- Other:

## ELECTRICAL SYSTEM PARAMETERS:

- **Volts:** _______ kV
- **Phase:** 3
- **Hertz:** 60
- **Three Wire**
- **Four Wire**
- **Wye**
- **Delta**

**System Grounding:**
- Solid
- Ungrounded
- High Resistance
- Low Resistance
- Other:

**Ground Fault Current:** _______ AMPS

**Available Fault Current:** _______ kA Asymmetrical  
**X/R Ratio:** _______

- **One Line Diagram**
- Other:

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<th>DATE</th>
<th>REVISION DESCRIPTION</th>
<th>BY</th>
<th>APPROVED</th>
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</tbody>
</table>
APPLICATION REQUIREMENTS (4.1):

DRIVEN EQUIPMENT (4.1.4):

DRIVEN EQUIPMENT ROTATION (AS VIEWED FROM NON-DRIVE END OF MOTOR):
- CLOCKWISE
- COUNTERCLOCKWISE
- BI-DIRECTIONAL

TYPE OF CENTRIFUGAL LOAD:
- PUMP
- COMPRESSOR
- FAN
- OTHER:

LOAD INERTIA Wk2: _______ lb-ft² at _______ RPM
- OTHER:

DRIVER - MOTOR (4.1.4, 4.2.6, 4.2.12):

HP: _______ SYNCHRONOUS RPM: _______ @ _______ HERTZ:
- DIRECT COUPLED
- BELT DRIVEN
- OTHER:

MOTOR LOAD ACCELERATING CAPABILITY:
- LOAD TORQUE VARIES AS SPEED² & FL TORQUE REQUIRED IS ≤ RATED MOTOR FL TORQUE
- PROVIDED LOAD TORQUE AND INERTIA DATA

STARTING CONDITIONS:
- UNLOADED (e.g. VALVE/DAMPER CLOSED)
- LOADED (e.g. VALVE/DAMPER OPEN)
- PARTIAL LOADED (e.g. MIN.FLOW)
- OTHER:

MOTOR USE IN AN ADJUSTABLE SPEED DRIVE (ASD) APPLICATION (4.2.11)

- VARIABLE TORQUE SPEED MIN. RPM: _______ @ _______ lb-ft MAX. RPM: _______ @ _______ lb-ft
- CONSTANT TORQUE SPEED MIN. RPM: _______ @ _______ lb-ft MAX. RPM: _______ @ _______ lb-ft
- CONSTANT POWER SPEED MAX. RPM: _______ @ _______ lb-ft

STARTING VOLTAGE: X 80% OTHER:

STARTING METHOD:
- X ACROSS THE LINE
- REDUCED VOLTAGE
- AUTO TRANSFORMER
- ASD ONLY
- ASD + ACROSS THE LINE STARTING
- ASD START WITH BYPASS TO NORMAL POWER
- ASD WITH ACROSS THE LINE START AND BYPASS TO NORMAL POWER
- SOLID STATE STARTER
- LRC LIMIT DURING START: _______________________ %

OTHER:

MANUFACTURE SUPPLIED ACCESSORIES DESCRIPTIONS (4.1.5):

____________________________
____________________________
____________________________

UL LISTING (4.1.6):
- REQUIRED
- NOT REQUIRED
- OTHER: _______________________
ELECTRICAL DESIGN (4.2):

- **Motor Characteristics (4.2.1):**
  - X Premium Efficiency
  - [ ] Other:
  - X Severe Duty
  - [ ] Other:
  - X NEMA Design B
  - [ ] Other:
  - Duty Cycle: X Continuous
  - [ ] Other:

- **Electrical Characteristics (4.2.4, 4.2.5, 4.2.7, 4.2.10):**
  - Voltage: 460 Volts
  - Phase: 3
  - Hertz: 60
  - Dual Voltage Rated: [ ] Required
  - [ ] Not Required
  - X Six Leads
  - [ ] Other:
  - Multispeed: [ ] Required
  - [ ] Not Required
  - [ ] Two Speed
  - [ ] Two Windings
  - [ ] Other:
  - Service Factor: X 1.0
  - [ ] Other:

MECHANICAL DESIGN (4.3):

