

**REQUEST FOR PROPOSALS  
REPLACEMENT BLOWER  
HARRIMAN UTILITY BOARD  
WASTEWATER TREATMENT PLANT**

Harriman Utility Board (HUB), Harriman, Tennessee is requesting proposals (RFP) from qualified Suppliers for one (1) screw-type rotary blower, controls, and accessories to replace an existing positive-displacement blower at the Wastewater Treatment Plant in Harriman, Tennessee.

Included with this request are the applicable technical specifications (Appendix A) and a copy of relevant Reference Drawings (Appendix B) of the existing blower room.

The design basis is Aerzen Delta Hybrid Model D25S as reflected in the technical specifications. It is not the intent of the specification to exclude equipment of equivalent type and performance.

Proposal Content

The proposal shall contain the following items:

1. Lump sum price(s) for furnishing and delivery of the blower, control panel, accessories, and services as specified herein.
2. Equipment information and system design parameters, including but not limited to anticipated blower performance.
3. Preliminary blower layout drawings. The blower manufacturer shall be responsible for adapting the equipment to the existing structure.
4. Itemized list of equipment, materials, and services to be furnished, together with a list of items and services to be furnished by others.
5. Expected submittal schedule and equipment delivery schedule.
6. List of exceptions to or deviations from the specifications (if any). If none, state "No Exceptions."
7. Brief summary of experience with blower systems and a list of at least ten (10) municipal installations in the U.S. of similar type and size to that required for the Wastewater Treatment Plant. Include system capacity and date completed. Provide name and telephone number of person to contact at the plant.
8. Brief summary and anticipated cost of recommended periodic maintenance and replacements including costs and interval.
9. Brief, concise summary of any advantages, which are unique to the suppliers' system or equipment, compared to other blower systems.

Additional information is neither desired nor requested. Proposals which contain numerous or significant exceptions to the specifications may be considered nonresponsive.

Proposal Submittal

Proposals shall be labeled "Proposal For WWTP Digester Blower" and be submitted to:

## Harriman Utility Board WWTP – Blower Replacement

Attn: Courtney Walker  
Harriman Utility Board  
PO Box 434  
200 N Roane St.  
Harriman, TN 37748

Proposals will be accepted until 2:00 p.m. EDT September 24, 2024.

### Basis of Selection

This proposal is part of an evaluated selection process. HUB will consider factors other than evaluated price in making the final selection. These factors may include, but are not limited to, capacity, process flexibility, mechanical simplicity and reliability, ease and frequency of maintenance, experience, and technical support capability. HUB may waive any informality and make a selection at its sole and absolute discretion, which it deems to be in its best interest.

A responsive supplier is one who provides the information requested above and who proposes to furnish the blower, controls, and accessories as specified herein. A qualified supplier is one who has been regularly engaged in the manufacture and furnishing of packaged blower systems for a minimum of five (5) years and who has a minimum of ten (10) blower systems in satisfactory operation in the U.S. of similar type and similar or larger size to that required for the wastewater treatment facility.

