SETTLEMENT AGREEMENT AND MUTUAL RELEASE

THIS AGREEMENT, ("Agreement") is made and entered into on the 1st day of February, 2023 ("Effective Date"), by and between Atlas Copco Compressors LLC ("Contractor") and Norman Utilities Authority ("NUA") (collectively, "Parties").

WITNESSETH:

WHEREAS, NUA currently has two (2) turbo blowers manufactured by Houston Services Industries ("HSI"), which have been designated by NUA for replacement by Contractor ("Original Blowers") at the NORMAN WATER RECLAMATION FACILITY ("Site"); and

WHEREAS, Archer Western Construction issued a purchase order to Houston Services Industries, Inc ("HSI") for the Original Blowers on or about April 28, 2014 and Contractor has since assumed the obligations of HSI; and

WHEREAS, the parties agree that the Contractor's warranty covering the Original Blowers has been assigned by Archer Western Construction as owner and purchaser and from Houston Services Industries, Inc. to Contractor as the warrantor; and

WHEREAS, the parties have agreed to resolve NUA's warranty claim and all disputes existing between them as set forth in this Agreement; and

WHEREAS, NUA desires to replace the two (2) Original Blowers which did not demonstrate compliance with the contract documents for Contract K-1314-136; and

WHEREAS, Contractor is familiar with NUA's needs at the Site and therefore recommends that NUA accept two (2) Atlas Copco model ZBVSD+ 250J magnetic bearing turbo blowers as defined in Exhibit A ("Equipment") to replace the Original Blowers; and

WHEREAS, NUA desires to accept the Equipment from Contractor, and Contractor desires to supply such Equipment to NUA, subject to the terms and conditions of this Agreement.

NOW, THEREFORE, in consideration of the foregoing recitals, which are incorporated into this Agreement as an integral part hereof, and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Parties agree as follows:

1. Contractor Duties.

A. Supply of Equipment & Ancillary Services. Contractor shall supply and ship to NUA, and NUA shall accept from Contractor, two (2) newly manufactured model ZBVSD+ 250J magnetic bearing turbo blowers (each individually, "Blower," and collectively, "Equipment") in accordance with the specifications set forth in Exhibit A of this Agreement. NUA acknowledges the new Equipment will not be of the same design and performance as the existing HSI turbo blowers that will be replaced (Exhibit B contains original specifications and Exhibit C contains

original performance curves). Contractor shall also provide NUA with the ancillary services associated with the Equipment purchase as specified in Exhibit A. Exhibits A-C are attached to this Agreement and made a part hereof. It is agreed and understood that Exhibits B and C are provided for reference only.

B. Grant of License**.** Contractor hereby grants to NUA a perpetual, non- exclusive license to use any software embedded into or otherwise associated with the Equipment ("License"). In the event NUA transfers ownership of the Equipment to another party, NUA may transfer the License to any other party in connection with a transfer of the Equipment in which it is embedded. The following shall apply to any License provided hereunder:

(i) subject to NUA complying with this Agreement, NUA is granted a non- exclusive, non-transferable (except as provided for herein) License to use the software in machine-readable object code form only in accordance with the software documentation provided by Contractor; (ii) any License so granted is limited to the proper use of the Equipment containing the software; and (iii) NUA shall not sublicense the software to any other entity nor assign its License rights except as provided herein. Notwithstanding the above, in the event NUA transfers title to any Equipment containing the software, the License granted herein shall transfer to NUA's transferee. Any License granted hereunder shall continue for the life of the Equipment in which the software is embedded or is otherwise an integral part.

2. **Delivery Schedule**. Contractor acknowledges that time is important for the performance of this agreement and Contractor shall exert commercially reasonable efforts to meet scheduled delivery dates. Contractor shall deliver the Equipment to NUA as follows

A. The first Blower shall be delivered within 24 to 26 weeks after execution of this Agreement.
B. The second Blower shall be delivered within 24 to 26 weeks after execution of this Agreement.

3. Payment.

Equipment Pricing. Contractor shall supply the Equipment at no cost to NUA and in consideration of the mutual promises and obligations set forth in this Agreement ("Total Purchase Price"). The Total Purchase Price shall be inclusive of all ancillary services related to the purchase of the Equipment as set forth in Exhibit A, including but not limited to taking possession of and transporting the replaced Original Blowers from the Site (as defined in the recitals and upon installation of the new Equipment), training, start-up assistance, delivery costs, and Contractor's warranty obligations under this Agreement.

A. Installation. Removal of Original Blowers and Installation of new Equipment shall be the sole responsibility and at the sole cost of NUA, including but not limited to reconnection of piping, electricals, and controls.

4. **Inspections and Acceptance**.

A. Inspection. NUA shall have a right to inspect the Equipment within a reasonable time not to exceed ten (10) business days after delivery to determine whether the Equipment is the correct model (as defined herein).

B. Acceptance. NUA shall accept the Equipment if the Equipment fully conforms to the Specifications and the requirements of this Agreement. Final Acceptance acknowledgement shall be provided per Exhibit D after installation of the equipment and successful operation for a period of thirty (30) calendar days of continuous operation or ninety (90) days upon receipt of the correct model (as defined herein).

Nonconforming Equipment. NUA will give Contractor written notification within fifteen (15) business days of any discovery by the NUA of non-conformance of any of the Equipment with the Specifications ("Non-conformance") prior to Final Acceptance. Contractor shall correct the Non-conformance or if correction is not possible, exchange the defective Equipment with replacement Equipment within a reasonable time mutually agreed to by the Parties, at no additional cost to NUA, and if already installed, Contractor shall be responsible for the cost of removal of defective Equipment and installation of new Equipment, including but not limited to reconnection of piping, electricals, and controls. Contractor's failure to timely correct any Non- conformance is grounds for the NUA to reject and return to Contractor the non-conforming Equipment at no additional cost to NUA. In the event NUA rejects any or all of the Equipment due to Non-conformance and Contractor fails to repair or replace as described herein, then NUA may order substitute Equipment from another supplier and recover, as its sole remedy for Contractor's failure hereunder, from Contractor as damages.

5. **Equipment Warranties**.

A. Scope. Contractor warrants that each Blower shall (i) conform to the Specifications in Exhibit A and (ii) be free from defects in materials and workmanship. Contractor further warrants that each Blower operate as intended for a period of twenty-four (24) months from Final Acceptance. Contractor offers the additional warranties on the following components:

i. The main drive motor in each Blower shall be free of defects in design, material and workmanship for a period of twenty-four (24) months after Final Acceptance.

ii. The Variable Speed Drive (VSD) drive for the stationary compressor on each Blower shall be free of defects in design, material and workmanship for a period of twenty-four (24) months after Final Acceptance.

iii. 5 Year Extended Warranty on drive train and VSD from Final Acceptance per Exhibit E. Should the NUA decide not to comply with Exhibit E for the extended warranty, the warranties in paragraphs (i) and (ii) above shall remain

in effect.

B. Remedy. In the event NUA discovers during the applicable warranty period that any Blower or any portion or parts thereof were not as warranted, NUA shall notify Contractor within thirty (30) business days after discovery, and Contractor shall repair or replace the defective Blower or parts at no cost to NUA within a reasonable time mutually agreed to by the Parties. Repaired or replaced Equipment or parts shall be warranted for the remainder of the applicable existing warranty period provided pursuant to this Agreement as long as the repaired or replaced Equipment has demonstrated compliance with this Agreement.

6. **Warranties on Services.** Contractor warrants to NUA that the services required to be performed by Contractor pursuant to this Agreement will be performed in a workmanlike manner consistent with industry standards reasonably applicable to the performance of such services. This warranty shall expire ninety (90) days from the particular site visit. In the event of a breach of this warranty, Contractor shall re-perform such services within a reasonable time after notice from NUA.

7. **Exclusive Warranties.** THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES (WRITTEN, ORAL, IMPLIED, OR OTHERWISE).

8. **Title and Risk of Loss**. Title to and risk of loss in the Equipment shall remain with Contractor until delivery of the Equipment in accordance with this Agreement.

9. **Clear Title**. Contractor shall deliver the Equipment to NUA with clear title and free of all liens, claims, or encumbrances of any kind.

10. **Non-Exclusive Agreement**. This Agreement shall impose no obligation on NUA to utilize Contractor for the purchase of all Equipment of this type which may be needed for future applications. This is not an exclusive agreement.

11. **Notices.** Unless and to the extent otherwise provided in this Agreement, all notices, demands, requests for approvals and other communications which are required to be given by either party to the other shall be in writing and shall be deemed given and delivered on the date delivered in person, upon the expiration of five (5) business days following the date mailed by registered or certified mail, postage prepaid, return receipt requested, or upon the date delivered by overnight courier (signature required) to the address(es) for each party set forth in the Agreement.

12. **Indemnification**. The provisions of this paragraph are independent of, and will not be limited by any insurance obtained by the Contractor and shall survive the expiration or earlier termination of this Agreement with respect to any claims or liability arising in connection with any event occurring prior to such expiration or termination.

A. Contractor agrees to defend and indemnify NUA, its employees, agents, and subsidiaries ("Indemnified Parties") against claims by third parties for (a) personal injury (including death) and (b) physical damage to tangible property, to the extent

the personal injury or physical damage is caused by the negligence of Contractor. In the event the personal injury or physical damage to tangible property is caused by the joint or concurrent negligence of Contractor and NUA, the loss and expenses shall be borne by each party in proportion to its negligence. Third parties include any employees of Contractor or of NUA.

B. Contractor agrees to defend and indemnify Indemnified Parties against U.S. patent infringement claims by third parties based on allegations that the goods infringe any U.S. patent. If any patent infringement claim is made by a third party, Contractor shall have the right, at its option, to: (i) procure for NUA the right to continue using the goods, or (ii) modify the goods so that it becomes non-infringing, or (iii) replace the goods with non-infringing goods. Contractor's obligations under this paragraph shall not apply to (a) any goods not manufactured by an affiliate of Contractor; (b) use of goods in combination with anything not supplied by Contractor if the alleged infringement is based on such combination; (c) any goods altered or modified by NUA or any third party; or (d) any goods not used by NUA for normal intended use. This paragraph sets forth the entire liability of Contractor with respect to patent infringement.

C. Contractor's indemnification and defense obligations are contingent upon NUA (i) giving Contractor prompt notice of any possible claim; (ii) giving Contractor sole authority to control defense and settlement of the claim; and (iii) providing Contractor with full information and reasonable assistance at Contractor's expense.

13. **Successors and Assigns**. This Agreement shall inure to the benefit of and be enforceable by and against the Parties, their heirs, personal representatives, successors, and assigns, including successors by way of reorganization

14. **Compliance with Laws**. Contractor shall comply at all times with all federal, state, and local statutes, rules, regulations and ordinances, the federal and state constitutions, and the orders and decrees of lawful authorities having jurisdiction over the matter at issue (collectively, "Laws"), including but not limited to Oklahoma Public Records laws. Contractor shall also comply with all applicable NUA policies and procedures.