- **Lubrication (4.3.1.2):**
  - X Grease
  - X Polyurea
  - [ ] Lithium
  - [ ] Synthetic
  - [ ] Other:
  - [ ] Oil
  - [ ] Oil Mist
  - [ ] Other:

- **Grease Fitting (4.3.1.3):**
  - X Zerk
  - [ ] Other:

- **Enclosure (4.3.3):**
  - X TEFC
  - [ ] TENV
  - [ ] Drip Proof
  - [ ] Explosion Proof
  - [ ] Other:
  - Mouting (4.3.3.2):
    - X Horizontal
    - [ ] Vertical
    - [ ] Shaft Down
    - [ ] Shaft Up
  - Material (4.3.3.3):
    - [ ] Cast Iron
    - [ ] Cast Steel
    - [ ] Steel Plate
    - [ ] Other:
  - Corrosion Resistant Treatment (4.3.3.3): X Per IEEE 841
  - [ ] Other:

- **Fan Rotation (as viewed from non-drive end of motor) (4.3.4):**
  - X Bi-Directional
  - [ ] Clockwise
  - [ ] Counterclockwise
MECHANICAL DESIGN (4.3) (CONTINUED):

MOTOR TERMINAL BOXES:
LOCATION (4.3.5.2): X F-1 F-2 F-3 W-5 W-8 W-11
OTHER:

OVERSIZED TERMINAL BOX (4.3.5.3): REQUIRED NOT REQUIRED
IR INSPECTION WINDOWS (4.2.5.5): REQUIRED NOT REQUIRED
OTHER:

ACCESSORY TERMINAL BOXES (4.3.5.4): REQUIRED NOT REQUIRED
LOCATION (4.3.5.2): F-1 F-2 F-3 W-5 W-8 W-11
OTHER:

OVERSIZED TERMINAL BOX (4.3.5.3): REQUIRED NOT REQUIRED
OTHER:

VERTICAL MOTOR REQUIREMENTS (4.4):

FLANGE MOUNTING: P-BASE C-FLANGE D-FLANGE OTHER:
THRUST LOAD: DOWNWARD THRUST: lbf UPWARD THRUST: lbf
ANTI-REVERSING RATCHET: REQUIRED NOT REQUIRED
MOTOR SHAFT: X SOLID SHAFT OTHER:
OTHER:

ACCESSORIES (4.6):

SPACE HEATER (4.6.1):
MOTOR SPACE HEATER: REQUIRED NOT REQUIRED
VOLTAGE: X 120 VOLTS OTHER:
POWER REQUIRED: AMPS
MAIN TERMINAL BOX SPACE HEATER: REQUIRED NOT REQUIRED
VOLTAGE: X 120 VOLTS OTHER:
POWER REQUIRED: AMPS
ACCESSORY TERMINAL BOX SPACE HEATER: REQUIRED NOT REQUIRED
VOLTAGE: X 120 VOLTS OTHER:
POWER REQUIRED: AMPS
OTHER:

WINDING TEMPERATURE DETECTORS (4.6.2): REQUIRED NOT REQUIRED
X TWO PER PHASE ONE PER PHASE OTHER:
X 3 WIRE PLATINUM, 100 OHMS @ 0˚C OTHER:
OTHER:
ACCESSORIES (4.6) (CONTINUED):

BEARING TEMPERATURE DETECTORS (4.6.3):

- [ ] REQUIRED
- [ ] NOT REQUIRED
- [X] TWO PER BEARING
- [ ] ONE PER BEARING
- [ ] OTHER: ____________________________
- [ ] GROUND ONE COMMON LEAD
- [ ] OTHER: ____________________________

VIBRATION DETECTORS (4.6.4):

- [ ] REQUIRED
- [ ] NOT REQUIRED
- [ ] INSTALLED
- [ ] PROVISIONS ONLY
- [ ] OTHER: ____________________________

SENSOR TYPE: ____________________________

SENSOR MFG.: ____________________________

QTY / D.E. BEARING: ________
LOCATION (H,V,A): _________________

QTY / O.D.E. BEARING: ________
LOCATION (H,V,A): _________________

- [ ] OTHER: ____________________________

OTHER:

INSPECTION & TESTING (4.7):

- [X] TESTS PER IEEE 841
- [ ] OTHER:

ADDITIONAL TESTING AS DESCRIBED IN OTHER REQUIREMENTS:

- [ ] REQUIRED
- [ ] NOT REQUIRED

WITNESSED
- [ ] REQUIRED
- [ ] NOT REQUIRED

NOT WITNESSED

CERTIFIED TEST REPORTS:  

- [ ] REQUIRED
- [ ] NOT REQUIRED

SHIPPING:

- [ ] SUPPLIERS STD PREPARATION
- [ ] OTHER:

PRE-SHIPMENT SHOP INSPECTION:

- [ ] REQUIRED
- [ ] NOT REQUIRED

DOCUMENTATION (4.8):

PERFORMANCE SUBMITTALS PER TABLE 2 (4.8.3):

- [ ] REQUIRED
- [ ] NOT REQUIRED

ELECTRONIC DOCUMENT FORMAT:

- [X] DWG
- [X] PDF
- [ ] OTHER: ____________________________

SUPPLIER TO PROVIDE:

- [1] REPRODUCIBLE PLUS

- _______ COPIES OF ALL DOCUMENTS PLUS

- _______ COPIES OF OPERATING MANUALS

OTHER REQUIREMENTS:

__________________________________________________________________________

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DATA REQUIREMENTS FROM SUPPLIER (4.8.2):

- **FRAME SIZE:**
  - HP: __________
  - FULL LOAD SPEED: __________ RPM
  - FULL LOAD CURRENT: __________ AMPS

- **LOCKED ROTOR CURRENT @ FULL VOLTAGE:** __________ AMPS

- **ALLOWABLE STALL TIME @ FULL VOLTAGE:** __________ SECONDS

- **ALLOWABLE STALL TIME @ 80% VOLTAGE:** __________ SECONDS

- **INSULATION SYSTEM:**
  - CLASS ________
  - [ ] RANDOM WOUND
  - [ ] FORM WOUND

- **TEMPERATURE RISE AT RATED LOAD:** __________ °C
- **SERVICE FACTOR:** __________

- **NOISE SOUND POWER LEVEL:** __________ dBA

**BEARING INFORMATION:**

- **BEARING TYPE:**
- **LUBRICATION METHOD:**
- **RECOMMENDED LUBRICANT:**
- **TEMPERATURE RISE @ RATED LOAD:** __________ °C

**MANUFACTURE & NUMBER:**

**ODE:** __________

**TABLE 2 DATA REQUIREMENTS (CHECKED BOXES) FROM SUPPLIER (4.8.3):**

1) **TORQUE VS. RPM CURVES FOR 100% & 80% NOMINAL LINE VOLTAGE**
2) **MOTOR PERFORMANCE: % EFFICIENCY, POWER FACTOR, TORQUE, RPM, POWER (WATTS), CURRENT (AMPS), VS. PERCENT OF RATED POWER OUTPUT (HP) CURVES**
3) **MOTOR PERFORMANCE PERCENT CHANGE: % EFFICIENCY, POWER FACTOR, TORQUE, RPM, POWER (WATTS), CURRENT (AMPS) VS. PERCENT OF RATED POWER OUTPUT (HP) CURVES**
4) **MOTOR DERATING FACTOR VS. VOLTAGE PERCENT UNBALANCE CURVE**
5) **MOTOR THERMAL DAMAGE CURVE**
6) **HARMONIC DERATING FACTOR VS. HARMONIC VOLTAGE FACTOR CURVE BASED ON TYPICAL ASD INPUT LINE DISTORTION**
   a) **ASD AND MOTOR OF MATCHED PERFORMANCE TYPE**
   b) **ASD AND MOTOR SAME MANUFACTURE**
7) **RECOMMENDED POWER FACTOR CORRECTION CAPACITOR kVAR RATING**
8) **MOTOR EQUIVALENT CIRCUIT WITH PARAMETER VALUES**
9) **INDUCTION MOTOR TIME CONSTANTS**
   a) **OPEN CIRCUIT TIME CONSTANT FOR POWER TRANSFER SWITCHING SURGE ANALYSIS**
   b) **SHORT CIRCUIT TIME CONSTANT AND X/R RATIO FOR POWER SYSTEM FAULT CURRENT ANALYSIS**