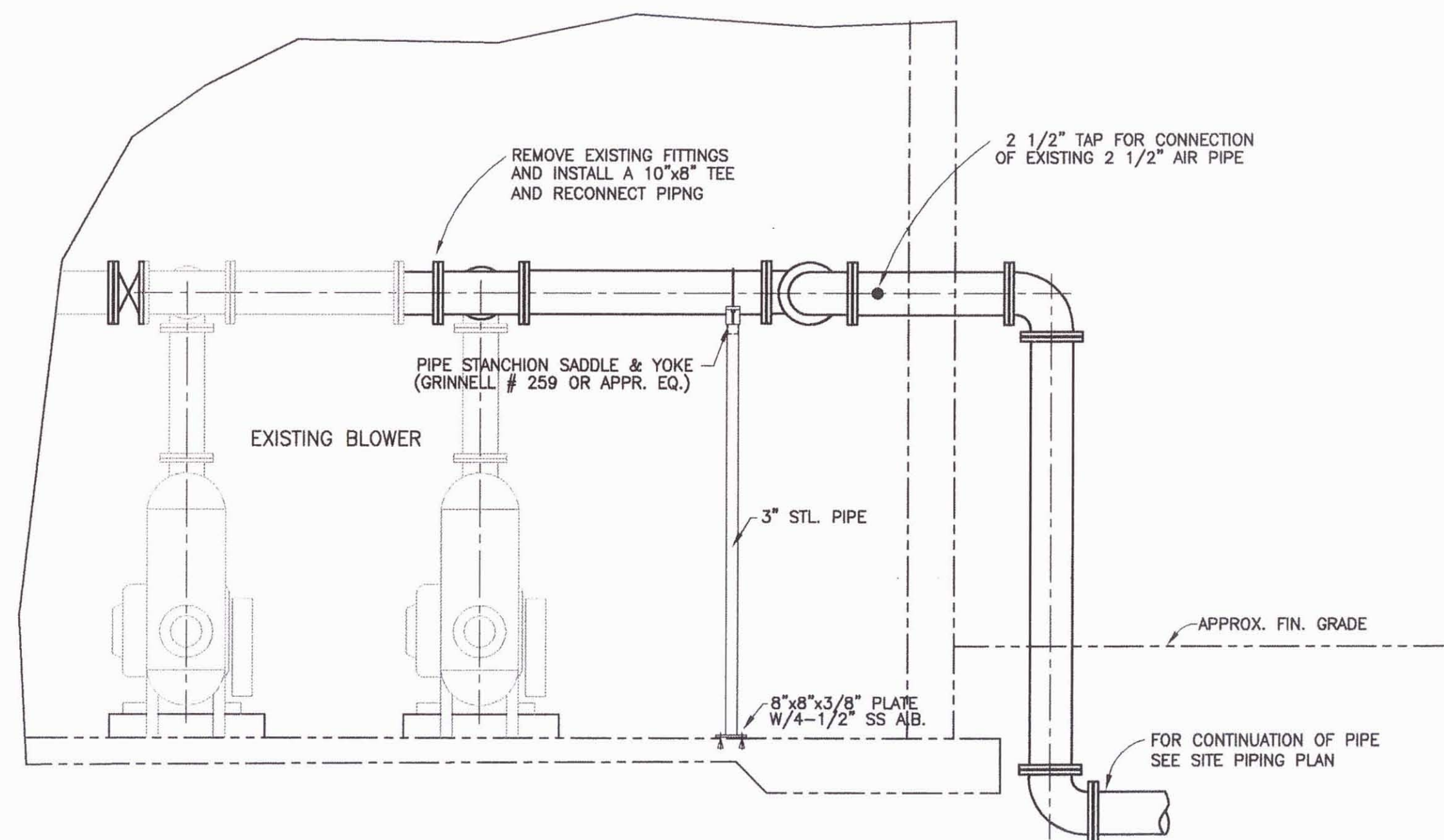
Interviews with suppliers are not planned at this time. However, HUB may decide to conduct interviews with one or more suppliers if it deems that such meetings would be beneficial to the selection process.

Suppliers who respond to the Request for Proposals will be notified in writing of the final selection.