15. **Force Majeure.** In the event that either party hereto shall be delayed or hindered in or prevented from the performance required hereunder by reason of strikes, lockouts, labor troubles, failure of power, riots, insurrection, war, acts of God, pandemics, or other reason of like nature not the fault of the party delayed in performing work or doing acts ("Permitted Delay"), such party shall be excused for the period of time equivalent to the delay caused by such Permitted Delay. Notwithstanding the foregoing, any extension of time for a Permitted Delay shall be conditioned upon the party seeking an extension of time delivering written notice of such Permitted Delay to the other party within ten (10) business days after the event causing the Permitted Delay.

16. **Due Authority.** Each party to this Agreement that is not an individual represents and warrants to the other party that (i) it is a duly organized, qualified and existing entity authorized to do business under the laws of the State of Oklahoma, and (ii) all appropriate

authority exists so as to duly authorize the person executing this Agreement to so execute the same and fully bind the party on whose behalf he or she is executing.

17. **Assignment.** Contractor shall make no assignment of this Agreement without the prior written consent of NUA. Any assignment of this Agreement contrary to this paragraph shall be void and shall confer no rights upon the assignee.

18. **Relationship of Parties**. Nothing contained herein shall be deemed or construed by the Parties, or by any third party, as creating the relationship of principal and agent or of partnership or of joint venture between the Parties, it being understood and agreed that nothing contained herein, nor any acts of the Parties, shall be deemed to create any relationship between the Parties other than the relationship of independent contractors and principals of their own accounts.

19. **No Construction against Preparer of Agreement.** This Agreement has been prepared by the Contractor and reviewed by NUA and its professional advisors. NUA, Contractor and both parties professional advisors believe that this Agreement expresses their agreement and that they should not be interpreted in favor of either NUA or Contractor or against NUA or Contractor merely because of the Parties' efforts in preparing them.

20. **Severability.** Should any paragraph or portion of any paragraph of this Agreement be rendered void, invalid or unenforceable by any court of law for any reason, such determination shall not render void, invalid or unenforceable any other paragraph or portion of this Agreement.

21. **Governing Law.** The laws of the State of Oklahoma shall govern this Agreement.

22. **Third Party Beneficiary**. Notwithstanding anything to the contrary contained in this Agreement, persons or entities not a party to this Agreement may not claim any benefit hereunder or as third party beneficiaries hereto.

23. **Entire Agreement**. This Agreement constitute the entire agreement between the Parties and supersede all prior and contemporaneous agreements, whether oral or written, between them. Any conflicting terms or conditions or any terms or conditions related to attorneys' fees, disclaimer of warranties, mediation, arbitration, or indemnification set forth by Contractor in the Proposal, a quote, invoice, or any other communication or document are void and of no effect, even if such communication or document is attached to this Agreement or the Purchase Order. This Agreement may be modified only in a writing duly executed by both Parties.

24. **No Waiver**. No provision of this Agreement will be deemed waived by either party unless expressly waived in a writing signed by the waiving party. No waiver shall be implied by delay or any other act or omission of either party. No waiver by either party of any provision of this Agreement shall be deemed a waiver of such provision with respect to any subsequent matter relating to such provision, and the NUA's consent respecting any action by Contractor shall not constitute a waiver of the requirement for obtaining NUA's consent respecting any subsequent action.

25. **Headings.** The paragraph headings are inserted herein for convenience and reference only, and in no way define, limit, or otherwise describe the scope or intent of any provisions hereof.

26. **Survival.** All obligations and rights of any party arising during or attributable to the period prior to expiration or earlier termination of this Agreement, including but not limited to Contractor's warranty obligations and those obligations and rights related to indemnification, shall survive such expiration or earlier termination.

27. **Limitation of Liability. NOTWITHSTANDING ANYTHING ELSE, CONTRACTOR SHALL ONLY BE LIABLE DIRECTLY TO NUA FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, OR SPECIAL DAMAGES (INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS OR REVENUE, LOSS OF TOTAL OR PARTIAL USE OF EQUIPMENT OR SERVICES, DOWNTIME COSTS, AND DELAY COSTS), EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR IF SUCH DAMAGES ARE FORESEEABLE IF CAUSED BY CONTRACTOR'S GROSS NEGLIGENCE OR MISCONDUCT. THE TOTAL LIABILITY OF CONTRACTOR IN THE AGGREGATE ARISING UNDER THIS AGREEMENT AND UNDER ANY THEORY OF RECOVERY SHALL BE LIMITED TO ONE MILLION DOLLARS Notwithstanding the foregoing, it is understood that nothing in this paragraph shall limit Contractor's indemnity obligations or Contractor's liability (if any) under applicable Laws for personal injury or any liability that cannot be limited (or excluded) under applicable Laws.**

28. **Release**. NUA, for itself and its affiliates, subsidiaries, its shareholders, officers, directors, employees, representatives, agents, and all other persons or entities claiming by, through or under them hereby, knowingly and voluntarily, forever waives, covenants not to sue, releases, and discharges Contractor and its respective parent entities, subsidiaries, shareholders, officers, directors, employees, representatives and agents ("Released Parties") from all claims, demands, actions, and causes of action, or causes of liability, rights, and offset rights, whether at law or in equity, whether known or unknown, asserted or unasserted, including without limitation any form of injunctive or equitable relief, any award of actual, consequential, incidental, liquidated or other types or categories of damages, any award of punitive or exemplary damages, any claims for attorneys' fees or costs or expenses of litigation, and any other type of relief which it or any other person or entity claiming by, through or under it, has or may have against any of the Released Parties as of the Effective Date arising out of, relating to, or connected with the Original Blowers. This release shall not prevent NUA from asserting any claim, right or remedy arising under this Agreement and/or the Warranty contained in this Agreement.

The Contractor, for itself and its affiliates, subsidiaries, its shareholders, officers, directors, employees, representatives, agents, and all other persons or entities claiming by, through or under them hereby, knowingly and voluntarily, forever waives, covenants not to sue, releases, and discharges NUA and its respective parent entities, subsidiaries, shareholders, officers, directors, trustees, employees, representatives and agents ("Released Parties") from all claims, demands, actions, and causes of action, or causes of liability, rights, and offset rights, whether at law or in equity, whether known or unknown,

asserted or unasserted, including without limitation any form of injunctive or equitable relief, any award of actual, consequential, incidental, liquidated or other types or categories of damages, any award of punitive or exemplary damages, any claims for attorneys' fees or costs or expenses of litigation, and any other type of relief which it or any other person or entity claiming by, through or under it, has or may have against any of the Released Parties as of the Effective Date arising out of, relating to, or connected with the Original Blowers. This release shall not prevent the Contractor from asserting any claim, right or remedy arising under this Agreement and/or the Warranty.

29. **Warranties of the Parties.** Each party represents and warrants that (a) it has the full power and authority to execute this Agreement on behalf of the entity for which it is signing, and to perform the obligations hereunder, (b) this Agreement is binding on and enforceable against the parties in accordance with its terms, and (c) the compliance by each party with its obligations hereunder will not conflict with or result in a breach of any agreement to which such party is a party or is otherwise bound.

30. **Designation of Authority for NUA.** The NUA designates that the Director of Utilities shall have the authority to execute Exhibit D upon successful completion of the terms precedent.

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IN WITNESS WHEREOF the Parties have caused this Agreement to be executed by their duly authorized representatives on the day and date first above written.

ATLAS COPCO COMPRESSORS LLC

By: Robert Eshelman

Print: Robert Eshelman

Title: President

WITNESSES

By: Ashley Cole

Print: Ashley Cole

Title: Administrative Assistant

NORMAN UTILITIES AUTHORITY

APPROVED as to form and legality this _____ day of _____, 20____.

_____
AUTHORITY Attorney

Approved by the Trustees of the **NORMAN UTILITIES AUTHORITY** this _____ day of _____, 20____.

NORMAN UTILITIES AUTHORITY

ATTEST

By: _____ _____

Title: Chairman Secretary

Exhibit A

Atlas Copco Scope of Supply

Item Number	Description	Qty	Price
001	ZB6VSD+ 250J Magnetic Bearing Turbo Blower	2	$0
002	MCP Modification and Integration to incorporate new units	1	$0
003	Blower Commissioning	2	$0
004	Freight for shipping equipment to site	1	$0

SUBMITTALS: Standard submittal generation 3 to 4 weeks from acceptance of agreement by both parties.

QUALITY STANDARDS: ISO 9001-2015

Norman Utilities Authority Scope of Supply

- NUA shall be responsible for all costs related to the removal of the existing blowers and the installation of the new ZB series blowers including reconnection of piping, electrical, and controls.

- As built drawings reflecting changes to the existing system, if required by NUA shall be the responsibility of NUA

Note: NUA understands that the blowers being provided will not be rated for the same capacity as the rating of the current HSI blowers on site and shall be pursuant to the performance data in this Exhibit A

Exhibit A

Equipment

Item 001: Quantity two (2) Magnetic Bearing Direct Drive Turbo Blower – ZB6VSD+ 250 J

- ZB 6 VSD+ 250kW J
  - Structural base frame with integrated forklift slots
  - Sound enclosure for indoor installation
  - High efficiency cartridge air inlet filter with electronic sensor
  - Integrated baffling system for reduced noise level
  - Direct connection between air intake and blower's compression stage
  - Atlas Copco's 250kW permanent magnet synchronous motor
  - Built-in regulation blow-off valve and integral silencer
  - Turbo blower centrifugal single stage impeller
  - Integrated close-loop water circuit
  - High frequency Variable Speed Drive (VSD / VFD)
  - Elektronikon® "Mk5-control and monitoring system
  - RFI filters reducing harmonic disturbances in the electrical network
  - AC chokes against high voltage peaks
  - Constant power supply to magnetic bearing controller without the use of a battery bank (UPS)
  - LC filters protecting the permanent magnet motor from harmonics
  - Remote monitoring and (3G) connectivity
  - All alarm and safety devices connected to the blower controller
  - Plug-and-play package with singe electrical connection
- Adders
  - Ethernet / IP Communication Package
- Field Installed Accessories provided by Atlas Copco, Installed by others
  - 16" Discharge Expansion Joint
  - 16" Discharge Check Valve
  - TCI HGP 350HP Harmonic Filter
- Testing
  - Factory Standard Performance Test Report (Un-Witnessed
- Freight to Jobsite
- Start-up & Training
  - (1) Trip for (3) Days for installation check & Start-up
    If additional days are required to meet system performance requirements, technician will be available for the required additional days at no cost to owner provided the site was prepared and ready for technician upon arrival

Item 002: MCP Modification to work with new units

- MCP
  - Modification as required for new blowers to be operated by the master control panel.
    - Sequencing control
    - Flow control
- Start-up & Training
  - (1) Trip for (3) days for controls testing assistance & Training (same note as with blower commissioning)

Documents Provided (For information only): NUA shall have right to comment on any major concerns

- Atlas Copco Standard General Arrangement top and side views drawings (for blower and skid assembly)
- Atlas Copco Standard Wiring Diagram, Flow Diagram, and Installation Proposal
- Blower datasheet and curves
- Blower brochure
- Blower manual

Clarifications:

1. Installation, piping, elbows, spool pieces, piping hardware, piping gaskets, anchor bolts, housekeeping pads, and wiring to be provided by others.
2. Proposal is based on Atlas Copco Standard equipment and accessories.
3. ZB units are tested to ISO 5389 for turbo compressors and are guaranteed to be within tolerances specified on the performance curve. Field performance will be for functionality and satisfying process requirements only.
4. Equipment being provided is based on attached performance. If modified operating conditions are not explicitly stated in the submittal package, the equipment shall meet the project specifications in Exhibit B.

