|  |  |  |
| --- | --- | --- |
| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 22,2009 | Review/update of the document “Related Sections” |
| 3 | April 10, 2013 | Final Draft – Consolidated Comments Spec Update Project |
| 4 | June 17, 2013 | Finalized for Legal Review. Incorporation of new Commissioning and Computerized Maintenance Management System Data Requirements Specification cross references. |
| 5 | June 2, 2014 | Incorporation of Legal Comments (AV) |
| 6 | July 15, 2014 | Amended to reflect changes related to commissioning specification and name change (AV) |
| 7 | September 24, 2014 | Updated, Finalized Specification – Reference eDOCS #1029445-v5 (AV) |
| 8 | February 11, 2015 | Updated standards and made corrections/additions (AV) |
| **9** | **March 2, 2015** | **Updated, Finalized Specification – Legal Reference eDOCS #5043366 v12 (AV)** |
| 10 | November 11, 2016 | Updated NEMA MG-1 reference to 2016 new version (AV) |
| 11 | February 15, 2017 | Updated standards references. Updated Acceptable Manufacturers to be consistent with other specifications (CDP PMO) (AV) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GEneral

## Scope of Work

### The work of this Section includes providing [     ] submersible mixer(s), complete with [     ] mast assemblies and control panels, for installation in [basins and providing submersible mixers, complete with mast assemblies and control panels for installation in basin.]

### Unit Responsibility: The work requires that the submersible mixer(s) meeting design velocity gradient (G sec-1) and Gt (velocity gradient \* time, dimensionless) value requirements, complete with all accessories (including, but not limited to, electric motors, rail mounting system, carrier cable/chain and external contacts in Local Control Panel for control, be the end product of one responsible system manufacturer or responsible system supplier. Unless otherwise indicated in the Contract Documents, the Contractor shall obtain each system from the supplier of the equipment. The Contractor shall ensure that the supplier will furnish all components and accessories of the system to enhance compatibility, ease of operation and maintenance, and as necessary to place the equipment into operation in conformance with the specified performance, features and functions without altering or modifying the Contractor's responsibilities under the Contract Documents.

### The Contractor shall ensure that the submersible mixer manufacturer will coordinate mixer rail mounting details and all load requirements with the Contract Drawings and equipment to be installed in the zones in which submersible mixers are required.

### General Requirements: Refer to Division 1 - General Requirements for additional information and requirements that apply to the work specified herein and are mandatory for this Contract.

## Related Sections

### [Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.

### Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.

### This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]

### [List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### [List Sections specifying products installed but not supplied under this Section and indicate specific items.]

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### Summary of Applicable Cross Referenced Sections:

#### Section 01060 – Regulatory Requirements

#### Section 01250 – Substitutions

#### Section 01300 – Submittals

#### Section 01425 – Computerized Maintenance Management System Data Requirements

#### Section 01430 – Operation and Maintenance Data

#### Section 01600 – Material and Equipment

#### Section 01810 – Equipment Testing and Facility Commissioning

#### Section 01820 – Demonstration and Training

#### Section 05500 – Metal Fabrication General

#### Section 09900 – Painting and Protective Coatings

#### Section 11010 – Equipment General Requirements

#### Section 13390 – Package Control Systems

#### Section 16122 – Wires and cables

#### Section 16222 – Motors: 1 to 200 kW, 575V

#### Section 16260 – Low Voltage Adjustable Frequency Drive Systems

#### *Division 13 SCADA and Instrumentation – [insert applicable specifications]*

#### *[Product requirements for [item]... for installation under this Section.]*

#### *[List Sections specifying related requirements.]*

### Section 11010 – Equipment General Requirements.

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

## References

### Comply with the latest edition of the applicable codes, standards, and all amendments thereto of the following standard authorities:

#### ASTM - American Society for Testing and Materials:

##### ASTM A420/A420M-16, Standard Specification for Piping Fitting of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service.

#### ANSI - American National Standards Institute.

#### AWWA - American Water Works Association

#### UL – Underwriters Laboratory Inc.

#### ULC - Underwriters Laboratory Inc. Canada.

#### AISI – American Iron and Steel Institute.

##### AISI A48 40B

#### National Electrical Code (NEC)

#### NEMA – National Electrical Manufacturers Association.

#### NFPA – National Fire Protection Association.

#### Canadian Standards Association (CSA)

##### CSA C390-10 (R2015), Test Methods, Marking Requirements, and Energy Efficiency Levels for Three-phase Induction Motors.