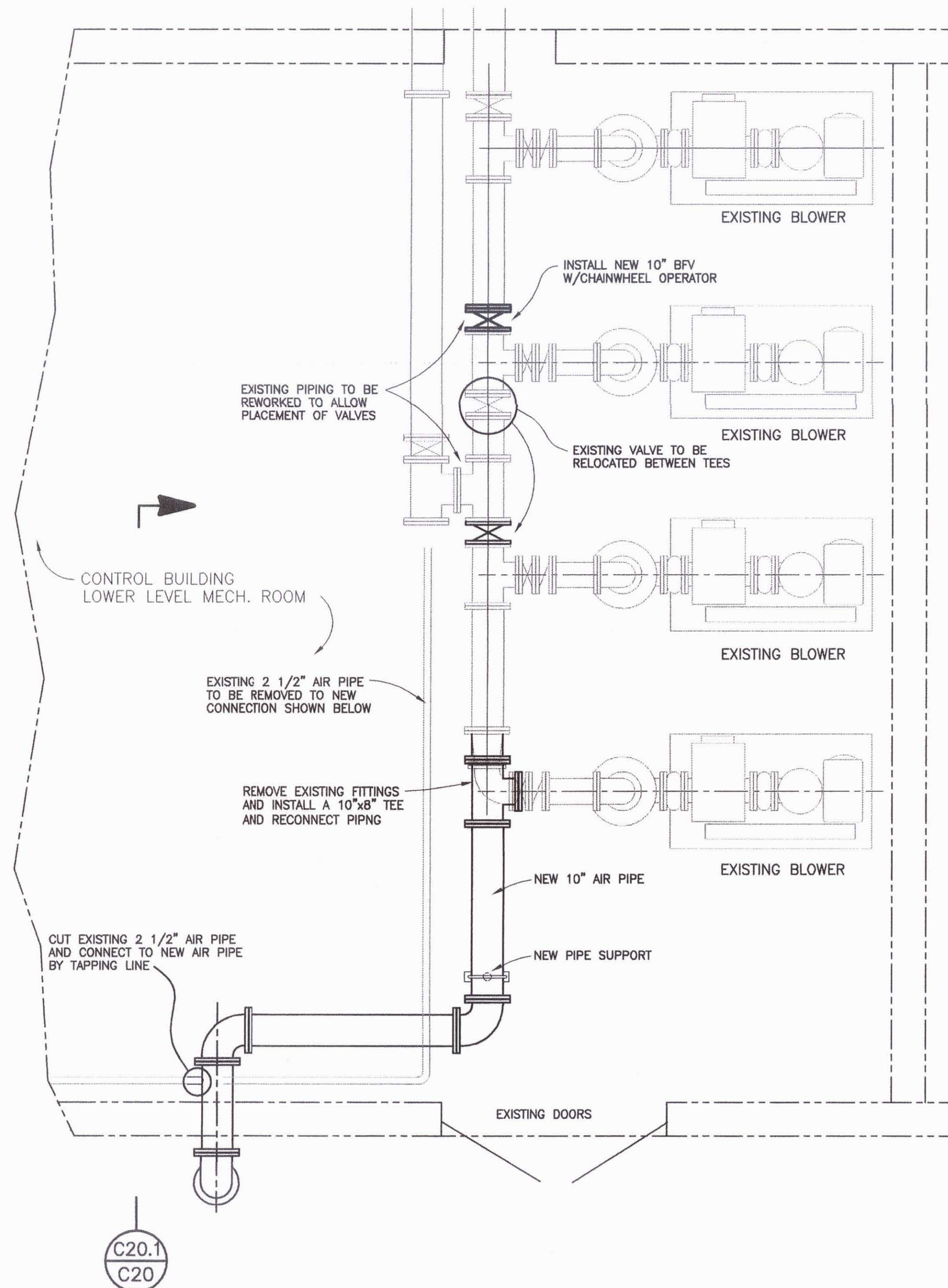
### Conditions

1. The pricing provided in the Supplier's proposal shall be valid for three (3) months from the Proposal Date listed above.
2. HUB reserves the right to abandon this request for proposals in its entirety and to make no selection.

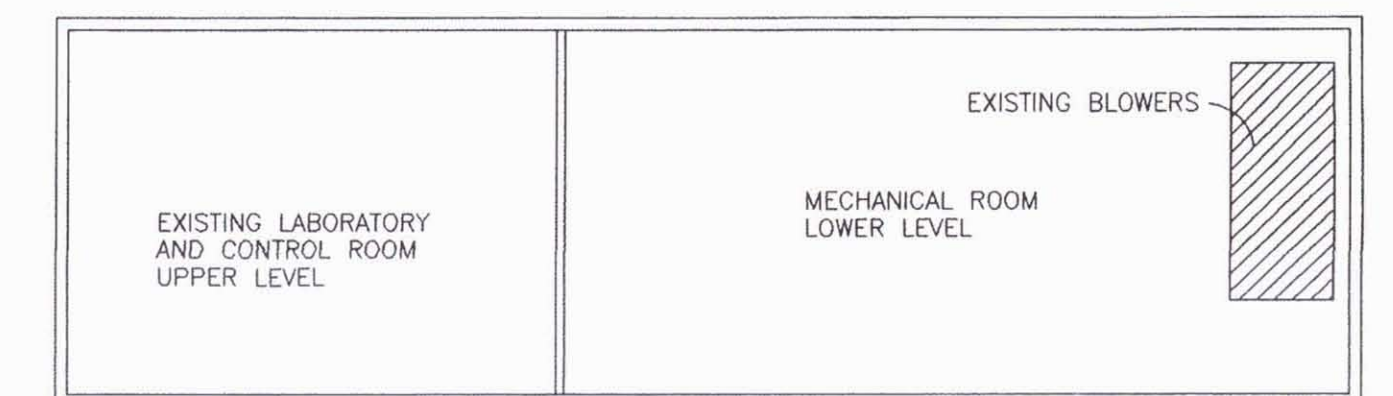




SECTION C20.1  
SCALE: 3/8" = 1'-0"



PLAN - EXISTING BLOWERS  
SCALE: 3/8" = 1'-0"



PLAN - EXISTING CONTROL BUILDING  
SCALE: 1/16" = 1'-0"

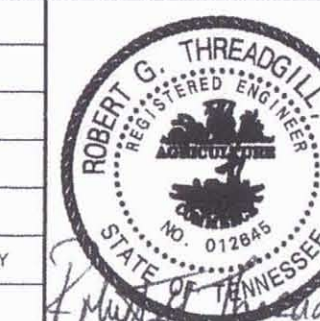
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**GRW**  
GRW Elrod Dunson, Inc.  
Engineers, Architects, Planners

ENGINEER/ARCHITECT: *Robert Threadgill*  
CONSTRUCTION COMPANY: *Judy Construction*  
DATE: *6/23/2005*

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NO.	DESCRIPTION	DATE	BY



GRW PROJECT NO. 7601-10

**RENOVATION EXISTING BLOWERS  
PLAN AND SECTIONS  
WASTEWATER TREATMENT PLANT UPGRADE  
HARRIMAN UTILITY BOARD - HARRIMAN, TENNESSEE**

**GRW**  
GRW Elrod Dunson, Inc.  
Engineers, Architects, Planners  
LEXINGTON LOUISVILLE INDIANAPOLIS  
NASHVILLE KNOXVILLE