Exhibit A

Technical data: ZB 6 VSD+ 250 J AC

Unit data*3	
Mean sound pressure level*2	74 dB(A)
Cooling air inlet flow	4983cfm
Electrical cubicle cooling flow	500cfm
Total air outlet cooling flow	5484cfm
Length	99.02 in
Width	47.24 in
Height	78.19 in
Net weight	4407 lb
Material	
Motor casing	Aluminum
Volute	Aluminum
Impeller	Aluminum
Limitations	
Maximum ambient temperature	113 °F
Minimum ambient temperature	14 °F
Maximum ducted inlet temperature	113 °F
Minimum ducted inlet temperature	-22 °F
Maximum cooling air inlet temperature	113 °F
Minimum cooling air inlet temperature	14 °F
Maximum altitude (above sea level)	3280 ft
Maximum effective working pressure	13.1psi(g)
Installation connections	
Compressed air outlet	16" - 150 lbs
BOV outlet	17.5x21.6 inch
Main drive motor	
Motor manufacturer	Atlas Copco
Motor nominal power	335 hp
Motor service factor	1.1
Motor protection class	IP 51
Bearing type	active magnetic bearing
Motor synchronous speed	24000 rpm
Insulation class	H
Motor winding protection	PT100 (4x)
Motor bearing protection	NTC thermistor (2/bearing)

Exhibit A

Electrical data	
Supply voltage	440 - 460V
Supply frequency	60Hz
Package current*4	411A

Main feeder circuit protection (Customer's installation) *5	
Main fuse type	gG/gL
Maximum main fuse size	3x630 A
Main control panel short-circuit current rating	?

Notes

*1 Specific energy requirement corresponds to 'Specific power consumption' according to ISO 18740:2016. Guaranteed with a tolerance of **+/-5%.**

*2 A-weighted emission sound pressure level at the work station (LpWSAd).
Measured according to ISO 2151: 2008 using ISO 9614-2 (sound intensity scanning method).
The added correction factor (+/- 3 dB(A)) is the total uncertainty value (KpAd) conform with the test code.
For air cooled machines, sound pressure levels are stated with ducting of outlet cooling air according the installation proposal

*3 Unit data is valid at reference conditions

*4 Package current is the current a compressor uses
- at reference ambient conditions
- at 100 % load
- at max pressure
- at nominal voltage
- right before service interval (including fouled filters, etc).

*5 The pre-described fuses OR circuit breaker are maximum main fuses or circuit breaker to protect the installed compressor electrical panel.
Cable and fuse or circuit breaker selection will depend on customer's installation.
Fuses or circuit breaker of the same type/class are mandatory. Not installing these fuses or circuit breaker will void warranty in case of an electrical failure.
Installing smaller fuses might lead to smaller supply cables. If Main circuit breaker shown as NA (not applicable), only fuses are allowed.

Pasel3 Performance Report
Performance graphs

V3.3.21 x86 | DB V1.5.2 U34

Customer:
Reference:
Model: ZB 6 VSD+ 250kW J (SYSTEMS PRE)

Date: 27/07/2021
User: clegrand

Customer conditions

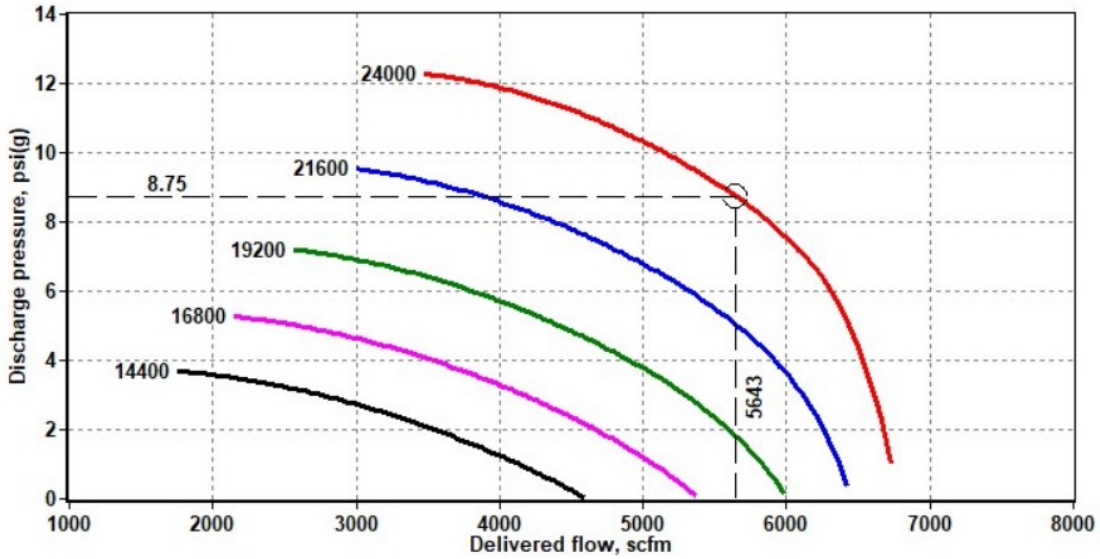
Atmospheric pressure	14.100	psi(a)
Inlet pressure before filter	0.000	bar(g)
Inlet filter dp factor	1.000	-
Inlet temperature	105.0	°F
Relative humidity	90.0	%
Frequency	60.0	Hz
Gas	Air	

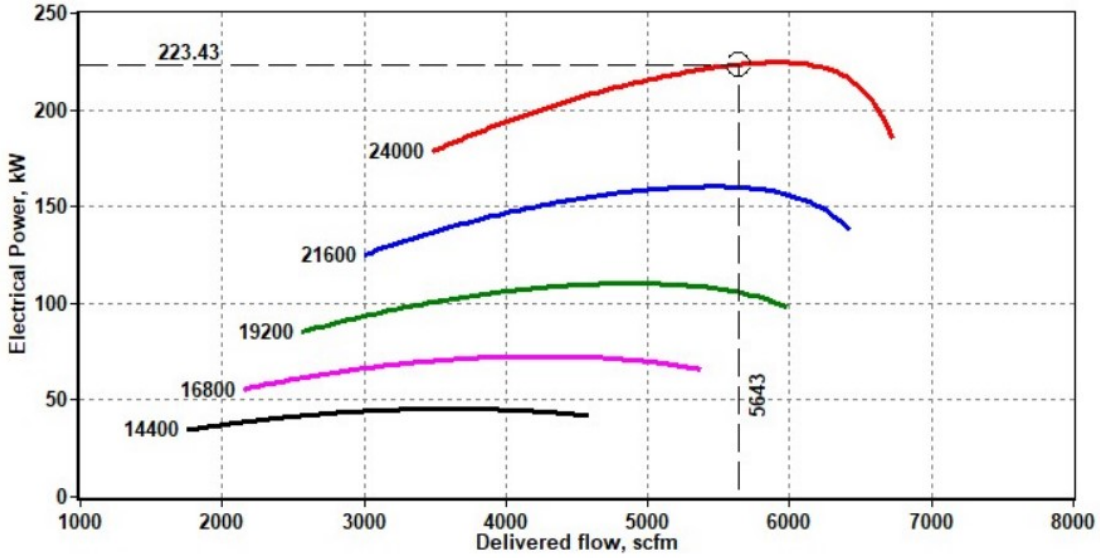
Reference conditions

Pressure	14.70000	psi(a)
Temperature	68.0	°F
Relative humidity	36.0	%

Acceptance Pt Tolerance

Flow +/-	2	%
SER +/-	2	%
Pressure +/-	0	%
Overrides	No	





Calculated capacity and specific energy requirement values are guaranteed within published tolerance at design point and under AML conditions. All additional performance output parameters, as well as off-design calculations at non-AML conditions, are indicative. Atlas Copco reserves the right to revise calculation algorithms and improve output results without prior notice.

Pasel3 Performance Report
Summary multi points

V3.3.21 x86 | DB V1.5.2 U34

Customer:		Date:	27/07/2021
Reference:		User:	clegrand
Model:	ZB 6 VSD+ 250kW J (	Case:	Multi-point

Global settings

Frequency	60.0 Hz
Gas	Air
Aftercooler	No
Overrides	No

Reference conditions

Pressure	14.7000	psi(a)
Temperature	68.0	°F
Relative humidity	36.0	%

Tolerance

Flow +/-	2 %
SER +/-	2 %
Pressure +/-	0 %

Operating points

Atmospheric pressure	psi(a)	14.100	14.100	14.100
Inlet pressure before filter	bar(g)	0.000	0.000	0.000
Inlet filter dp factor	-	1.000	1.000	1.000
Inlet temperature	°F	105.0	76.0	5.0
Relative humidity	%	90.0	90.0	90.0
Discharge pressure	psi(g)	8.750	8.750	8.750
Differential pressure	psi	8.750	8.750	8.750
Flow	scfm	5643.1	6294.3	7113.0
Pressure Rise to Surge	%	15.5	20.3	24.4
Turndown	%	49.9	53.5	55.7
Isothermal Efficiency	%	63.9	61.4	59.3
SER	bhp/100	4.6	4.8	5.0
Electrical power	kW	223.4	242.2	243.5
Run time	hr	1.0	1.0	1.0
Energy consumption	kWh	223	242	243
Price	€/kWh	1.000	1.000	1.000
Electricity cost	€	223	242	243
Total runtime	hr	3.0		
Total energy consumed	kWh	709		
Total cost	**€**	**709**		

Calculated capacity and specific energy requirement values are guaranteed within published tolerance at design point and under AML conditions. All additional performance output parameters, as well as off-design calculations at non-AML conditions, are indicative. Atlas Copco reserves the right to revise calculation algorithms and improve output results without prior notice.