## Submittals

### General: Administrative, shop drawings, samples, quality control, and Contract close-out submittals shall conform to the requirements of Section 01300 - Submittals.

### Shop Drawing and Samples: Provide shop drawings in accordance with the requirements of Section 01300 - Submittals.

### In addition to the requirements of Section 01300 - Submittals, submit the following additional detailed shop drawing information:

#### General layout of mixer, mast assembly and cable and/or chain assembly, complete engineering description and performance characteristics.

#### Manufacturer's catalogue information, descriptive literature, specifications and identification of materials of construction.

#### Detailed mechanical and electrical drawings showing the equipment fabrications and interface with other items. Include dimensions, size, and locations of connections to other work, and weights of associated equipment. Detailed electrical drawings must indicate interface with electrical system and controls.

#### Computational fluid dynamics reports analyzing the mixing characteristics to confirm design requirements are met.

#### Detail of motor.

#### Instrument details; including external contacts for temperature and moisture control in the local control panel at the mixers.

#### All other required information as detailed in the equipment information template in a format that is electronically suitable for upload to the Region’s CMMS (Maximo). All maintenance/equipment information shall conform to Section 01430 - Operation and Maintenance Data. Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

#### Mixer sizing calculations including all design data and assumptions.

#### List of recommended spare parts and cost of these parts at time of equipment supply.

#### Detail of tube steel or hollow structural sections (HSS) support bar used for supporting weight of mixer during lifting, including structural sizing calculations.

#### Details of lifting davit assembly.

#### Information on proposed factory-applied coating system(s). See Section 09900 – Painting and Protective Coating, for specific requirements. Include manufacturer’s descriptive technical catalogue literature and specifications, hazardous communication data sheets, and written manufacturer’s Certificate of Compliance that the factory-applied coating system(s) is identical to the requirements specified.

##### Where the proposed coating system(s) differ(s) from that which is specified in the Contract Documents, or where, in the manufacturer’s opinion, the proposed coating system(s) exceed(s) the requirements specified, submit the complete technical literature of the proposed system(s) to the Consultant for review.

### Motor Submittals:

#### Complete motor nameplate data, as defined by NEMA, motor manufacturer and including any motor modifications.

#### .2 Submit a report confirming that the motor efficiency meets the minimum motor efficiency standards and requirements in accordance with CSA C390-10 (R2015), Test Methods, Marking Requirements and Energy Efficiency Levels for Three-phase Induction Motors.

### Quality Control Submittals: Conform to the requirements of Section 01300 - Submittals.

### Operation and Maintenance Manual and Maintenance Summary: Provide an O&M Manual and maintenance summary in conformance with the requirements of Region’s standards for operating manuals.

#### All information (including data for lubricants) shall also be provided in electronic format suitable for uploading to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

## Extra Materials

### Tools: The work includes one complete set of special tools recommended by the manufacture for maintenance and repair of each separate type of equipment. The tools shall be stored in tool boxes and identified with the equipment number by means of stainless steel or solid plastic name tags that are attached to the box.

### Spare Parts:

#### All equipment shall be furnished with the specified manufacturers spare parts, as indicated in the individual equipment Specification Sections.

#### All information shall also be provided in an electronic format suitable for uploading to the Region’s CMMS (Maximo).

#### Spare parts shall be tagged by project equipment number and identified as to part number, equipment manufacturer, and subassembly component (if appropriate). Spare parts subject to deterioration, such as ferrous metal items and electrical components, shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping. Spare parts with individual weights less than [     ] kg and dimensions less than [     ] metres wide, or [     ] mm high, or [     ] metres in length, shall be stored in a wooden box with a hinged wooden cover and locking hasp. Hinges shall be strap type. The box shall be painted and identified with stenciled lettering stating the name of the equipment, equipment numbers, and the words "spare parts." A neatly typed inventory of spare parts shall be taped to the underside of the cover.

#### Provide the following spare parts and special tools:

|  |  |
| --- | --- |
| **Item** | **Quantity** |
|  |  |
|  |  |
|  |  |
|  |  |

## Product Delivery, Storage, And Handling

### Product delivery, storage, and handling shall comply with the requirements of Section 01600 - Material and Equipment.