DESIGNED: RGT	DATE: SEPTEMBER, 2002
DRAWN: DGR	SCALE: AS NOTED
REVIEWED: RGO	SHEET NO. C-20
APPROVED: RGT	

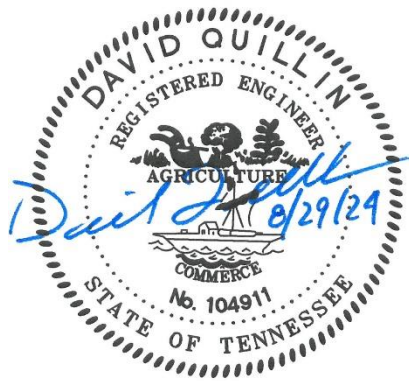
9-30-02



SPECIFICATION

FOR

PURCHASE OF REPLACEMENT BLOWER  
HARRIMAN UTILITIES BOARD  
HARRIMAN, TENNESSEE



Prepared by:

240 W. Bessemer St.  
Alcoa, Tennessee 37701

**C2RL, INC**  
engineers

Job Number: 519.03  
Date: August 2024

## **SECTION 11372 ROTARY LOBE COMPRESSORS**

### **PART 1 - GENERAL**

#### **1.01 SCOPE OF WORK**

- A. Furnish all equipment, and incidentals required for Owner installation of ONE (1) new rotary lobe compressor(s) and appurtenances, as shown on the Drawings and as specified herein.
- B. The entire package and its components shall comply with all applicable safety and environmental regulations.

#### **1.02 RELATED WORK**

- A. Valves, except as otherwise specified herein, are provided by the Owner.
- B. Instrumentation work, except as otherwise specified herein, is by Owner.
- C. Electrical work, except as otherwise specified herein, is by Owner.

#### **1.03 SUBMITTALS**

- A. Submit for approval electronic copies of all materials required to establish compliance with this Section. Submittals shall include at least the following information:
  - 1. Certified general arrangement drawings showing materials, details of construction, dimensions and connections.
  - 2. Complete Performance Data at the Design Point and all specified operating points including:
    - a. Actual Operating Speed (RPM) and % of maximum rated speed
    - b. Capacity – scfm and icfm
    - c. Design inlet conditions, pressure, temperature, and relative humidity (%)
    - d. Discharge pressure
    - e. dB(A) noise pressure level
    - f. Blower Shaft HP, Motor HP and Package HP
  - 3. List of recommended spare parts broken down into on hand parts and long term for 2 years operation and 3 to 5 years operation.
  - 4. Descriptive Brochures
  - 5. Motor Data
  - 6. Instrumentation and Wiring Diagram
  - 7. ISO-1217 Factory Performance Test Results. Slip test results shall not be unacceptable as an alternate. Manufacturer shall provide documented results for the purchased machines. Typical or average data shall not be acceptable.

8. ISO-8573-1 Class Zero Oil Free Certificate
  9. Declaration of Conformity, per Machinery Directive 2006/42/EC, Annex II, No.1 A.
- B. Complete blower package operating and maintenance instructions professionally published, hard copy and electronic copy, shall be furnished for all equipment included under these specifications.

#### 1.04 QUALITY ASSURANCE

##### A. Qualifications

1. Package shall be Aerzen Delta Hybrid Model D25S or equivalent. Regardless of manufacturer, the package shall be produced by the manufacturer of the blower stage, to ensure single source responsibility for blower performance and compatibility of associated accessories.
2. The equipment shall be designed, constructed, and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the Drawings.
3. The rotary lobe compressors shall be covered by a warranty for 24 months from date of commissioning, or 30 months from date of shipment, whichever occurs first.

#### 1.05 BLOWER PERFORMANCE CRITERIA

- |                                 |                                       |
|---------------------------------|---------------------------------------|
| 1. Quantity of Machines         | 1                                     |
| 2. Design Inlet Temperature     | 100 °F                                |
| 3. Site elevation               | 800 ft                                |
| 4. Design Inlet Pressure        | 14.27 psia                            |
| 5. Design Relative Humidity (%) | 80 %                                  |
| 6. Design Flow                  | 580 scfm per machine                  |
| 7. Minimum Turndown             | 85 scfm per machine                   |
| 8. Design Discharge Pressure    | 9.15 psig                             |
| 9. Maximum Blower Speed         | 6,630 RPM                             |
| 10. Brake Horsepower (Max)      | 30 bHp                                |
| 11. Motor Size (Max)            | 40 Hp                                 |
| 12. Free Field Noise Guarantee  | 70 dB(A) at 1 meter (at design point) |

(1) Package BHP to include pressure loss through a clean inlet filter / silencer, pressure loss of the exhaust silencer and check valve.

(2) Package Performance shall be guaranteed to ISO 1217 with a tolerance is +/- 5% on volume flow and +/- 5% on package horsepower. Manufacturer of blower shall provide data for purchased machine.

(3) Sound data shall be from an ISO 2151 method of measurement, in an ISO 3745 qualified test facility. Sound data shall be compliant with a Declaration of Conformity assessment standard.