Pasel3 Performance Report
Summary operating point 1

V3.3.21 x86 | DB V1.5.2 U34

Customer:
Reference:
Model: ZB 6 VSD+ 250kW J (SYSTEMS PRE)

Date: 27/07/2021
User: clegrand
Case: Multi-point

Customer conditions

Atmospheric pressure	14.100	psi(a)
Inlet pressure before filter	0.000	bar(g)
Inlet filter dp factor	1.000	-
Inlet temperature	105.0	°F
Relative humidity	90.0	%
Discharge pressure	8.750	psi(g)
Frequency	60.0	Hz

Tolerance

Flow +/-	2 %
SER +/-	2 %
Pressure +/-	0 %

Gas	Air		
Inlet Filter	Yes	Control	Yes
Aftercooler	No	Overrides	No
Check valve	Yes		
Safety valve	No		

Reference conditions

Pressure	14.7000	psi(a)
Temperature	68.0	°F
Relative humidity	36.0	%

Estimated performance	Unit	Surge	Surge @ pr.	Design	Max. flow	Operating
Inlet flow	scfm	3472	2851	5667	6779	5667
Delivered flow	scfm	3443	2826	5643	6761	5643
Std. Outlet Flow	scfm	3443	2826	5643	6761	5643
Discharge pressure	psi(g)	12.30	8.75	8.75	0.26	8.75
Differential pressure	psi	12.30	8.75	8.75	0.26	8.75
Electrical power	kW	177.3	110.1	223.4	179.3	223.4
Isothermal efficiency (electrical)	%	63.8	65.0	63.9	3.7	63.9
SER (electrical)	bhp/100cfm	6.0	4.6	4.6	3.1	4.6

Operating Conditions

Stable pressure rise at open inlet / on operating curve	15.5	% / 15.5%
Estimated theoretical turndown / turnup at operating point	49.9	% / 0.0%

	Unit	Design point	Operating point
Inlet filter pressure drop	bar	0.0169	0.0169
Checkvalve pressure drop	bar	0.0334	0.0334
Discharge temperature	°F	211.3	211.3

Calculated capacity and specific energy requirement values are guaranteed within published tolerance at design point and under AML conditions. All additional performance output parameters, as well as off-design calculations at non-AML conditions, are indicative. Atlas Copco reserves the right to revise calculation algorithms and improve output results without prior notice.

Pasel3 Performance Report
Summary operating point 2

V3.3.21 x86 | DB V1.5.2 U34

Customer:
Reference:
Model: ZB 6 VSD+ 250kW J (SYSTEMS PRE)

Date: 27/07/2021
User: clegrand
Case: Multi-point

Customer conditions

Atmospheric pressure	14.100	psi(a)
Inlet pressure before filter	0.000	bar(g)
Inlet filter dp factor	1.000	-
Inlet temperature	76.0	°F
Relative humidity	90.0	%
Discharge pressure	8.750	psi(g)
Frequency	60.0	Hz

Tolerance

Flow +/-	2 %
SER +/-	2 %
Pressure +/-	0 %

Gas		Air	
Inlet Filter	Yes	Control	Yes
Aftercooler	No	Overrides	No
Check valve	Yes		
Safety valve	No		

Reference conditions

Pressure	14.7000	psi(a)
Temperature	68.0	°F
Relative humidity	36.0	%

Estimated performance	Unit	Surge	Surge @ pr.	Design	Max. flow	Operating
Inlet flow	scfm	3770	2949	6320	7099	6320
Delivered flow	scfm	3739	2924	6294	7079	6294
Std. Outlet Flow	scfm	3739	2924	6294	7079	6294
Discharge pressure	psi(g)	13.38	8.75	8.75	0.80	8.75
Differential pressure	psi	13.38	8.75	8.75	0.80	8.75
Electrical power	kW	192.6	106.3	242.2	192.8	242.2
Isothermal efficiency (electrical)	%	63.4	65.0	61.4	9.9	61.4
SER (electrical)	bhp/100cfm	6.5	4.6	4.8	3.4	4.8

Operating Conditions

Stable pressure rise at open inlet / on operating curve 20.3 % / 20.3%
Estimated theoretical turndown / turnup at operating point 53.5 % / 0.0%

	Unit	Design point	Operating point
Inlet filter pressure drop	bar	0.0194	0.0194
Checkvalve pressure drop	bar	0.0367	0.0367
Discharge temperature	°F	181.9	181.9

Calculated capacity and specific energy requirement values are guaranteed within published tolerance at design point and under AML conditions. All additional performance output parameters, as well as off-design calculations at non-AML conditions, are indicative. Atlas Copco reserves the right to revise calculation algorithms and improve output results without prior notice.

Pasel3 Performance Report
Summary operating point 3

V3.3.21 x86 | DB V1.5.2 U34

Customer:
Reference:
Model: ZB 6 VSD+ 250kW J (SYSTEMS PRE)

Date: 27/07/2021
User: clegrand
Case: Multi-point

Customer conditions

Atmospheric pressure	14.100	psi(a)
Inlet pressure before filter	0.000	bar(g)
Inlet filter dp factor	1.000	-
Inlet temperature	5.0	°F
Relative humidity	90.0	%
Discharge pressure	8.750	psi(g)
Frequency	60.0	Hz

Tolerance

Flow +/-	2 %
SER +/-	2 %
Pressure +/-	0 %

Gas	Air		
Inlet Filter	Yes	Control	Yes
Aftercooler	No	Overrides	No
Check valve	Yes		
Safety valve	No		

Reference conditions

Pressure	14.7000	psi(a)
Temperature	68.0	°F
Relative humidity	36.0	%

Estimated performance	Unit	Surge	Surge @ pr.	Design	Max. flow	Operating
Inlet flow	scfm	4228	3180	7141	7735	7141
Delivered flow	scfm	4193	3152	7113	7712	7113
Std. Outlet Flow	scfm	4193	3152	7113	7712	7113
Discharge pressure	psi(g)	14.32	8.75	8.75	1.23	8.75
Differential pressure	psi	14.32	8.75	8.75	1.23	8.75
Electrical power	kW	195.8	98.3	243.5	193.7	243.5
Isothermal efficiency (electrical)	%	63.1	65.1	59.3	14.0	59.3
SER (electrical)	bhp/100cfm	6.8	4.6	5.0	3.7	5.0

Operating Conditions

Stable pressure rise at open inlet / on operating curve 24.4 % / 24.4%
Estimated theoretical turndown / turnup at operating point 55.7 % / 0.0%

	Unit	Design point	Operating point
Inlet filter pressure drop	bar	0.0212	0.0212
Checkvalve pressure drop	bar	0.0389	0.0389
Discharge temperature	°F	100.6	100.6

Calculated capacity and specific energy requirement values are guaranteed within published tolerance at design point and under AML conditions. All additional performance output parameters, as well as off-design calculations at non-AML conditions, are indicative. Atlas Copco reserves the right to revise calculation algorithms and improve output results without prior notice.

Exhibit B
Original Project Specifications (For reference only)

SECTION 43 11 20 - HIGH SPEED TURBO BLOWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: This section includes the Work necessary to completely furnish, install, adjust, protect, put in operation, and test the High Speed Turbo Blowers as shown on the Drawings and as specified herein, including all related equipment, material, and appurtenances.

B. Related sections:
   1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
   2. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
   3. The following Sections are related to the Work described in this Section. This list of Related Sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the CONTRACTOR to see that the completed Work complies accurately with the Contract Documents.
      a. Section 01 33 00 – Submittal Procedures
      b. Section 01 60 00 – Product Requirements
      c. Section 01 78 23 – Operation and Maintenance Data
      d. Section 01 79 00 – Demonstration and Training
      e. Section 05 50 00 – Metal Fabrications
      f. Section 09 90 00 – Painting and Protective Coatings
      g. Section 40 23 43 – Process Valves and Operators
      h. Section 43 11 20.13 – Aeration Control Systems
      i. Division 26 – Electrical Sections

C. Principle items to be furnished and installed include the following:
   1. Two (2) High Speed Turbo Blowers

D. Related items to be furnished and installed include the following:
   1. Master Control Panel and Integral Blower Control Panel
   2. Four (4) Multistage Centrifugal Blower Local Control Panels

1.2 GENERAL

A. Equipment Numbers:
   1. 25B05
   2. 25B06

B. Like items of equipment provided hereinafter shall be the end products of one manufacturer to achieve standardization of appearance, operation, maintenance, spare parts and manufacturer's services.

C. Unit Responsibility: The Work requires the High Speed Turbo Blowers, Master Control Panel (see related specification 43 11 20.13), and Blower Control Panels (see related specification 43 11 20.13) complete with all accessories and appurtenances (including, but not necessarily limited to, Inlet Filters/Silencers, Discharge Expansion Joints, Discharge Check Valves, Manual Discharge Shutoff Valves, Blow-Off Valves, Blow-Off Silencers, Integrated Variable Frequency Drives, Local Control Panels, Operator Interface Terminal, Flow Control Valves, Air Flow Meters, Inlet and Discharge Air Temperature Indicating Transmitters, Pressure Indicating Transmitters and Gauges, Dissolved Oxygen Transmitters and Sensors), be the end product of

one responsible Manufacturer or Equipment Supplier. The Manufacturer or Equipment Supplier shall assume all responsibility for mating the piping and aeration distribution system(s) piping with the blower system to obtain the performance specified. The 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 in operation in conformance with the specified performance, features, and functions without altering or modifying the Contractor's responsibilities under the Contract Documents. The Contractor is responsible to the Owner for providing the equipment systems as specified herein.

D. The blower supplier shall be responsible for all start-up coordination.

E. General Requirements: See Division 01, GENERAL REQUIREMENTS, which contains information and requirements that apply to the work specified herein and are mandatory for this project.

F. The equipment specified herein is included in the MANUFACTURER/ SUBCONTRACTOR Form. Refer to the Bid Form and the Instructions to Bidders for additional requirements.

1.3 SUBMITTALS

A. General: Administrative, shop drawings, samples, quality control, and contract closeout submittals shall conform to the requirements of Section 01 33 00, SUBMITTAL PROCEDURES.

