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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 22,2009 | Review/update of the document related sections and insertion of pre-approved suppliers’/manufacturers’ names |
| 3 | April 23, 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 | May 28, 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 #1029447-v5 (AV) |
| 8 | February 18, 2015 | Updated standards (AV) |
| **9** | **March 2, 2015** | **Updated, Finalized Specification – Legal Reference eDOCS #5043361 v13 (AV)** |
| 10 | November 11, 2016 | Updated NEMA MG-1 reference to 2016 new version and NFPA 70 (2017 edition) (AV) |
| 11 | February 14, 2017 | Updated standards references. Updated acceptable manufacturers (CPD PMO, OMM) (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:

#### Two rotary lobe, positive displacement blowers, complete with all accessories including inlet filters, silencers, sound enclosure, and all appurtenant work for installation in the carbon handling room.

#### One rotary lobe, positive displacement blower, complete with all accessories including inlet filters, silencers, and all appurtenant work for installation in the mechanical room of the screen and grit building.

#### An entire system functioning 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, meeting all performance and efficiency requirements defined in such documents.

### Unit Responsibility: The work requires that the rotary positive displacement blowers, complete with all accessories and appurtenances (including, but not necessarily limited to, electric motors, air flow meters, motor protective relays, electrical sub-metering (including telemetry to SCADA and SCADA programming and graphics development), inlet filter, inlet silencer, sound attenuation at the equipment area, discharge silencer, instruments, and components, 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 responsible supplier of the equipment, which supplier shall 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 requirements, features and functions without altering or modifying the Contractor's responsibilities under the Contract Documents. The Contractor shall provide the equipment systems as specified in this Section and in accordance with the design performance and other requirements of Division 13 and the Process Narrative/Process Control Narratives that are included as part of the Contract Documents in the SCADA appendices.

## 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.

[List Sections specifying related requirements.]

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

### 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 Fabrications General

### Section 09900 – Painting and Protective Coating

### Section 11010 – Equipment General Requirements

### Section 13390 – Package Control Systems

### Section 13400 – Programmable Automation Controllers

### Section 13400A – Programmable Automation Controllers – I/O Layout Appendix

### Section 16031 – Inspection and Testing

### Section 16051 – Installation of Cables in Trenches and Ducts

### Section 16122 – Wires and Cables 0 – 1000V

### Section 16220 – Low Voltage Variable Frequency Drive Systems

### Section 16260 – AC Induction Motors

### Division 13 – SCADA and Instrumentation [insert Process Narrative and other applicable specifications]

### Division 16 – Electrical [insert applicable specifications]

### Design Guidelines Section 12 - Electrical

### Design Guidelines Section 21 –Development and Maintenance of Asset Inventory and Tagging

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

## References

### Comply with the latest edition of the following statutes, codes, and standards, and where no standards are listed below a standards authority, all applicable codes and standards of that authority, and all amendments thereto:

#### Acoustical Society of America:

##### ANSI S1.4-2014 Electroacoustics - Sound Level Meters – Part 1: Specifications.

#### American Bearing Manufacturers' Association (ABMA).

#### American National Standards Institute (ANSI)

##### ANSI/ASME B1.20.1-2013, Pipe Threads, General Purpose, Inch

##### ANSI/ASME B16.1-2010, Pipe Flanges and Flanged Fittings

##### ANSI/ASME B16.5-2013, Pipe Flanges and Flanged Fittings

##### ANSI/ASME PTC 10-1997, Test Code on Compressors and Exhausters

##### ANSI/ASTM A48/A48M-03(2016), Standard Specification for Gray Iron Castings.

#### National Electrical Manufacturers Association (NEMA)

##### ANSI/NEMA MG 1-2016, Motors and Generators.

#### Underwriters Laboratories (of Canada ) UL, ULC

##### UL 674 Electric Motors and Generators for Use in Hazardous (Classified) Locations

#### National Fire Protection Association (NFPA) [Consultant to review NFPA 70 relative to Canadian Federal/Provincial fire codes and apply Canadian codes where possible]

##### NFPA 70: National Electrical Code, 2017 edition [Consultant to insert appropriate OEC requirements as appropriate]

#### Occupational Health and Safety Act, RSO 1990

## Definitions

### BHP: (Shaft) brake horsepower is the standard curve horsepower required corrected for pressure and temperature at inlet conditions. Units shall be expressed in kW and horsepower.