## 1.06 DELIVERY, STORAGE AND HANDLING

- A. All equipment shall be completely factory assembled, skid mounted, crated, and delivered to protect against damage during shipment.
- B. All exposed flanges shall be covered and sealed with shrink-wrap to prevent the entrance of moisture or debris. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- C. All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

## 1.07 MAINTENANCE

### A. Spare Parts

- 1. Furnish the following spare parts for each blower package specified:
  - a. Complete set of matched V-belts
  - b. One inlet air filter element
  - c. One oil filter element
  - d. One volume of oil for first service interval
- 2. Spare parts shall be properly bound and labeled for easy identification without opening the packaging.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Rotary Lobe Compressor Packages shall be designed to minimize the life-cycle costs and maximize plant reliability. The design and the selection of the components shall be based on a minimum useful life of 20 years and a Mean Time Between Overhauls of 5 years of continuous operation. Bearing life shall be submitted by manufacturer of the blower stage, based on specified conditions.
- B. No special foundations shall be required. The packages will be installed directly on a concrete slab without grouting the base frame. There shall only be 4 easily accessible anchor points.
- C. Manufacturer shall guarantee that the rotary lobe compressor shall provide oil-free operation and be certified to ISO 8573-1 Class Zero.
- D. Blower Casing:
  - 1. The casing shall be of one-piece construction, with separate side plates that are bolted and pinned to the housing.
  - 2. Casing materials shall be close-grained cast iron ASTM A48 suitably ribbed to prevent distortion under the specified operating conditions.
  - 3. Inlet and outlet shall be flanged connections, not threaded.
  - 4. Airflow shall be vertical top to bottom with inlet and outlet connections offset so that the flow travels horizontally across the blower stage. Casings that do not utilize a horizontal internal flow shall not be allowed.



5. The vibration level as measured at the casing, in the X/Y planes of the bearings, shall not exceed 0.3 "/sec RMS when operating at the specified operating pressure and speed. The vibration level shall be checked at start-up and documented in the field start up report.

E. Factory Testing:

1. Each rotary lobe compressor stage shall be factory performance tested in accordance with ISO 1217 standards to verify flow and brake horsepower. A slip test shall not be acceptable, nor is average data for the manufactured size.
2. The acceptance criteria are +5% tolerance on power and -5% tolerance on flow regardless of the size of the machine.
3. The manufacturer shall submit free field noise data for the complete blower package. The results have been obtained using an ISO 2151 method of measurement, in an ISO 3745 qualified test facility. The performance data shall include a Declaration of Conformity, per Machinery Directive 2006/42/EC, Annex II, No.1 A.

F. Rotors:

1. Each rotor (male and female) shall be of the "stiff" design with first lateral critical speed at least 120% of the maximum allowable operating speed.
2. The rotors shall operate without rubbing nor shall they require lubrication.
3. Rotors shall be drop-forged in one single piece of AISI 1043 or equivalent, machined to final tolerance. Minimum material tensile strength shall be 620Mpa. Lesser precision cast iron rotors with surface coatings shall NOT be accepted.
4. Open rotors shall not be acceptable.
5. For maximum strength and reliability, the female rotor shall be driven by the drive motor and the male rotor shall be driven by the timing gear set. Stages that utilize a male driven rotor shall not be accepted.
6. A male and female rotor configuration with internal compression ratio and axial flow entry must be used to increase the adiabatic efficiency of the blower stage. Twisted rotor profiles applied for pulsation cancelation only shall not be allowed. Radial flow entry type rotors shall not be allowed.
7. Only precision-machined rotors with sealing strips to optimize clearance and performance shall be accepted. Manufacturers using coated rotors are required to include the following additional services in their proposal, with a broken-out adder to their proposed cost:
  - a. For the first 5 years of service, the manufacturer (not the packager) will visit the site. Each machine will be shut down and visually inspected for evidence of degradation. Inspection will include clearance measurement with feeler gauges. An annual report will be submitted, including photographs, for each machine.
  - b. An annual performance test will be performed on site, including flow and power measurement, for each machine. The results will be compared to the original ISO-1217 test results for each machine, and a report submitted to the owner and the engineer.