### Delivery of Materials: Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.

### Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements. The Contractor is responsible for storage and security from theft.

### Protection of Equipment: Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry at all times. Mixers, motors, drives, electrical equipment, and other equipment with anti-friction or sleeve bearings shall be stored in weather tight and heated storage facilities prior to installation. For extended storage periods, plastic equipment wrappers shall not be used to prevent accumulation of condensate in gears and bearings.

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

*If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.*]

# PRODUCTS

## Manufacturers

### Where a manufacturer's standard equipment name and/or model number is listed, the equipment system shall be provided as modified to conform to the performance, functions, features, and materials of construction as specified herein.

### Acceptable Manufacturers:

#### KSB Pumps Inc.

#### ABS Group.

#### Grundfos Canada Inc.

#### Approved Equivalent.

## Service Conditions

### Liquid: Screened, de-gritted, primary settled sewage.

### Mixing Cycle: Continuous.

### Tank Configuration and Dimensions: As shown on the Contract Drawings.

## Performance Requirements

### [     ] Mixers:

#### Size mixers for no inflow and bottom re-suspension.

#### Maximum Propeller Speed: [     ] rpm.

#### Drive: Direct

#### Solids concentration 5,000 to 10,000 mg/L.

#### Minimum flow rates: [     ] per mixer for Zones [     ], [     ] per mixer for Zones [     ], and [     ] per mixer for Zone [     ].

#### Minimum thrust per mixer: [     ] per mixer for Zones [     ] per mixer for Zones [     ] and [     ] per mixer for Zone [     ]

### [     ] Mixers:

#### Size mixers for no inflow and bottom re-suspension.

#### Maximum Propeller Speed: [     ] rpm.

#### Drive: Direct

#### Solids concentration 0.5 – 1 percent.

#### Minimum flow rate: [     ].

#### Minimum thrust per mixer: per mixer.

## Equipment Description

### Materials: Manufacturer's standard, unless otherwise hereinafter specified.

### Mixer Description:

#### Each mixer shall be a submersible type. All components of the mixer, including motor and gear box (if applicable), shall be capable of continuous underwater operation while the mixer blade is completely submerged. In addition, all components of the mixer, including motor, shall be capable of continuous operation in air, completely un-submerged, for 60 minutes minimum.

#### Major mixer components for submersible mixers, including propellers, housing and brackets, shall be constructed of 316 stainless steel, AU8, Grade 35E, with smooth surfaces devoid of blow holes and other irregularities. All exposed nuts and bolts shall be constructed of 316 stainless steel.

#### Major mixer components for geared mixers shall be constructed of Class 35B cast iron with an epoxy coating in accordance with Section 09900 – Painting and Protective Coating. The propeller shall be constructed of 316 stainless steel.

#### Both geared and direct drive mixers shall be supplied with 304 stainless steel jet rings.

#### All mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber O-rings. Fitting shall be such that sealing is accomplished by metal to metal contact between machined surfaces. No secondary sealing compounds, rectangular gaskets, elliptical O rings, grease, or other devices shall be used.

#### The cable entry shall be an integral part of the stator casing. The cable entry shall be comprised of a conical cable holder with a flange bearing against a shoulder in the stator casing opening. The cable entry cone shall be constructed of gray cast iron AISI A48 40B. Sealing shall be accomplished by metal to metal contact between machined surfaces resulting in compression of the O ring. The cable shall be sized in accordance with National Electrical Code (NEC) standards and cast into the cable entry cone providing a leak-proof, torque free seal at the cable entrance. A terminal board in the motor is required for submersible mixers.

### Propeller:

#### The propeller shall consist of a minimum of three blades welded to the side of the hub. The blades shall be constructed of AISI 316 stainless steel. Propeller shaft shall be constructed of ASTM A420/A420M-16 stainless steel. 304 stainless steel jet rings shall also be supplied.

### Shaft and Seals:

#### Each mixer shall be provided with a double seal system consisting of a mechanical seal on the outer side and a radial shaft seal or a second mechanical seal on the inner side. The mechanical seals shall be the lapped and face type made of tungsten carbon or silicon carbide running in oil reservoirs for cooling and lubrication. Only the seal faces of the outer mechanical seal assembly and its retaining clips shall be exposed to the mixed liquid. The rotating portion of the outer mechanical seal on geared mixers shall be protected by a labyrinth seal.