B. In addition to the requirements of Section 01 33 00, SUBMITTAL PROCEDURES, submit the following additional specific information:
   1. Shop Drawings:
      a. Make, model, weight, and horsepower of each equipment assembly including but not limited to: Inlet Filters, Discharge Expansion Joints, Discharge Check Valve, Discharge Shutoff Valve, Flow Control Valves, Air Flow Meters, Vibration Monitors/Switches, Discharge Air Temperature Indicating Transmitters, Pressure Indicating Transmitters & Gauges.
      b. Manufacturer's catalog information, descriptive literature, specifications, and identification of materials of construction.
      c. Detailed mechanical, and electrical drawings showing the equipment fabrications and interface with other items. Include dimensions, size, and details of anchorage and of connections to other work, and weights of associated equipment.
      d. External utility requirements (quantity and connection details) such as air, water, power, drain etc., for each component.
      e. Motor nameplate data, motor manufacturer, and any motor modifications.
      f. Complete wiring diagrams, elementary or control schematics, including coordination with other electrical control devices such as the motor control centers. Suitable control panel outline drawings shall be furnished for approval before proceeding with manufacture. Standard preprinted sheets or drawings marked to indicate applicability to this contract will not be acceptable.
      g. Interconnection drawings with clear delineation of all wiring, including field devices.
      h. Suggested spare parts list to maintain the equipment in service for a period of 1 year and 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
      i. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
      j. Instrumentation and Control Submittals: In conformance with Division 26.
   2. Quality Control Submittals:
      a. Manufacturer's Certificate of Compliance: Commercial products, including painting/coating systems.
      b. Special shipping, storage and protection, and handling instructions.
      c. Test procedures.

d. Certified copies of the results of all Factory Functional and field Performance Test reports.
e. Submit for the Engineer's approval a copy of the proposed blower start-up testing log sheet.
f. Certified copies of Blower Performance Curves and design point in accordance with this Section and including the following:
   1) Flow (ICFM & SCFM)
   2) Inlet Pressure (psig)
   3) Inlet Temperature (degree F)
   4) Relative Humidity (%)
   5) Discharge Pressure (psig)
   6) Discharge Temperature (degree F)
   7) Brake Horsepower
   8) Blower Efficiency (including actual tested wire-to-air efficiency)
   9) Speed (rpm)
   10) Surge Conditions and Pulsating Range
   11) Maximum Turndown
   12) Adiabatic Efficiency
g. Manufacturer's Certificate of Proper Installation. Installation instruction submitted 4 weeks prior to equipment shipment.
h. Operation and maintenance manual.

3. Contract Closeout Submittals: Service records for maintenance performed during construction.

1.4 QUALITY CONTROL

A. Factory performance tests shall be conducted for each High Speed Turbo Blower unit furnished under this Section. High Speed Turbo Blower unit(s) shall be operated to test the pre-programmed parameters and the functionality of the blower protection devices i.e. surge, motor overload, bearing temperature and vibration monitoring devices, alarms and shutdowns and the blower factory mounted sensors. Test conditions shall be at design conditions for a minimum of (1) hour after blower temperatures have stabilized.

B. Tests shall be in accordance with the latest applicable ASME Power Test Code-10.

C. Tests shall determine actual air deliveries, differential pressures, speeds and electrical input energy requirements for the conditions described.

D. Sufficient test point readings shall be made to establish the head-capacity, efficiency, and brake horsepower curves for each Blower.

E. Submit six copies of certified Blower Performance Curves to the Engineer for approval.

1.5 OPERATION AND MAINTENANCE DATA

A. O&M Manuals: Content, format and schedule for providing as specified in Section 01 78 23, OPERATION AND MAINTENANCE DATA.

B. Maintenance Summary Forms: As specified in Section 01 78 23, OPERATION AND MAINTENANCE DATA.

1.6 WARRANTY

A. Provide warranty for a period of 24 months after the final acceptance of the equipment by the Owner and Engineer. The warranty shall stipulate that the equipment furnished is suitable for

the purpose intended and free from defects of material and workmanship for the duration of the warranty. In the event the equipment fails to perform as specified, the Manufacturer will promptly repair or replace the defective equipment without additional cost to the Owner.

B. Spare parts identified within this specification shall not be used to address warranty repairs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Materials, equipment, components, and accessories specified in this section shall be, products of:
1. APG Neuros.

2.2 GENERAL REQUIREMENTS

A. See Section 01 60 00, PRODUCT REQUIREMENTS, for specific requirements related to the equipment specified herein.

B. All equipment shall be supplied complete. Parts shall have liberal strength, stability and stiffness and shall be especially adapted for the intended service. Ample room and facilities shall be provided for inspection, repairs, and adjustments.

C. Provide electromechanical relay contacts for alarm and shutdown conditions as described in the Instrumentation and Controls section of this specification.

D. Equipment Supports: Equipment supports, anchors, and restraints shall be designed for static, and dynamic loads. Provide for stable operation of blowers, control panels, and valves.

E. Flanges and Pipe Threads: Flanges on equipment shall comply with ANSI B16.1, Class 125; or B16.5, Class 150, unless otherwise indicated Threaded flanges and fittings shall have standard taper pipe threads complying with ANSI/ASMI B1.20.1.

F. Safety Devices: The completed work shall include all necessary permanent safety devices, such as machinery guards, emergency stops and similar items required by OSHA, and other Federal, State, and local health and safety regulations. Provide screens or guards at exposed rotating shafts, rotors, couplings, pulley, wheel, bolts, chains, or similar components. Where guards/screens are over grease fittings, couplings, or other items requiring maintenance, provide a means for ready access and mesh size of less than 1/2".

G. Lifting Lugs: Provide on equipment and equipment components over 100 pounds.

H. Anchor Bolts: Provide Type 316 stainless steel anchor bolts, number and size as recommended by Manufacturer.

I. Stainless steel nameplates giving the name of the Manufacturer, the serial number, model number, horsepower, speed, and any other pertinent data shall be attached to the blower and motor.

2.3 SERVICE CONDITIONS

A. The High Speed Turbo Blowers, Master Control Panel, and Blower Local Control Panels shall be located inside the equipment building as shown on the Drawings. Equipment shall be rated for operation in blower room with a temperature range of 0 to 120 degrees F.

B. Each High Speed Turbo Blower shall be designed for the conditions of service as defined on the Supplemental Data Sheet(s) following this section.

2.4 SYSTEM PERFORMANCE AND FUNCTIONAL REQUIREMENTS

A. The High Speed Turbo Blowers shall perform as specified on the Supplemental Data Sheet(s) following this section.

B. The Master Control Panel and Blower Local Control Panels shall perform as described herein, as described in 43 11 20.13 and as needed for a complete and operational system.

2.5 SYSTEM DESCRIPTION

A. All of the equipment specified herein is intended to be a complete High Speed Turbo Blower system capable of transferring atmospheric oxygen into activated sludge mixed liquor. The system will consist of new and existing equipment complete with piping, valves, control panels, gauges, meters, alarms, and all accessories necessary to provide the operations and performance described herein.

2.6 HIGH SPEED TURBO BLOWERS

A. General

1. Blowers shall be of the Bump Foil Air Bearing type and shall not require oils or lubricants for adequate operation. Leaf or Layered style bearings are unacceptable.
2. Blowers shall be capable of variable speed operation with a minimum turndown of fifty percent (50%) and shall use an integral variable frequency drive. Each blower shall be capable of operating continuously and satisfactorily at any point between the minimum and maximum flows without any surge, vibration, hunting, or excessive heating of bearings or motor.
3. Blowers shall be designed to operate at optimum specific speed in order to maximize adiabatic efficiency and reduce motor speed. Maximum efficiency is achieved at 95% of full load.
4. Complete blower packages shall be UL Listed, with no exception. UL Listing nameplate to be on package exterior. UL listing must be for the complete package.
5. Blowers shall be factory tested per ASME PTC-10 Performance test to verify flow and wire power at inlet design conditions as well as blower maximum conditions. The acceptance criteria are 1% tolerances on power and 4% tolerances on flow regardless of the size of the machine.
6. No special foundations shall be required for installation.
7. All elastomeric materials for couplings, valves, etc., shall be rated for a minimum 250° F temperature.
8. System components shall be designed for continuous operation in an environment with conditions as follows:
   a. Temperature 0 to 120 degrees F
   b. Relative Humidity 30 to 100 percent
   c. Ambient Pressure 14.7 psia

B. High Speed Blowers

1. Each blower shall be designed to maintain a minimum rise to surge margin of 3.0 psig away from surge at any point in its capacity range.
2. Blower impellers shall be of the backswept three dimensional high efficiency configuration designed using Computational Fluid Dynamics (CFD) milled from forged aluminum alloy Type 7075 (cast impellers are not permitted), with first lateral critical speed at least 120 percent of the maximum allowable operating speed. The impeller shall be mounted directly to the motor shaft and shall be statically and dynamically balanced. The use of dual impellers is not permitted.
3. Bearings shall be sized for a minimum of expected ten (10) years between major overhauls.
4. Each blower shall be supplied with a sound enclosure covering the entire blower package. The sound enclosure shall be designed for easy inspection and maintenance of all blower package components. Quick release panels shall provide easy and quick access for routine maintenance of the blower and the package components. Hinged doors must be supplied for all panels heavier than 50 lbs. The blower package enclosure shall protect against falling water, condensation and dust. Electrical components, instrumentation and instrument connections shall not be mounted or interface with moving panels of the sound enclosure.
5. Blowers shall not allow heat caused by motor or electrical cooling to be exhausted into the blower room. Blower and integral VFD shall not require any external cooling devices such as cooling fans or external glycol cooling.
6. Each blower shall be supplied with built in vibration isolating mounts. The blower manufacture shall be responsible for attenuating noise and vibration in the blower package such that no special installation base shall be required nor shall any vibration from the blower package be transmitted to the floor or intake and discharge base or the piping.
7. Blowers may be placed on a concrete equipment pad as shown on the drawings and may be anchored to the pad using 316 SS anchor bolts or threaded rods. MANUFACTURER shall provide the specification for anchor bolt or threaded rod for the CONTRACTOR's information. CONTRACTOR shall furnish and install the MANUFACTURER specified anchor bolts.

C. Motors
1. Each blower shall be supplied with a high speed Permanent Magnet Synchronous Motor (PMSM) driven by a variable frequency drive operating on 460/480 Volts, 3 Phase, 60 Hertz input power. Induction or Brushless DC Motors shall not be acceptable. Electric motors shall meet the requirements of Section 26 05 09 LOW VOLTAGE MOTORS UP TO 500 HP.
2. The maximum allowable motor horsepower shall be as specified.
3. Motors shall be suitable for driving the blowers continuously over the entire operating range.
4. Manufacturers of motors shall be as follows:
   a. Baldor Motors
   b. General Electric Motors
   c. U.S. Electric Motors
5. For additional specific requirements on motors, refer to the Motor Data Sheets at the end of the Section.

D. Variable Frequency Drives (VFDs):

1. Each blower shall be supplied with a VFD. VFDs shall meet the requirements of Section 26 29 24, VARIABLE FREQUENCY DRIVES 0.50 – 50 HP, and Section 26 29 25, VARIABLE FREQUENCY DRIVES 60 – 500 HP.