- c. Any sign of performance loss or coating degradation will be monitored. If the engineer or owner determine that the results pose a threat to the reliability of the aeration system over the first five years, the manufacturer will, at their own expense (including parts and labor) replace the designated compressor stage, or overhaul and recoat the existing stage, depending on the number of units affected by the degradation.
  8. Rotors shall be statically and dynamically balanced per ISO1940/ANSI S2.19 G2.5.
- G. Bearings:
  1. Each rotor/shaft shall be supported by anti-friction bearings and fixed to control the axial location of the rotor/shaft in the unit.
  2. Regardless of theoretical bearing life calculations, the bearings shall be sized for a minimum expected life of 5 years between overhauls.
  3. The applied design conditions shall yield a bearing load and minimal L-10 bearing life calculation of 100,000 hrs. Calculated bearing life shall be submitted, based on specified operating conditions.
- H. Timing Gears:
  1. The rotors shall be timed by a pair of single helical gears with quality equivalent to AGMA 12. Spur cut gears shall not be acceptable.
  2. Gears shall have hardened and ground teeth and a minimum AGMA service factor of 1.70.
  3. Gears shall be mounted via hydraulic expansion onto the shafts with a tapered interference fit and secured by a locknut. Pinned gears shall not be acceptable.
- I. Seals:
  1. Seals shall be designed to prevent lubricant from leaking into the air stream as well as to prevent oil from leaking out of the machine.
  2. The seal shall be a cartridge type consisting of two rotary slip rings mounted in a retainer on the air end, an atmospheric air gap in the center with top and bottom ventilation and a noncontact labyrinth seal with no wearing parts on the oil end. Internal lip seals shall not be permitted.
  3. The rotor input shaft shall have a noncontact labyrinth seal with no wearing parts.
- J. Lubrication/Oil Cooler:
  1. The timing gears and the bearings shall be oil lubricated. Grease lubrication shall not be acceptable.
  2. Lubrication system shall be pressurized and powered by a 24VAC oil pump. Splash lubricated machines are not acceptable due to their limited turndown.
  3. Oil Cooler/Heat Exchanger for lubrication system is required for optimal flow turndown.
- K. Oil Level:
  1. Oil level shall be monitored by a switch and displayed on the AERtronic HMI. Oil level shall also be visible via site glass(es) on the blower stage.

2. Sight glasses only visible inside the enclosure or that cannot be easily viewed by the operator shall not be acceptable.

L. Painting:

1. Painting shall be per supplier's standard meeting the following criteria:
  - a. Except for machined sealing and machined mounting surfaces, the package shall be painted dark blue.
  - b. Aluminum, stainless steel, and brass shall not be painted.
  - c. The supplied motor shall not be over sprayed and will be supplied with the motor manufacturer's standard protection and paint color.
  - d. Painted Cast Iron and Carbon Steel shall be Alkyd Resin Primer and Final coat with a total dry film thickness of 70µm. Surface preparation SSPC10 or better.
  - e. Sound enclosure shall be powder-coated polyester base total dry film thickness 80µm.
  - f. Galvanized components shall only be painted with appropriate surface preparation.

## 2.02 BLOWER ACCESSORIES

A. Inlet Filter / Silencer:

1. Each package shall be supplied with one combination inlet filter and silencer.
2. The inlet filter silencer shall be mounted directly to the inlet flange of the blower.
3. The filter media efficiency shall meet the requirements of ASHRAE 52.2 MERV7 50-70% @3-10 microns corresponding to EN779 G4.
4. The silencer portion shall be located upstream of the inlet filter.
5. The filter element shall be designed to trap dirt on the inside so that upon changing, dirt does not fall into the machinery. Filters where dirt accumulates on the external surface of the filter shall not be permitted.
6. Filter and silencer performance losses (clean element) shall be included in the entire package performance calculation.

B. Base Frame / Discharge Silencer:

1. Each package shall be supplied with one combination base frame / discharge silencer.
2. The silencer shall be fabricated of a single shell of pressure vessel quality steel with continuous welds.
3. The silencer must be subject to a pressure test for tightness and strength at a minimum of 1.65 times the maximum design pressure.
4. The silencer shall have a machined flanged inlet connection and bolt directly to the discharge flange of the rotary lobe compressor, with no intermediary or interconnecting pieces. Threaded connection between the compressor stage and the discharge silencer is subject to leakage and misalignment and shall not be permitted.

5. Discharge silencer performance losses shall be included in the entire package pressure calculation. Blower accessories shall be supplied by the manufacturer of the blower stage.
6. The base frame shall be constructed from welded carbon steel that shall be designed to maintain alignment of the blower internal components and the drive during operation.
7. The base frame shall be designed to resist distortion while being installed on vibration isolating mounts.
8. The manufacturer shall supply a stainless-steel grounding lug fully welded to the base.

C. Flexible Connectors:

1. Each package shall be provided with a flexible ANSI style discharge connector.
2. Flexible connectors shall prevent the transmission of noise and vibrations from the blower package into the piping.
3. Flexible discharge connectors shall be Proco Style 240 or equivalent, Type EE, EPDM, with a standard ANSI flange discharge connection, rated for 300 °F at 20 psig. Soft face range with galvanized split ring reinforcement.