### Motor:

#### Each mixer motor shall be squirrel cage, induction, shell type design, housed in an air filled, watertight chamber. The motor shall be rated for continuous duty, 460 volts, three-phase, 60 Hz with 1.10 or 1.15 service factor.

#### The stator winding shall be insulated with moisture resistant Class H insulation rated for [     ] degrees Celsius [     ] degrees Fahrenheit]. The stator shall be dipped and baked three times or trickle impregnated in Class H varnish.

#### The motor shall be designed for continuous duty and capable of sustaining at least 10 evenly spaced starts per hour.

#### The rotor bars and short rings shall be made of aluminum.

#### The motor shaft shall be made of shaft steel AISI 4340 or C1045 carbon steel. See Section 16222 - Motors: 1 to 200 kW 575V, for additional requirements that apply.

### Provide motor winding temperature sensor interface with an alarm relay in the local panel.

### Provide motor housing leakage sensor to interface with an alarm relay in the local panel.

### Motor power and thermostat conductors shall be routed together from the motor in a common, jacketed cable. Cable length shall be as specified in the Contract Documents.

### Motor Tests: The mixer manufacturer shall perform the following inspections and tests on each mixer before shipment:

#### An insulation test of the windings and balancing for the rotor.

#### A test of the mixer motor to check electrical data measurements at full load.

#### A submerged test of the unit in clean water.

#### A motor and cable insulation test for moisture content and insulation defects.

#### Confirmation of energy efficiency test and provision of a report detailing motor energy consumption to the Consultant.

### Mixer Mount Assembly:

#### Each mixer shall be equipped with a single guide rail type mast assembly designed to secure the mixer while in operation and guide the mixer during installation and removal for servicing. Each mast assembly shall consist of an upper support bracket assembly guide rail, a bottom mixer support, and a bottom bearing field rail bracket. All components of the mast assembly shall be constructed of 316 stainless steel.

#### The upper support bracket assembly shall provide a stable means of securing the mixer mast assembly to the top of [     ] basins and [     ] basin.

#### Each mixer stand shall provide support for the mixer during operation. It will also act as a guide during installation and removal of the mixer.

#### The bottom mixer support console shall be positioned to prevent the mixer blade tips from hitting the basin floor, and be clamped to the guide bars using six bolts. It shall be strong enough to support the weight of the mixer.

#### Provide intermediate guide supports as required.

## Lifting Davit Assembly

### For the [     ] basin, provide one lifting davit assembly for the [     ] mixers. For the [     ] basins provide lifting davit assembly for the six mixers located along the [     ].

### Provide a lifting davit assembly that includes a lifting davit with an adjustable boom and manually operated winch with a stainless steel lifting cable. The lifting assembly shall be capable of handling [     ] kg ([     ] lb).

### Provide a pedestal mount for each mixer location for the davit. Review the original design and coordinate any required re-design with the tank and roof supplier to match the support requirements of the tank design and to obtain the best practical design of supports and access openings.

### Provide a boom with a load rating suitable to lift equipment at full extension. The davit and winch shall be supplied and installed to raise and lower the mixing equipment complete from outside the tank at grade to inside the tank at floor level. The winch shall be easy operable by hand operator or electric drill. A hand operator shall be supplied with each davit and one reversible power lift drill kit and necessary attachments are to be supplied loose.

### Materials: Davit and winch stainless steel.

### Lifting cable: 316 stainless steel.

## Accessories

### Equipment Identification Plates: A stainless steel identification plate shall be securely mounted on the equipment in a readily visible location, using SST fasteners. The plant shall bear the die stamped equipment identification number indicated in this specification and/or as shown on the Drawings.

### Anchor Bolts: As specified in Section 05500 - Metal Fabrications General, 12 mm (1/2 inch) in diameter, minimum. All anchor bolts shall be made of 316 stainless steel.

### Lifting Lugs: Equipment weighing over 45 kg (100 pounds) shall be provided with lifting bracket(s).

### Lifting Chain: A stainless steel lifting chain shall be securely mounted on the equipment and extend to the top of the concrete roof of the [     ] basins and [     ] basin as shown on the drawings. Provide links/shackles in chain at [     ] metres ([     ] foot) intervals to accommodate tube steel support bar.