E. Accessories

1. Each blower package shall include a EPDM flexible connector to be installed on the discharge aeration piping prior to the main air header. The flexible connectors shall be sized for a standard pipe diameter and shall prevent the transmission of noise and vibrations and allow for slight misalignments on the pipe-work between the blower package and the piping. The flexible connector shall be suitable for the maximum operating temperature and pressure ratings of the equipment in the air stream.
2. Discharge check valves shall meet the requirements of Section 40 23 43, PROCESS VALVES AND OPERATORS. The discharge check valves shall be Type V635 as shown on the Drawings. Acceptable Manufacturers shall be as specified in Section 40 23 43, PROCESS VALVES AND OPERATORS.
3. Discharge shutoff valves shall meet the requirements of Section, 40 23 43 PROCESS VALVES AND OPERATORS. Discharge shutoff valves shall be butterfly valve Type V510. Acceptable Manufacturers shall be as specified in Section 40 23 43, PROCESS VALVES AND OPERATORS.
4. Each blower shall be equipped with an integrated blow-off valve actuated by blower pressure. The blow-off shall be supplied with a properly sized blow-off silencer.
5. Each blower shall be provided with an integrated combination intake/inlet filter/silencer system. Intake, filter and silencer performance losses shall be included by the blower vendor in the blower performance calculation. The intake/inlet filter/silencer system shall be integrated into the overall blower and enclosure design and shall fit within the enclosure.
6. Each blower shall be equipped with an inlet flanged adapter to allow for piped inlet air.
7. The filter media must have an efficiency of 90% by weight per ASHRAE 52-76 with synthetic dust equivalent to separation > 95% @ 10 microns. Filter element shall be removable without disconnecting the inlet duct and shall be washable by maintenance personnel as a preventative maintenance procedure.

2.7 ELECTRICAL COMPONENTS AND ACCESSORIES

A. General:
   1. Conform to Division 26, ELECTRICAL.
   2. Provide all necessary electrical components and wiring for a complete, functional system.
   3. Where indicated, motor starters shall be provided in a separate motor control center specified in Division 26, ELECTRICAL. Provide all necessary control functions to properly interface with this motor starter.

B. Wiring: The 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, the Contractor shall make the necessary modifications to the electrical wiring and documentation as part of the lump sum price. Wiring shall meet the requirements of Division 26, ELECTRICAL, and NFPA 70. Insulation shall be rated 600 volts, minimum. Low-voltage (24V) signals shall be run in twisted, shielded pair cable.

C. Electrical Raceways: Electrical wiring shall be installed in conduit meeting the requirements of Division 26, ELECTRICAL. Raceways shall be installed in accordance with Division 26, ELECTRICAL, and NFPA 70.

D. Provide breather drain units in the bottom of all electrical enclosures to allow moisture to exit the enclosure.

E. Motors:
   1. Provide high speed Permanent Magnet Synchronous Motor (PMSM) meeting the requirements of Division 26, ELECTRICAL, and as specified herein.

2.8 INSTRUMENTATION AND CONTROLS

A. General:
1. The Drawings and Specifications depict the minimum functional requirements of the control system to be provided. Provide all items not specifically called out which are required to implement the functions described herein. The supplier shall provide all instrumentation and controls necessary to provide a safe and operable system. The specific control system proposed shall be subject to the approval of the Engineer.
2. Conform to Division 26, ELECTRICAL.
3. Wiring: The 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, the Contractor shall make the necessary modifications to the electrical wiring and documentation as part of the lump sum price. Wiring shall meet the requirements of Division 26, ELECTRICAL, and NFPA 70.
4. Electrical Raceways: Electrical wiring shall be installed in conduit meeting the requirements of Division 26, ELECTRICAL. Raceways shall be installed in accordance with Division 26, ELECTRICAL, and NFPA 70.
5. All electrical connections to external devices and equipment shall be provided by the Contractor.
6. All instrumentation and controls shall meet the requirements of Division 26. For acceptable manufacturers, see Section 26 90 10, PROCESS AND ANALYTICAL INSTRUMENTS.

B. Each blower shall be equipped with the following integrated instrumentation:
1. Inlet differential Pressure sensors for filter monitoring
2. Discharge differential Pressure sensor
3. Inlet and Discharge Temperature sensors
4. Bearing Temperature sensor
5. Motor Temperature sensor
6. Vibration sensor

C. Temperature Indication Transmitters shall meet the requirements of Section 26 90 00 GENERAL INSTRUMENTATION AND CONTROL and Section 26 90 10 PROCESS AND ANALYTICAL INSTRUMENTS and shall be insertion type.

D. Differential Pressure indication transmitter shall meet the requirements of Section 26 90 00 GENERAL INSTRUMENTATION AND CONTROL and Section 26 90 10 PROCESS AND ANALYTICAL INSTRUMENTS.

E. Programmable Logic Controller (PLC):
1. Each High Speed Turbo Blower shall be supplied with an integrated PLC control system physically located inside the blower enclosure. The PLC shall meet the requirements of Section 26 90 00, GENERAL INSTRUMENTATION AND CONTROLS, Section 26 90 20, PROGRAMMABLE LOGIC CONTROLLERS.
2. The PLC shall be pre-programmed with logic as required for performing and coordinating all specified control and communications functions further specified herein.
3. I/O shall be as shown in the plans with 20% additional spares available for future use.
4. The PLC shall be capable of communication through Ethernet/IP communication protocol to the Master Control Panel.

F. Operator Interface Terminal (OIT):
1. The OIT shall be the latest version Rockwell Automation PanelView 600. The OIT shall meet the requirements of Section 26 90 00, GENERAL INSTRUMENTATION AND CONTROLS, Section 26 90 30, SCADA COMPUTER SYSTEM AND NETWORK.
2. The interface shall include features to allow for equipment status monitoring, process data monitoring, setpoint adjustment, alarm notification, alarm viewing, and alarm

acknowledgement and reset. Displays shall include intuitive, user friendly fault menus for ease of monitoring diagnostics and troubleshooting.

G. Uninterruptible Power Supply (UPS) shall meet the requirements of Section 26 90 00, GENERAL INSTRUMENTATION AND CONTROLS, Section 26 90 20, PROGRAMMABLE LOGIC CONTROLLERS.

H. Surge protective devices (SPD) shall be provided to protect the electrical and control components from excessive voltage and current: type 1 SPD to protect the 480V loads (VFD) and type 2 SPD to protect the 120V loads (PLC controller box). The SPD locations shall be strategically selected to have surge immunity and the MCOV shall be not less than 115% of nominal voltage.

I. Ethernet Switches shall meet the requirements of Section 26 90 00, GENERAL INSTRUMENTATION AND CONTROLS, Section 26 90 30, COMPUTER SYSTEM AND NETWORK.

J. Miscellaneous Electrical Devices shall meet the requirements of Section 26 90 00, GENERAL INSTRUMENTATION AND CONTROLS, Section 26 90 20, PROGRAMMABLE LOGIC CONTROLLERS.

K. Equipment and controls furnished by other manufacturers shall be provided in accordance with their instructions, where applicable.

L. Local Control Panel, General:
   1. All components in the control panel shall be completely factory wired and shall include all necessary controls for both the manual and automatic operation as indicated on the Drawings and Specifications. All external control connection points (power and control connections) shall terminate on terminal blocks. The terminal strip shall have box-type connectors and all terminals shall be clearly marked for easy identification. A ground terminal strip shall also be provided. At least 10 percent of terminals supplied shall be spare.
   2. Power: 480 VAC, three-phase, 60-Hz. Main Disconnect: Circuit breaker interlocked with door handle.
   3. The control panel shall continuously monitor blower operation and stop the blowers as required to prevent damage from mechanical failure, surge or improper manual operation. Time delays shall be provided to prevent nuisance alarms while starting the blowers and to prevent the re-start of rotating blowers. The number of blower starts per hour shall be limited to 4 or less. Blower shutdown for surge and overload shall be implemented following start-up override time delays. Blower surge protection algorithms shall be a function of blower current and air flow. All blower protection functions shall be fully operable in both Manual and Automatic operating modes.
   4. Power shall be fed from the panel to all system equipment and appurtenances. Coordination with the Contractor shall be provided for the electrical requirements of equipment being furnished under other equipment specification and instrumentation sections.
   5. All integrated controls shall be enclosed in a sub-panel with a NEMA 12 rating or as noted on the drawings.
   6. Power shall be fed from the panel to all system equipment and appurtenances. Coordination with the Contractor shall be provided for the electrical requirements of equipment being furnished under other equipment specification and instrumentation sections.

M. Local Control Panel Operator Interfaces: At a minimum, provide the following functions on the face of the panel:
   1. Operator Interface Terminal:

a. Color graphic screens shall be provided at the OIT for the Blower Set Points, Operating Control Mode selections, and operating parameters. Each programmed screen shall provide equipment status and current process data.
b. All Operator control inputs and value displays not specifically identified herein shall be provided as an object on an appropriate screen of the OIT.
c. A graphic screen showing the blower individually shall be provided to display Blower status and a minimum of current process data including: individual Blower Control Mode, Percent of Full Motor Speed, motor running HP, Run/Startup/Coast Down status and indication, and Alarm/Warning status and indication.
d. An additional graphic screen showing each Blower individually shall be provided to display: Motor Current feedback, Motor Horsepower, Percent of Full Motor Speed, Inboard and Outboard Bearing Vibration and Temperature Set Point command and feedback, Motor Winding Temperature Set Point command and feedback, Surge and OL Set Point command and feedback, Startup/Cost Down Time Delay Set Point command and feedback, and all other required Set Points. Blower/Motor Protection Set Points command shall only be made available through Password Protection.
e. A graphic screen shall be provided to indicate the cause of each Blower related alarm or warning as well as system alarms or warnings.
f. Set Point Entry and Control Mode Selection:
    1) All Set Points, Operating Control Mode Selections, and Tuning Parameters used by the Blower System during operation shall be entered directly on the OIT or remotely via the Master Control Panel. All required Set Points for selecting and controlling the Blowers shall be Operator adjustable without program modification.
    2) All Operator adjustable parameters shall be made in English Units.

N. Local Control Panel External Interfaces: Provide the following interfaces between the control panel and items outside the system package including but not limited to main control panel:
1. Dry Contact Inputs:
    a. Start
    b. Stop
    c. Emergency Stop
2. Analog Inputs:
    a. Speed Reference
3. Ethernet Communication:
    a. All Alarms
    b. All Equipment Status
    c. All parameter displayed at the operator interface
    d. Motor Speed
    e. Air flow
    f. Discharge Pressure
    g. Blower Run Status
    h. Local-Off-Remote selection
    i. Ethernet Communication: The Blower Manufacturer shall submit, to the Engineer, a backup copy of the FactoryTalk View application and a PLC memory map of all control and monitoring values.

O. Other Instrumentation and Controls: Provide all items not specifically called out which are required to implement the functions described herein.

P. Control Description
1. Each blower shall be capable of operating in Local or Remote control.
    a. Local: Blower speed modulation shall be the result of the operator selected control mode and an operator adjustable setpoint.
    b. Remote: Blower speed shall be controlled via the Master Control Panel.

2. Each blower shall have the ability to be controlled in four different modes: constant speed, constant pressure, constant flow or dissolved oxygen.
3. Blower controls shall provide real time monitoring via discharge pressure vs. suction air flow graph indicating current operating point and boundaries.
4. Each blower shall include built in automatic surge protection.
5. Blower controls shall include built in measurement for the following parameters:
   a. Flow
   b. Speed
   c. Vibration
   d. Temperature
   e. Pressure
   f. Sensors with associated data display and adjustment capability for each of the above.
   g. Integrated control system shall control the blow-off valve for each blower.