D. Electric Motor:

1. Each package shall be supplied with a WEG manufactured TEFC NEMA Premium Efficiency or equivalent motor that shall operate on 460 Volts, 3 Phase, 60 Hertz current, 3600 RPM. Operation of motors above 60 Hertz shall not be allowed under any circumstance.
2. Motors shall be horizontal, foot mounted, rigid base, Torque NEMA B, Temperature rise Class B, TEFC IP55, watertight and dust tight enclosure.
3. Class F, inverter rated insulation, Class H applied varnish, 3:1 constant torque VFD-duty.
4. Regreasable bearings, positive pressure lubrication system with automatic drawn plugs – pressure compensated (frame sizes 254T and larger).
5. All frame sizes shall be domestic NEMA standard frame sizes, suitable for overhung belt drive and with the conduit box on top of the motor. IEC frame motors shall not be allowed.
6. The motor will be mounted on a pivoting base to provide automatic tensioning of the belts. The motor nominal rating after any corrections for ambient conditions shall be 10% above the maximum operating horsepower.
7. The motor shall have a 1.25 service factor for sizes up to 100 HP and a 1.15 service factor for sizes above 100 HP.
8. Motor windings shall be supplied with a normally closed thermostat, one per phase, wired in series to form a fail-safe motor protection circuit for the external fault circuit of the motor controller on all frame sizes at or above 324T. Thermostat shall be a Klixon Precision Thermostat by Sensata Technologies.
9. Motors shall be equipped with an Aegis ring to mitigate the effects of stray motor currents.

10. Blower manufacturer shall be responsible for coordinating the starting torque requirement of the blower and the motor.
11. The use of the TEFC motor to cool the blower system or circulate the enclosure air shall not be allowed.
12. Regardless of VFD supply, the manufacturer shall publish the VFD program settings in the submittal documentation to verify operation is within the intended RPM range of the motor.
13. Under no circumstances shall operation above 60Hz be permitted to achieve the required flow rate. Motor operation shall be limited to a maximum of 60Hz by the motor controller.

E. V-Belt Drive:

1. Each package shall be supplied with a V-belt drive that shall be of the high-capacity type, oil, and heat resistant.
2. Drive shall be designed for a minimum service factor of 1.4 times operating power (bHp), or 1.1 times the motor nameplate Hp, whichever is larger to allow a minimum of 1.4-service factor based on the maximum blower bHp.
3. Belt tensioning shall be automatic without the use of any spring devices or interaction on the part of the operator. Slide rails or spring tensioners shall not be used as a tensioning device.
4. Sheaves shall be dynamically balanced regardless of the operating speed and hydraulically mounted on the compressor drive shaft.
5. The automatic tensioning system shall yield a v-belt life of 16,000 hrs of operation.

F. Belt Guard:

1. The belt drive shall be guarded in compliance with OSHA regulations.
2. Portions of the guard shall be easily removable allowing for belt inspection and replacement.
3. Guard material shall be perforated galvanized carbon steel.

G. Vibration Isolators:

1. Each package shall be supplied with vibration isolating feet with a minimum efficiency of 80%.
2. The manufacturer shall be responsible for attenuating noise and vibration in the package such that no special installation base shall be required, nor shall any additional measures be required to reduce vibrations from the package being transmitted to the base or the piping.

H. Pressure Safety Valve:

1. Each package shall be supplied with a single pressure safety valve on the discharge side of the blower mounted downstream of the discharge silencer and upstream of the check valve.
2. The safety valve shall be set to protect the machine from exceeding its maximum pressure rating and shall be sized to pass 100% of the design flow.



3. The valve shall be field adjustable, spring loaded, and have a certificate of conformity to PED if operating above 15 psig.
4. The pressure safety valve shall be housed inside and attenuated by the sound enclosure. The safety valve shall relieve hot air into a segmented and sealed section of the sound enclosure so that the hot air cannot reenter the inlet of the machine. Weighted relief valves inside the enclosure shall not be permitted. Diaphragm electronically actuated relief valves shall not be permitted.

I. Check Valve:

1. Each package shall be supplied with one check valve that shall be installed on the discharge line.
2. The check valve shall be of the full-bore low pressure-drop, flapper type design with a steel body, and steel flap embedded in EPDM with full-contact seal. Applications with a continuous discharge temperature of greater than 285°F will require the steel flap embedded in Silicone with a full-contact seal.
3. The valve shall be easily removable without disturbing the piping. Check valves requiring installation in the discharge piping shall not be considered unless installation cost of the external valve is included in supplier's proposal.
4. Pressure losses produced by the check valve shall be included in the entire package performance calculation.

J. Local Control Panel:

1. Each package shall be supplied with the following control functions and features:
  - i. Intuitive TFT color touch screen display.
  - ii. Display, monitoring, alarm, and shutdown of inlet pressure, discharge pressure, discharge temperature, enclosure cooling fan thermal overload, main drive motor thermal overload, oil temperature and oil pressure.
  - iii. Display run hours
  - iv. Log errors and first out indication
  - v. Track and log maintenance
  - vi. E-Stop button mounted on front of blower enclosure
  - vii. Operation of enclosure cooling fan motor starter and oil demister
  - viii. Ability to transfer measured values, fault and status messages, as well as remaining times of the service intervals to the customer control system via Modbus RTU or Ethernet IP.
  - ix. Permissive control function of customer start and stop signals to a motor controller
  - x. Digital potentiometer
    - i. LOCAL Operation: speed control of the VFD via the HMI screen.
    - ii. REMOTE Operation: transfer of VFD speed command from external controller to the VFD
    - iii. These signals can be communicated using either hard wire connection or the communication protocol