### icfm: Inlet volume in cubic feet per minute is the volume of air in CFM entering the blower at inlet conditions. Units shall be primarily expressed in SI units with imperial measurements as secondary.

### scfm: Standard volume in cubic feet of air per minute is the volume of air in CFM at 68 degrees Fahrenheit, 14.70 psi absolute (psia), and 36 percent relative humidity. Units shall be primarily expressed in SI units with imperial measurements as secondary.

### Discharge Pressure: The pressure in kPa (pounds per square inch) gauge kPaG (psig) at the blower discharge flange at rated capacity.

### Overall Efficiency: The total efficiency for motor, drive, and blower from the motor terminals to the pumped air.

## Submittals

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

### Shop Drawings 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:

#### Product Data: Furnish the following information:

##### A complete list of all system components to be provided.

##### For each component, all required information (as detailed in the equipment information template) must be provided in a format that is electronically up-loadable to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

##### Make, model, weight, kW and horsepower of each equipment assembly.

##### Complete catalogue information, descriptive literature, specifications, and identification of materials of construction.

##### Complete list of equipment tag names conforming to the Region’s tagging standard as detailed in the equipment information requirements of Section 21 –Development and Maintenance of Asset Inventory and Tagging.

##### Standard and specialized equipment assembly cuts.

##### Performance data for each type of equipment that shows compliance with the requirements of this Specification Section.

##### KW and horsepower demand over the operating range of the blower.

##### Factory calculated sound levels (dBA) of blower unit and silencers.

##### Identification of outside utility requirements for each component such as air, water, power, etc. Include operating parameters for all required utilities. The Contractor shall be familiar with the facility’s power quality so that any electrical components (including VFDs) can fully function under typical levels of power quality as delivered by the Local Distribution Company (LDC). The Contractor shall provide electrical devices to protect electrical components (including VFD’s) from sags and swells experienced from the LDC at no additional cost to the Region.

##### A list of suggested spare parts to maintain the equipment in service for a period of five years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information. The spare parts list and other relevant spare parts data shall be submitted in a format suitable for uploading to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

##### A list of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance shall be provided in a format suitable for upload into the Region’s CMMS (Maximo).

##### Special shipping, storage and protection, and handling instructions.

##### Routine maintenance requirements prior to plant startup. All records of routine maintenance performed by the Contractor prior to hand-over to the Region must be provided in electronic format suitable for uploading to the Region’s CMMS (Maximo).

#### Shop Drawings: Furnish the following information:

##### Detailed structural, mechanical, and electrical drawings showing the equipment fabrications and interface with other items.

###### 1. Include dimensions, size, and locations of connections to other work.

###### 2. Include information on weights of all major equipment.

###### 3. Include information on sound enclosure dimensions, sound attenuation measures and installation procedures.

##### System layout, installation, and placing drawings for equipment, drivers, and bases.

##### Complete wiring diagrams of the blower protective monitoring system including the baseplate-mounted terminal junction box and equipment monitoring panel.

### Wiring and Control Diagrams:

#### Wiring and control diagrams shall be furnished for all equipment, panels, and instrument components in accordance with the requirements of Section 01300 - Submittals for shop drawings and in accordance with Division 13 – SCADA and Instrumentation.

#### Point-to-point wiring and control schematic diagrams shall conform to the format and content requirements contained in Section 13400 – Programmable Automation Controllers, Section 13400A – Programmable Automation Controllers – I/O Layout Appendix including:

##### Panel construction and face layout drawings.

##### Complete model numbers for all control system components.

##### Catalogue cuts of each blower control system component, including monitoring panel components.

### Information Submittals:

#### Certificate of Proper Equipment Application: With the initial shop drawing submittal or substitution request, provide a completed Certificate of Proper Application as described in Section 01300 - Submittals. Submittal review will not be conducted without this completed certificate.