### Tube Steel Support Bar: A stainless steel, tube steel or hollow structural sections (HSS) bar shall be provided to support the weight of the mixers during lifting. Size the bar to accommodate the mixer and to fit in the link/shackle of the lifting chain.

## Electrical Components and Accessories

### General: Provide all necessary electrical components and wiring for a complete, functional system. Electrical components shall be provided in accordance with the requirements of Division 16 - Electrical.

### Provide electrical sub-metering and telemetry to the SCADA system for the mixer electrical motor(s), as required.

### Wiring: The Contract Drawings and Specifications indicate the anticipated wiring for the equipment provided under this Section. If additional wiring is required, or if required wiring does not match what is indicated in the Contract Drawings or the Specifications, the Contractor shall make the necessary modifications to the electrical wiring and documentation at no additional cost to the Region. All wiring shall meet the requirements of Section 16122 – Wires and Cables 0-1000V, and NFPA 70. All insulation shall be rated at a minimum of 600 volts.

## Controls

### In accordance with the general control requirements and component qualities specified in Section 13390 - Package Control Systems.

### In accordance with the operational requirements set out in Division 13 SCADA and Instrumentation and the Process Narrative/Process Control Narratives that are included as part of the Contract Documents in the SCADA Appendices.

### Panels:

#### Local field panels for each pump as listed under EQUIPMENT AND COMPONENT NUMBERS.

#### NEMA 4X, pedestal mount panels consisting of local control devices, relays, power supplies, and accessories.

### Operator Controls and Indicators (for each pump):

#### ON/OFF/REMOTE selector switch.

#### ON status light.

### External Interfaces: Provide the following interfaces from the local field panel to the external MCC motor starter.

#### ON, OFF, and REMOTE selector switch contact outputs.

#### HIGH TEMPERATURE contact output. Contact shall open on alarm.

#### MOISTURE LEAK contact output. Contact shall open on alarm.

#### Contact outputs rated for 5 A at 120 volts AC, minimum.

#### Receive motor ON contact closure input.

#### Receive alarm RESET contact closure input.

### Functional Requirements:

#### Monitor the motor winding temperature and provide a contact output at the local panel when detecting a predetermined high temperature condition as detailed in the Process Narratives/Process Control Narratives which are included as appendix documents to the Contract. [*Please ensure that the Process Narrative/Process Control Narratives are attached as appendix documents to the Contract]*

#### Monitor moisture leakage into the motor housing and provide a contact output at the local panel when detecting moisture or a fluid leak.

#### Reset the alarm outputs on receiving an external RESET signal.

### Power Requirements: 120 volts AC input to the panel. Provide power supply or transformer as required for the temperature and moisture alarm relay.

## Shop Fabrication

### Factory Finishing: Factory prime and finish coatings shall conform to the requirements of Section 09900 – Painting and Protective Coating, System No. [     ].

## Source Quality Control

### Factory Inspections and Tests: Mixer shall be tested for proper alignment, quiet operation, proper connection, and satisfactory performance. Provide written certification of these tests to the Consultant prior to shipping the mixers.

### Balancing: Rotating elements of equipment, except small, commercially packaged equipment, shall be statically and dynamically balanced at the factory prior to final assembly. The Contractor shall furnish certified copies of all test results.

### The Contractor is required to perform a vibration analysis and submit a vibration report required during SAT procedures. Refer to Division 13 - SCADA and Instrumentation for additional requirements and information.

### Option: Mixer shall have a vibration transducer installed and telemetered to the SCDA system in accordance with the Contract Drawings.

# EXECUTION

## Installation

### Mixers shall be installed in strict accordance with the manufacturer's recommendations, and the installation shall be certified as herein specified before testing.

### Lubricants: The installation includes oil and grease for initial operation.

## Field Quality Control

### Testing: Provide field functional testing.

### Commissioning shall be performed in accordance with Section 01810 – Equipment Testing and Facility Commissioning.

## Manufacturers' Services

### *[Consultant to revise number of Person-days depending on the number of mixers required]* The Contractor shall ensure that the manufacturer’s representative will be present at Site or the classroom designated by [the Region,] for the minimum number of Person-days listed below, travel time excluded:

#### 2 Person-days, 2 separate Site visits for installation assistance and inspection.

#### 2 Person-days, 2 separate Site visits for functional and performance testing, and completion of Manufacturer’s Certificate of Proper Installation

#### 0.5 Person-days, 1 designated classroom visit for pre-startup classroom or Site training.

#### 0.5 Person-days, 2 separate Site visits for facility startup.

#### 0.5 Person days, 1 Site or designated classroom visit for post startup training of the Region’s personnel.

#### The Contractor shall ensure that the training will be performed by a technically competent person who may be videotaped by Region staff during the session. Taped sessions will be used for refresher training or to train staff absent from the original training session.