- xi. The local control panel shall be provided with the following digital outputs:
      - i. Common alarm
      - ii. Common fault
      - iii. Ready to run
      - iv. Transfer of external start/stop command
      - v. Status remote
      - vi. Maintenance required
      - vii. Alternatively, these outputs can be obtained using the communication protocol
    - xii. The local control panel shall be provided with the following digital inputs:
      - i. Remote start/stop
      - ii. Motor controller fault
      - iii. Customer E-stop
      - iv. Alternatively, these inputs can be supplied using the communication protocol
- 2. Control Enclosure
  - a. IP54 suitable for indoor/outdoor installation
  - b. Factory installed, integral to sound enclosure
- 3. Control Supply Power
  - a. 460 VAC, 10 Amp feed with 24 VDC transformer
- 4. Monitoring Sensors
  - a. Inlet Pressure Transducer
  - b. Discharge Pressure Transducer
  - c. PT 1,000 Discharge Temperature RTD
  - d. PT 1,000 Oil Temperature RTD
  - a. Oil Pressure Transducer
- 5. Local control panel shall be the Aerzen AERtronic Digital Controller
- K. Each blower shall receive its initial oil filling at the factory. Oil to be fully synthetic and rated for 16,000 hours of operation between change intervals.
- L. Acoustical Sound Enclosure:
  - 1. Each package shall be supplied with a sound enclosure covering the entire blower package.
  - 2. The enclosure shall provide suitable protection for outdoor installation under wind loads of 50mph and snow loads of 25lbs/ft<sup>2</sup>.
  - 3. The enclosure shall be designed so as to be able to install them side-by-side with all maintenance done from the front or back of the package.

4. Details shall be as follows:
  - a. Enclosure Panels shall be made of galvanized steel sheet, powder coated in a light reflecting, blue color per RAL 5001. The skid shall be of the same color.
  - b. The enclosure and the blower package shall both be mounted on a skid / oil-drip pan designed for meeting environment protection standards and for easy transportation and installation.
  - c. A grounding strap shall be installed between the blower base and the package skid to bypass any vibration isolating mounts for grounding continuity.
  - d. Quick release panels, each less than 50 lb (as mandated by MSHA) must provide easy and quick access for routine maintenance of the blower and the package components.
  - e. Enclosure Cooling / Ventilation Fan:
    - i. Ventilation fan shall be provided for cooling the sound enclosure.
    - ii. The fan shall be sized for sufficient heat removal from the sound enclosure, even when the blower is operated with a VFD.
    - iii. The cooling fan shall be driven separately by a 460V, 3Ph, 60Hz electric motor powered by the same 460 VAC electric feed as the local control panel. A 120V single phase motor for this application will not be acceptable as the current draw and motor operating temperature are too high.
    - iv. The enclosure cooling fan shall be a dedicated device. The use of the TEFC drive motor to cool the blower or circulate the sound enclosure shall not be allowed.
  - f. To prevent possible operator damage, electrical components, instrumentation, and instrument connections shall not be mounted or interface with moving panels of the sound enclosure.
  - g. Both blower oil sumps shall be piped to a common fill located at the front of the package for easy maintenance. An oil level indicator shall be accessible from the HMI of the Local Controller that will give an accurate oil level indication while the blower is in operation. All oil lines shall be industrial-quality hydraulic hose and fittings.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. The Contractor shall install the rotary lobe compressors in accordance with the manufacturer's written instructions.
- B. The Contractor shall make all electrical and process connections to the blower package prior to the arrival of the manufacturer's representative.
- C. Manufacturer's authorized service technician shall verify proper installation, electrical connections and equipment alignment prior to start up.

### 3.02 FIELD SERVICE & TESTING

- A. After installation of all equipment has been completed and as soon as conditions permit, the manufacturer shall provide ONE (1) trip for a total of ONE - (1) 8-hour days to verify the installation of blowers and conduct an acceptance test under actual operating conditions.
  - 1. The Manufacturer shall perform a physical check of the blower installation, perform safety checks, power up the equipment and perform functional testing.
  - 2. The functional test shall consist of 4 hours of operation of each blower with vibration, temperature, and pressure readings as well as motor amp readings taken and recorded at 60-minute intervals.
  - 3. The Manufacturer shall provide operations and maintenance training to the plant personnel. The training shall consist of 1 hour of classroom training using the Operation and Maintenance Manual for reference and 2 hours of hands-on training at the blower package.
- B. If required, Contractor shall make any changes, at his own expense, to the installation that may be necessary to assure satisfactory operation. Contractor shall be held liable for changes needed in the installation.
- C. Manufacturer shall provide a written field test / start up report after completion of testing.

END OF SECTION