#### 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 Section 01430 - Operation and Maintenance Data. Refer also to Section 01425 - Computerized Maintenance Management System Data Requirements.

## Product Delivery, Storage and Handling

### Product delivery, storage, and handling shall comply with Section 01600 - Material and Equipment. The Contractor shall be responsible for all aspects of delivery, security, maintenance during long-term storage and handling of any Products.

### Delivery of Materials: Products shall be delivered in its 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.

### 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. Motors, drives, electrical equipment, and other equipment with antifriction, 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 the accumulation of condensate in gears and bearings.

## Extra Materials

### Three replacement filters for the in-line filter system.

### Complete set of special tools.

### All data for extra materials to be provided in electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

## 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

## General

### See Section 01600 - Material and Equipment, for specific requirements related to the equipment specified herein.

### Safety Devices: The completed work shall include all necessary permanent safety devices, such as machinery guards, emergency stops, and similar items required by OHSA and other federal, provincial, and local health and safety regulations.

### Flanges and Pipe Threads: Flanges on equipment shall comply with ANSI B16.1-2010, Class 125; or B16.5-2013, Class 150, unless otherwise indicated in the Contract Documents. Threaded flanges and fittings shall have standard taper pipe threads complying with ANSI/ASME B1.20.1-2013.

### Bearings:

#### Bearings shall conform to the standards of the American Bearing Manufacturers Association, Inc. (ABMA).

#### Except where otherwise indicated in the Contract Documents, bearings of process equipment shall have a minimum L-10 life expectancy of 100,000 hours.

## Manufacturers

### Where a manufacturer's standard equipment name and/or model number is listed in these specifications, the equipment system shall be provided as modified to conform to the performance requirements, functions, features, sub-metering, SCADA linkage and materials of construction as specified in this Specification Section and the Contract Documents.

### Ensure that the supplier will provide detailed energy use performance metrics under a defined set of operating conditions which will be verified during SAT activities in order to ensure that the Region’s energy optimization objectives are met.

### Acceptable Manufacturers:

#### Aerzen Canada Inc.

#### Blower Engineering, Inc.

#### Roots Systems Ltd.

#### Approved Equivalent.

## Performance Requirements

### Inlet Condition at Inlet Flange: [     ] degrees Celsius, degrees Fahrenheit, [     ] percent relative humidity and [     ] kPa, [ ] psia (altitude [     ] metres, feet above sea level).

### Blower(s) design rating for continuous duty at specified inlet conditions:

|  |  |  |
| --- | --- | --- |
|  | Equipment Tag Name | Equipment Name |
| Quantity |  |  |
| Flow rate | Standard m3 /min  [     ] scfm | Standard m3 /min  [     ] scfm |
| Discharge pressure  at discharge flange | [     ] kPa gauge  [     ] psig | [     ] kPa gauge  [     ] psig |
| Blower speed | 3,600 rpm, maximum | 3,600 rpm, maximum |
| Motor kW horsepower | [     ] kW  [     ] hp | [     ] kW  [     ] hp |

### Blower(s) performance data to be provided in accordance with the subsection 2.3.2 Table, above, at the following treatment design capacities:

#### 25% design capacity.

#### 50% design capacity.

#### 75% design capacity.

#### 90% design capacity.

### The silencers for blowers shall effectively attenuate pulses produced by the blowers and shall attain the following minimum attenuation characteristics at flow rates of [     ] standard m3/min standard m3/min (scfm) at an inlet pressure [     ] kPaA (psia) and blower discharge pressure of [     ] psig. Inlet/Discharge silencer pressure drop shall not exceed [     ] mm (inches) of water. End connections shall be 57 kilogram (125-pound) steel flanges sized to match blower connections/size at the blower connections and 150 mm (6-inch) at the silencer inlet and outlet. The connections shall be drilled to match the supplied flexible connectors.