Q. Alarms and Warnings:
1. All Blower Alarms and Warnings shall be active in both Automatic and Manual modes of operation.
2. The turbo blower system shall be continuously monitored to assure the turbo blower and its control systems are functioning correctly. If the monitoring system detects something that is not functioning properly either an alarm or a fault message appears in the control panel display. If the fault is not critical to the safe operation of the turbo blower an alarm message will be displayed and the turbo blower will continue to operate. If the fault is critical to the safe operation of the turbo blower a fault message will be displayed and the turbo blower will be automatically taken out of service until the reason for the fault is acknowledged and/or corrected.
3. Alarms shall be identified for each Blower/Motor protection monitored parameter. Alarms resulting in Blower shutdown shall be identified for any condition that may cause damage to the Blower, Motor, or related equipment. When any control loop or device failure activates an alarm, it shall be displayed on an Alarm Screen of the OIT and sound the Common Alarm Horn and indicate the Blower shutdown on the Master Control Panel.
4. Time delays shall be provided to prevent nuisance Alarms and Warnings during operation and while starting Blowers.
5. The minimum Blower/Motor Protection Alarms and Warnings for each Blower shall be:
   a. Blower Surge
   b. Motor Overload
   c. High Discharge Pressure
   d. High Discharge Temperature
   e. Motor Winding High Temperature
   f. Motor failed to operate
   g. Blower High Vibration
   h. Loss of any instrumentation analog input to the PLC
   i. Loss of network communications

2.9 TOOLS AND SPARE PARTS

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

B. Spare Parts:
1. All equipment shall be furnished with the specified manufacturers spare parts, as indicated in the individual equipment sections.
2. 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 50 pounds and dimensions less than 2 feet wide, or 18 inches high, or 3 feet in length shall be stored in a wooden box with hinged wooden cover and locking clasp. 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.

3. Provide, at a minimum, the following spare parts for the equipment:
   a. Furnish one set of special tools required for complete assembly or disassembly of blower system components for each type or size of blower specified, together with a neat metal box for the same. This tool kit shall be sufficiently complete to permit normal repair and maintenance of all equipment furnished under this project.

   b. Furnish two (2) sets of air filter elements per blower.

2.10 FABRICATION

A. Shop Assembly:
   1. Shop fabricate and assemble mechanism components in the largest sections practicable and permitted by transportation carrier regulations.
   2. Properly match-mark units for ease of field erection.
   3. Completely shop assemble and test control panels.

B. Shop/Factory Finishing:
   1. Exposed metal surfaces of motors, gear reducers, and assemblies shall be factory prepared and primed and field finish coated in accordance with Section 09 90 00 Painting and Protective Coatings, System No. 4, or approved equal.
   2. Surfaces inaccessible subsequent to erection shall be prepared, primed, and finished in the factory in accordance with Section 09 90 00 Painting and Protective Coatings, System No. 4, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordination shall include space and structural requirements, clearances, utility connections, signals, outputs and features required by the manufacturer including safety interlocks.

3.2 ASSEMBLY AND PREPARATION FOR SHIPMENT

A. Each drive unit, including motor, shall be completely factory assembled, aligned, and securely crated for shipment. Accessory equipment which cannot be shipped assembled to the unit, such as shafts, baseplates, impellers, spare parts, and anchorage materials, shall be separately crated, clearly marked as to the contents, and shipped on the same shipment as the drives.

B. For shipment, exposed surfaces subject to rust, such as mounting flange faces, etc., shall be covered with a rust-preventive compound such as Kendall No. 5, or equal.

3.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 60 00, PRODUCT REQUIREMENTS.

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

C. Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

D. 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. Pumps, motors, drives, electrical equipment, and other equipment with anti-friction or sleeve bearings shall be stored in weathertight 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.

3.4 INSTALLATION

A. Installation shall be by the Contractor with coordination from the Manufacturer.

B. Anchor Bolts: Provide templates and specify bolts for furnishing by Contractor.

C. Manufacturer shall coordinate with Contractor during all phases of installation to ensure that manufacturer's representative is present during critical installation operations.

D. Install the turbo blower and accessories in accordance with manufacturer's recommendations found in the Installation Manual and any addendums including alignment of components, mounting level and connections.

3.5 FIELD QUALITY CONTROL

A. Inspection and Check-out:
1. Prior to equipment start-up, the Contractor, with the assistance from the manufacturer's representative, shall inspect all equipment for proper assembly and alignment, quiet and proper operation.
2. Complete electrical system shall be tested to ensure proper function.
3. Inspect piping to assure it is clean and free of any contaminants that may harm the turbo blower.
4. Instrumentation and Controls:
   a. A complete functional test of the internal instrumentation and control systems shall be completed to assure they have not been damaged during shipment.
   b. Set operational limits and alarm and shutdown limits as needed.
   c. See specifications sections 43 11 20.13 for additional information.
5. Piping and accessories are properly aligned.
6. All accessories are adequately supported per the specification and drawings.
7. The turbo blower is adequately grounded per the manufacturer's installation instructions.
8. The turbo blower anchor bolt and all accessory fasteners are properly torqued.
9. Assure that all electrical systems are properly connected and terminals are tight.
10. All components shall operate without alarms or shut downs, except as intended, for eight consecutive hours to be considered ready for start-up.
11. Equipment shall operate through the design performance range consistent with available flows. Adjust, balance, calibrate and verify that the equipment, safety devices, controls and process system operate within the design conditions. Response shall be checked for each equipment item and alarm.

B. Equipment Performance Test:

1. Run each turbo blower from minimum to maximum specified flows at the differential pressure of the plant system to assure that no damage has occurred during shipment that may affect the performance of the turbo blower.
2. Record temperature, pressure and flow.

C. Operational Testing:
1. Testing of each turbo blower shall be deemed successful if it has been demonstrated that it operates as intended and meets specification requirements.
2. The turbo blower tests shall be deemed failed if an unintended shutdown occurs, the control system does not respond as it should and vibration is in excess of the specified value. Minor on-line adjustments and tuning of instrumentation are not considered a failure.
3. If during the testing the turbo blower fails any of the tests the cause of the failure will be corrected and the testing repeated until no failures occur.

D. A copy of all information from functional tests, including data, worksheets, and other materials shall be turned over to the Owner at the completion of the testing program.

3.6 MANUFACTURER'S SERVICES

A. A manufacturer's representative for the equipment specified herein shall be present at the job site for the minimum person-days listed for the services hereinunder for each unit provided, travel time excluded. Each day shall consists of eight (8) hours at the project site excluding travel time and breaks. Provide services at no additional cost to the Owner.
1. Installation, Startup, and Testing Services:
   a. 1 person-day for installation assistance, inspection, and Certificate of Proper Installation.
   b. 1 person-day for functional and performance testing.
   c. Provide Qualifications of Manufacturer's Representative.
2. Training Services:
   a. 1 person-day of prestart classroom or jobsite training of Owner's personnel.
   b. Training of Owner's personnel shall be at such times and at such locations as required and approved by the Owner.

B. See Section 01 79 00, DEMONSTRATION & TRAINING.

3.7 MANUFACTURER'S CERTIFICATES

A. Provide Manufacturer's certificate(s) in accordance with Section 01 79 00, DEMONSTRATION & TRAINING.

3.8 SUPPLEMENTS

A. The supplements listed below and following end of section are part of this Specification:
1. Section 43 11 20.1 – High Speed Blowers (#1 & #2)

END OF SECTION

Section 43 11 20.1 – HIGH SPEED TURBO BLOWERS (No. 1 & 2)

PROJECT:	NORMAN WRF PHASE 2 IMPROVEMENTS
OWNER:	THE NORMAN UTILITIES AUTHORITY
EQUIPMENT NAME(S):	High Speed Turbo Blowers No. 1 & 2
EQUIPMENT TAG NUMBER(S):	25B05 & 25B06
CONTROL PANEL(S):	Integral Control Panel (one per blower) Plus Master Control Panel
TOTAL BLOWERS REQUIRED:	2

MANUFACTURERS	MODEL
APG Neuros	NX350-C070
HSI	FRAME 5

SERVICE CONDITIONS

Gas :	Air	
Air Temperature (F):	76	Normal
Air Temperature (F):	105	Maximum
Air Temperature (F):	5	Minimum
Barometric Pressure:	14.1	psia
Design Relative Humidity:	90%	
Site Elevation above MSL:	1150	
Installation:	Indoors	

PERFORMANCE REQUIREMENTS

Rated Capacity:	5,875	scfm
Rated Discharge Pressure:	8.75	psig
Rated Turndown Capacity	3,400	scfm
	@ 8.75	psig
Wire-to-Air Efficiency at Design	74.9%	

EQUIPMENT DESCRIPTION

Casing and Heads:	Aluminum A356	Number of Stages:	Single
Tie Rods:	Galvanized Steel	Operating speed:	21,000 RPM
Interstage Sealing:	Not Applicable	Casing Design Pressure:	25 psig
Shaft	Titanium Alloy Ti-6AL-4V	Seals:	Labyrinth
Impellers:	Aluminum Type 7075 - Forged	Bearings:	Bump Foil Air Bearings
Base:	Carbon Steel	Lubrication:	None
Base Pads:	Elastomeric by Blower Manufacturer	Vibration:	< 3 mm/sec
Finish:	Alkyd Resin Primer w/ Powder Coated Polyester		

MOTOR DATA

Type: Inverter Duty; High Efficiency; Permanent Magnet Synchronous Motor

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 1450 and have an applied UL listing marking.

Motor Horsepower:	350 (Max)	Mounting Type:	☒ Horizontal ☐ Vertical
Voltage:	460	Enclosure Type:	TEFC
Phase:	3	Material:	Titanium motor/copper winding
Frequency:	60 Hz	Load Class:	Insulation H; Temp Ride B
Synchronous Speed:	21,000	☐ Multispeed, Two Speed:	N/A rpm
Service Factor:	☐ 1.0 ☒ 1.15		

☒ Adjustable Speed Drive: See Division 26, ELECTRICAL. Provide Inverter Duty Rated Motors.

Windings: ☐ One ☐ Two ☒ Thermal protection embedded in windings.

Motor nameplate horsepower shall not be exceeded at any operational point.

Provide: ☐ Space Heater ☒ Oversize main terminal (conduit) box for motors ☐ Moisture detection switches.

Additional Motor Requirements: See Section 26 05 09, Low Voltage Motors up to 500 HP

SPECIAL FEATURES / NOTES

See Specification for accessories to be furnished with blowers.
Section 40 23 43, PROCESS VALVES AND OPERATORS, for additional requirements
See Division 26 ELECTRICAL for electrical requirements.