#### Training shall be in accordance with the requirements of Section 01820 – Demonstration and Training and as augmented below:

##### 3 Person-days, 3 separate Site visits for installation assistance and inspection.

##### 3 Person-days, 3 separate Site visits for functional and performance testing, and completion of Manufacturer’s Certificate of Proper Installation

##### 0.5 Person-day, 1 designated classroom visit for pre-startup classroom or Site training.

##### 3 Person-days, 3 separate Site visits for facility startup.

##### 0.5 Person-days, 1 Site or designated classroom visit for post startup training of the Region’s personnel.

#### Training shall be in accordance with the requirements of Section 01820 – Demonstration and Training.

## Supplements

### The supplements listed below, attached following “End of Section”, form part of this Section:

#### Induction Motor Data Sheets:

##### [     ]

##### [     ]

**END OF SECTION**

|  |  |
| --- | --- |
| INDUCTION MOTOR DATA SHEET | |
| Project: | |
| Region: | |
| Equipment Name: | |
| Equipment Tag Number(s): | |
| Type: Squirrel-cage induction meeting requirements of NEMA MG 1-2016 or as per Specifications | |
| Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer | |
| Hazardous Location: Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark | |
| Motor Horsepower: | Guaranteed Minimum Efficiency at Full Load:  percent |
| Voltage: | Guaranteed Minimum Power Factor at Full Load:  percent |
| Phase: | Service Factor (@ rated max. amb. temp.): 1.0 1.15 |
| Frequency: | Enclosure Type:  Submersible |
| Synchronous Speed:   rpm | Mounting Type: Horizontal  Vertical |
| Multispeed, Two-Speed: | Vertical Shaft:  Solid Hollow |
| / rpm | Vertical Thrust Capacity (lb): Up  Down |
| Constant Horsepower | Adjustable Speed Drive: See Section 16260, LOW VOLTAGE |
| Variable Torque | ADJUSTABLE FREQUENCY DRIVE SYSTEMS. |
| Constant Torque | Operating Speed Range:  to % of Rated Speed |
| Winding: One Two | Thermal Protection: |
|  | Space Heater:  volts, single phase |
|  | Oversize main terminal (conduit) box for motors |
|  | Terminal for connection of equipment grounding wire in each  terminal box |
| Additional Motor Requirements: See Section | |
| Special Features: | |
| Leakage Sensor | |
|  | |

Table data shall be submitted in electronic format suitable for uploading to the Region’s CMMS (Maximo).

|  |  |
| --- | --- |
| INDUCTION MOTOR DATA SHEET | |
| Project: | |
| Region: | |
| Equipment Name: | |
| Equipment Tag Number(s): | |
| Type: Squirrel-cage induction meeting requirements of NEMA MG 1-2016 | |
| Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer | |
| Hazardous Location: Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark | |
| Motor Horsepower: | Guaranteed Minimum Efficiency at Full Load: percent |
| Voltage: | Guaranteed Minimum Power Factor at Full Load: percent |
| Phase: | Service Factor (@ rated max. amb. temp.): 1.0 1.15 |
| Frequency: | Enclosure Type: |
| Synchronous Speed:    rpm | Mounting Type: Horizontal Vertical |
| Multispeed, Two-Speed: | Vertical Shaft: Solid  Hollow |
| / rpm | Vertical Thrust Capacity (lb): Up Down |
| Constant Horsepower | Adjustable Speed Drive: |
| Variable Torque |  |
| Constant Torque | Operating Speed Range: to % of Rated Speed |
| Winding: One Two | Thermal Protection: |
|  | Space Heater: volts, single phase |
|  | Oversize main terminal (conduit) box for motors |
|  | Terminal for connection of equipment grounding wire in each terminal box |
| Additional Motor Requirements: See Section | |
| Special Features: | |
| Leakage Sensor | |
| Table data shall be submitted in an electronic format suitable for uploading to the Region’s CMMS (Maximo). | |