The inlet silencer shall attain the following minimum attenuation characteristics:  
Octave Band  
Mid Frequency (Hertz) 63 125 250 500 1K 2K 4K  
Attenuation, db 30 33 35 37 35 33 32  
  
The discharge silencer shall attain the following attenuation characteristics:  
Octave Band  
Mid Frequency (Hertz) 63 125 250 500 1K 2K 4K  
Attenuation, db 35 37 39 40 42 40 38

### The silencers for the blower shall effectively attenuate pulses produced by the blower and shall attain the following minimum attenuation characteristics at flow rates of [     ] standard m3/min (scfm) at an inlet pressure [     ] kPa absolute (psia) and blower discharge pressure of [     ] psig. End connections shall be 57 kilogram (125-pound) steel flanges sized to match blower connection size at the blower connections and 100 mm (4-inch) at the silencer inlet and outlet. The connections shall be drilled to match the supplied flexible connectors.

The intake silencer shall attain the following minimum attenuation characteristics:  
Octave Band  
Mid Frequency (Hertz) 63 125 250 500 1K 2K 4K  
Attenuation, db 30 33 35 32 35 33 32  
  
The discharge silencer shall attain the following attenuation characteristics:  
Octave Band  
Mid Frequency (Hertz) 63 125 250 500 1K 2K 4K  
Attenuation, db 35 37 39 40 42 40 38

## Equipment Description

### Aeration Blowers:

#### Impellers shall be made from ductile iron or an approved equivalent. The impellers shall be of the straight, two-lobe involute type, and shall operate without rubbing or liquid seals or lubrication. The impellers shall be dynamically balanced and center-timed. First critical speeds shall not occur at or below maximum rotational speeds.

#### Casings shall be one-piece, with separate head-plates, and shall be made of close grained cast iron.

#### The impellers shall be timed by a pair of carburized and ground steel spur gears.

#### Blower shafts shall be made of alloy steel, and shall be pressed into the impeller body and pinned. Any proposed substitute materials (equivalent in nature) must be approved by the Consultant.

#### The impeller and shaft assembly shall be supported by spherical or cylindrical anti-friction bearings.

#### The blower shall be splash oil lubricated by the gears on the gear end and a shaft mounted slinger on the drive end. The blower shall have Viton lip seals to prevent oil from entering the airstream. The seals shall be vented to the atmosphere between the rotor chamber and covered in order to prevent pressurizing the lip seals.

#### The blower shall be driven with a V-belt system. Provide a V-belt drive with a suitable guard meeting the requirements of the OHSA and its regulations.

### Intake Filters:

#### Air intake filters shall be the inline type suitable for direct mounting in the air piping. The filter element shall be the cartridge type fabricated from a pleated paper media with an efficiency of 99 percent on 1 micron particles. The housing shall be designed to withstand a full vacuum or [     ] kPa (psig). The rated capacity of the filter for the backwash air blower shall be [     ] m3/min (cfm) with a clean pressure drop of approximately [     ] mm (inches) of water. The rated capacity of the filter for the channel scour air blower shall be [     ] m3/min (cfm) with a clean pressure drop of approximately [     ] mm (inches) of water. End connections shall be 57 kg (125-pound) steel flanges of the size shown on the Contract Drawings.

#### Intake filters shall be provided with 13 mm (0.5 inch) tapped connections on the inlet and discharge sides of the filter for differential pressure instrument connections.

#### Provide differential pressure gauges to measure the pressure drop across the intake filter. The gauge shall be provided with a 0 to 38 mm (15 inches) water column (wc) range and be accurate within 2 percent. Gauges shall be factory mounted in control panels hereinafter specified.

#### Differential pressure shall be conveyed to the SCADA system in accordance with the operational requirements set out in Division 13 SCADA and Instrumentation and the Process Narrative/Process Control Narratives that included as part of the Contract Documents in the SCADA Appendices.

### Inlet and Discharge Air Silencers:

#### The blower intake/discharge silencer shall be a heavy-duty industrial combination silencer designed especially for large rotary lobe type, positive displacement blowers operating above the transition speed. They shall have acoustic absorption sections at the inlets and arrangements of ported tubes and snubbing chambers.

#### The combination silencers shall be for horizontal mounting with motor and blower baseplates as shown on the Contract Drawings. The units shall be fabricated of welded steel and suitable for operating conditions of [     ] kPa gauge (psig) pressure and [     ] mm (inches) of mercury vacuum at temperatures up to [     ] degrees Celsius (C) on the intake side and [     ] kPa gauge (psig) at temperatures up to [     ] degrees Celsius (C) on the discharge side. Absorptive material shall be made of polyester or another inert fibre only with the approval of the Consultant. Fibreglass will not be accepted.

#### Sound attenuation for the room in the area of the blowers is required not to exceed specified noise levels three metres away from the equipment.

### Flexible Connections: The blower shall be provided with flexible elastomer bellows at the blower inlet and outlet flanges and at the inlet/discharge silencer inlet and outlet. Elastomer bellows shall be pressure-spool single arch expansion joint type with 57 kilogram (125-pound) ANSI flanges, retaining rings, and control rods. Elastomer bellows shall be rated for 93 degrees Celsius (200 degrees Fahrenheit) operating temperature.

### Pressure Relief Valve: Provide a pilot-cylinder, weight loaded, pressure relief valve designed to relieve [     ] m3/min, cfm at [     ] kPa gauge (psig) for the backwash air blowers and [     ] m3/min, cfm at [     ] kPaG (psig) for the channel scour air blower. Weight shall be field adjusted to prevent the valve from relieving at a normal blower discharge pressure.

### Sound Enclosure: Each unit shall be covered with a fibreglass reinforced plastic acoustic hood with sound attenuating insulation. The hood shall reduce noise levels to less than 85 dBA measured 4 feet away from the installed units. The hood shall be provided with stainless steel hinges and a lockable stainless steel hasp. Ample space shall be provided under the hood to prevent blower and motor overheating.

## Electrical Components

### 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.

#### Motor starters for constant-speed, 460-volt motors (or as supplied/provided to the facility) shall be provided in a separate motor control centre specified in Division 16 - Electrical unless otherwise indicated in the Contract Documents. Provide all necessary control functions to properly interface with this motor starter.

### Wiring: The Contract Drawings and Specifications indicate the anticipated wiring for the equipment provided under this Section. All wiring shall meet the requirements of Section 16122 – Wires and Cables 0-1000V and NFPA 70 *[Consultant to replace with OEC if appropriate]*. All insulation shall be rated a minimum of 600 volts. All low voltage (24V) signals shall be run in twisted, shielded pair cables.

### Electrical Raceways: All electrical wiring shall be installed in conduits meeting the requirements of Section 16051 – Installation of Cables in Trenches and Ducts. All raceways shall also be installed in accordance with Section 16051 – Installation of Cables in Trenches and Ducts and NFPA 70 *[Consultant to replace with OEC if appropriate]*.

## Motors

### Provide squirrel-cage AC induction motors meeting the requirements of Section 16405 - AC Induction Motors, and as specified in this Section.

### In addition, the motors shall meet the specific requirements listed in Division 16 – Electrical.

## Controls

### All instrumentation and controls work of this section shall be in accordance with the requirements of Section 13390 - Package Control Systems. Provide all items not specifically called out which are required implementing the specified functions and the functions required for proper system operation.

### Electrical sub-metering for all specified motors including all required wiring to the PAC and SCADA systems, including appropriate SCADA programming and graphics as defined in the operational requirements set out in Division 13 SCADA and Instrumentation and the Process Narrative/Process Control Narratives included in the SCADA appendices.

### Control Panels: Provide the following control panel(s):

|  |  |  |  |
| --- | --- | --- | --- |
| **Panel No.** | **Name** | **NEMA Rating** | **Mounting** |
|  |  |  |  |
|  |  |  |  |

### Operator Controls and Indicators: As a minimum, provide the following functions on the face of each control panel:

#### Hand Switches:

##### LOCAL/OFF/REMOTE (selector switch).

##### Blower START/STOP (pushbuttons).

##### Alarm RESET (pushbutton).

#### Alarm Indicating Lights:

##### Blower FAULT.

##### Blower HIGH DISCHARGE PRESSURE.

##### Blower HIGH TEMPERATURE.

##### Common FAIL alarm.

#### Status Indicating Lights:

##### Power ON.

##### Blower ON/OFF.

#### Other Panel Devices:

##### Blower Elapsed Run Time Meter (hours, non-resettable).

##### Inlet Filter Differential Pressure Indication.

### Functional Requirements:

#### When the LOCAL/OFF/REMOTE hand switch is in the LOCAL position, the blower is controlled with the local START/STOP pushbutton.

#### When the LOCAL/OFF/REMOTE hand switch is in the REMOTE position, the blower is started by the SCADA RUN signal and stops when the RUN signal is removed.

#### Shut down the blower system upon blower FAIL alarms.

#### Provide any necessary fail-safe interlocks required to protect the equipment.

#### Generate a common FAIL alarm to indicate the presence of any of the following conditions:

##### HIGH DISCHARGE PRESSURE.

##### HIGH DISCHARGE TEMPERATURE.

##### Blower FAULT.

##### Any abnormal shutdown condition.

#### The FAIL alarm is reset and individual alarm lamp is de-energized (indicating OFF) only after the removal of that particular alarm and pushing the RESET pushbutton.

### External Interfaces: Provide the following external interfaces to other equipment not provided under this Section:

#### Specialized electrical monitoring systems (EnerVista – provided by General Electric Canada) for electrical sub-metering and other motor control relay (Multilin 469) data that is distinct from the SCADA and PAC systems.

#### Discrete Outputs from Control Panels: Provide the following maintained contact outputs, which will be used as discrete inputs by the SCADA. Contacts shall be made of noble metal or hermetically sealed, and shall be suitable for 0.2 A at 24V dc and 0.5 A at 120V ac.

##### Blower ON status.

##### Blower hand switch in PLC position.

##### Blower common FAIL alarm.

#### Discrete Inputs from the Plant SCADA: Accept the following contact inputs to the control panel. Contacts will be rated for 2 A at 120V ac. Sensing voltage shall be 120V ac. Provide an interposing relay if a contact rating greater than 2 A is required.

##### Blower RUN.

#### Discrete Outputs to MCC: Provide maintained dry contact outputs rated for 10 A at 120V ac for use in motor starter circuit.

##### Blower RUN.

#### Electrical sub-metering instantaneous power data shall be as defined in Design Guidelines Section 12 – Electrical and Division 16 - Electrical. Power display to be by local digital indicator (if distinct from the motor control relay) and conveyed to the SCADA system 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.

#### Discrete Inputs from MCC: Accept the following dry contact maintained inputs from motor starter circuit rated 0.5 A at 120V ac. Sensing voltage supplied by control panel shall be 120V ac. Motor starter and starter circuits shall be provided as specified under Division 16 - Electrical.

##### Blower ON.

##### Blower FAULT (overload tripped).

### Power Requirements: The panels shall operate from individual 20-amp, 120-volt, single-phase, 60-Hz power source(s).

## Accessories

### Anchor bolts shall be as specified in Section 05500 - Metal Fabrications General. The number and size of the anchor bolts shall be in accordance with the manufacturer’s recommendations.

### Lifting Lugs: Equipment weighing over 100 pounds shall be provided with lifting lugs.

### Inlet and outlet bearing vibration sensors: Telemetry to the motor control relay and the SCADA system with all appropriate programming and graphics completed in accordance with the operational requirements set out in Division 13 - SCADA and Instrumentation and the Process Narrative/Process Control Narratives included in the SCADA appendices.

### Equipment Identification Plates: Provide a 16-gauge Type 316 stainless steel identification plate and securely mounted a plate on each separate equipment component and control panel(s) in a readily visible location. Plates shall bear 3/8-inch high engraved block type black enamel-filled equipment identification number and letters.

## Shop Fabrication

### Shop Finishing: Shop prime and finish coatings shall conform to the requirements of Section 09900 – Painting and Protective Coating.

# EXECUTION

## General

### Packaged Equipment: When any system is provided as pre-packaged equipment, coordination shall include space and structural requirements, clearances, utility connections, signals, outputs, and features required by the manufacturer, including safety interlocks.

## Installation

### Install in accordance with the manufacturer's recommendations. Mount the blower, driver, and combination silencer on a concrete base as shown on the Contract Drawings. The size of the concrete base shall be determined by the dimensions of the blower, driver, and combination silencer and shall be at least 6 inches wider and longer than the base and in accordance with the details shown on the Contract Drawings. Anchor bolts shall be accurately placed with templates. Coat the bolt thread projections with lubricant in order to facilitate future nut removal.

### Install the sound enclosure in accordance with the manufacturer's recommendations.

### Adjust the blower assemblies such that the driving units are properly aligned, plumb, and level within the blower manufacturer's tolerances with the driven units and all interconnecting shafts and couplings so that a proper hot alignment results. Flexible couplings shall not be considered to compensate for misalignment.

### All strain from attached piping shall be eliminated from the blower, and any evidence of blower or driver misalignment, noisy operation, or other signs of improper setting shall be corrected by the Contractor. The blower and drivers shall be doweled to the baseplate after the final alignment has been checked under operating conditions. Care during storage, installation, and lubrication shall be in strict accordance with the manufacturer's recommendations.

### Filter Startup: Prior to startup, the filter housings shall be cleaned of any trash, loose dirt or dust by vacuuming and hand wiping. The inside walls of the intake pipe shall also be thoroughly cleaned of dust and dirt. This procedure is to ensure that particles from inside the filter housing and intake pipe do not enter the blower during startup.

### Lubricants: The installation includes oil and grease for initial operation. All lubricant MSDS and basic data shall be provided in an electronic format suitable for uploading to the Region’s CMMS (Maximo). Refer to Design Guidelines Section 21 –Development and Maintenance of Asset Inventory and Tagging and Section 01425 - Computerized Maintenance Management System Data Requirements.

## Painting

### Field Finishing: Field finish coatings shall conform to the requirements of Section 09900 – Painting and Protective Coating.

## Field Quality Control

### Functional Test: Prior to plant startup, all equipment described herein shall be inspected for proper alignment, proper connection, normal operation, and satisfactory performance by means of a functional test. The functional test report shall be submitted to the Consultant for approval and the Region for sign-off.

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

## Manufacturers’ Services

### Manufacturer’s Representative: The Contractor shall ensure that the manufacturer’s representative will be present at Site or the classroom designated by Region, for the minimum number of Person-days listed below, travel time excluded:

#### 2 Person-days for installation assistance and inspection.

#### 2 Person-days for functional and performance testing and completion of the Manufacturer's Certificate of Proper Installation.

#### 2 Person-days for facility startup.

#### 2 Person-days for training of Region's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been submitted to and reviewed by the Consultant.

#### 2 Person-days for post-startup training of the Region's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed and approved by the Consultant.

#### Perform Demonstration Training in accordance with Section 01820 – Demonstration and Training in conjunction with the above requirements.

### See Section 01640 - Manufacturers’ Services and Section 01810 - Equipment Testing and Facility Commissioning.

## Supplements

### The supplement listed below, attached following “End of Section”, forms part of this Section:

#### Data Sheet 11376-01 Induction Motor Data Sheet.

**END OF SECTION**

|  |  |
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| DATA SHEET 11376-01 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/ULC 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: 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 16220, AC Induction Motors | |
| Special Features: | |
| Data shall be provided in an electronic format suitable for upload to the Region’s CMMS. | |