Exhibit C
Original HSI Blower Performance Curves (For reference only)

Houston Service Industries, Inc.
7901 Hansen, Houston, TX 77061

HIGH SPEED TURBO BLOWER PERFORMANCE CURVE

BLOWER DATA	
Model	: Frame 5
Impeller(s)	: Wheel 3
Serial No.	:

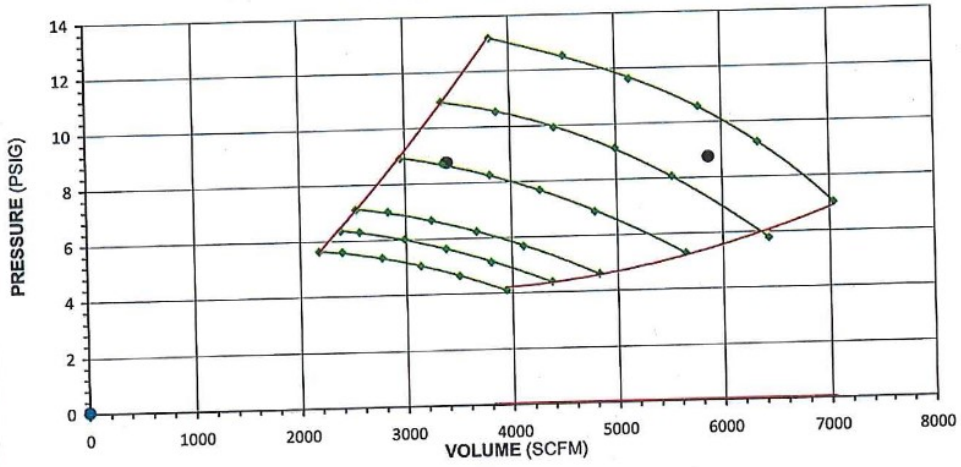
DESIGN POINT	
Volume (CFM)	: 5875.00
Disch Press (PSIG)	: 8.750
Diff Press (PSIG)	: 0.25
Power (kW)	: 222.20
Power (HP)	: 297.97

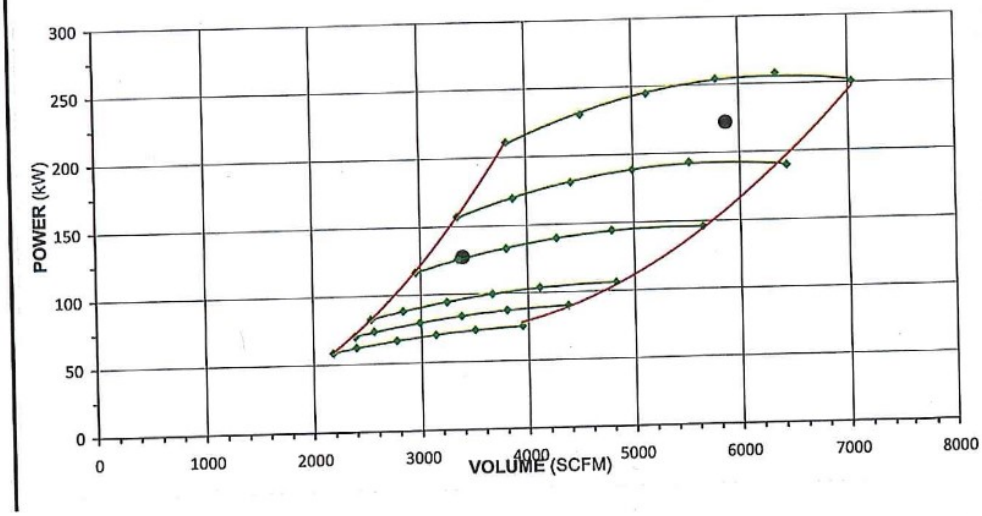
INLET CONDITIONS	
Bar Press (PSI)	: 14.100
Inlet Press (PSI)	: 13.850
Inlet Temp (°F)	: 76.00
Relative Hum.	: 90%
Molecular Wgt	: 28.664
Isentropic Exp	: 1.398

OTHER INFORMATION	
Date	:
Job No.	:
PO No.	:
Customer	:

ALTERNATE DESIGN POINT 1	
Volume (CFM)	: 3400.00
Disch Press (PSIG)	: 8.750
Power (kW)	: 127.39
Power (HP)	: 170.83

ALTERNATE DESIGN POINT 2	
Volume (CFM)	: 0.00
Disch Press (PSIG)	: 0.000
Power (kW)	:
Power (HP)	: #VALUE!





Houston Service Industries, Inc.
7901 Hansen, Houston, TX 77061

HIGH SPEED TURBO BLOWER PERFORMANCE CURVE

BLOWER DATA	
Model	: Frame 5
Impeller(s)	: Wheel 3
Serial No.	:

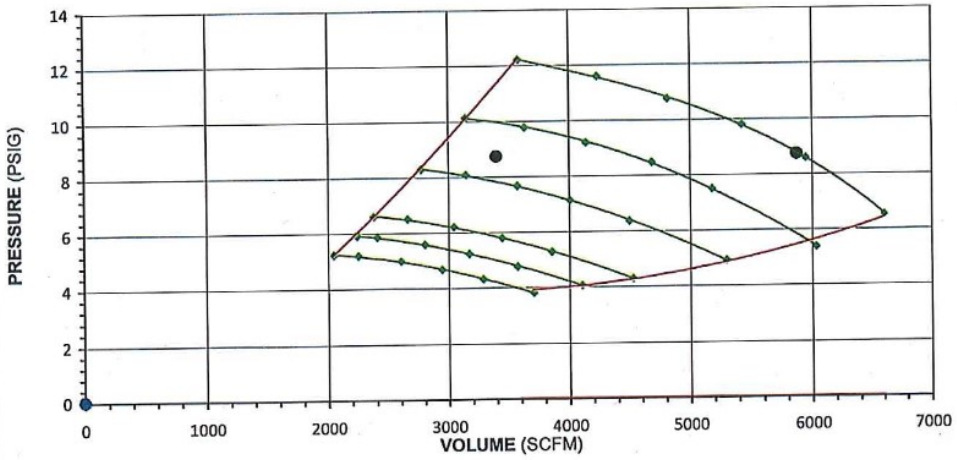
DESIGN POINT	
Volume (CFM)	: 5875.00
Disch Press (PSIG)	: 8.750
Diff Press (PSIG)	: 0.25
Power (kW)	: 240.35
Power (HP)	: 322.32

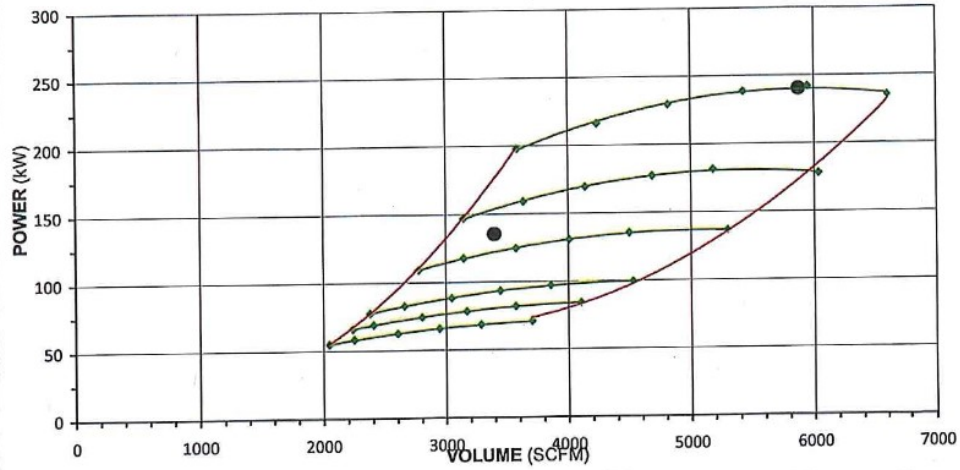
INLET CONDITIONS	
Bar Press (PSI)	: 14.100
Inlet Press (PSI)	: 13.850
Inlet Temp (°F)	: 105.00
Relative Hum.	: 90%
Molecular Wgt	: 28.663
Isentropic Exp	: 1.397

OTHER INFORMATION	
Date	:
Job No.	:
PO No.	:
Customer	:

ALTERNATE DESIGN POINT 1	
Volume (CFM)	: 3400.00
Disch Press (PSIG)	: 8.750
Power (kW)	: 135.12
Power (HP)	: 181.19

ALTERNATE DESIGN POINT 2	
Volume (CFM)	: 0.00
Disch Press (PSIG)	: 0.000
Power (kW)	:
Power (HP)	: #VALUE!





Houston Service Industries, Inc.
7901 Hansen, Houston, TX 77061

HIGH SPEED TURBO BLOWER PERFORMANCE CURVE

BLOWER DATA	
Model	: Frame 5
Impeller(s)	: Wheel 3
Serial No.	:

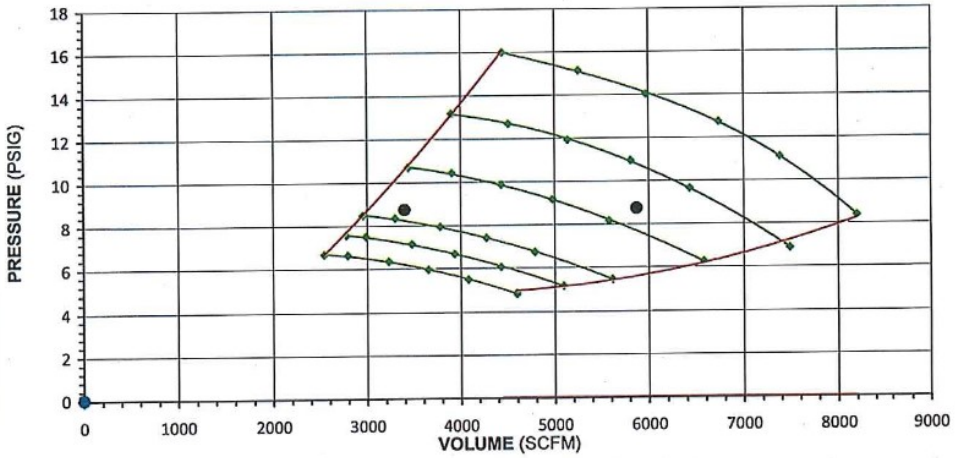
DESIGN POINT	
Volume (CFM)	: 5875.00
Disch Press (PSIG)	: 8.750
Diff Press (PSIG)	: 0.25
Power (kW)	: 187.47
Power (HP)	: 251.40

INLET CONDITIONS	
Bar Press (PSI)	: 14.100
Inlet Press (PSI)	: 13.850
Inlet Temp (°F)	: 5.00
Relative Hum.	: 90%
Molecular Wgt	: 28.664
Isentropic Exp	: 1.398

OTHER INFORMATION	
Date	:
Job No.	:
PO No.	:
Customer	:

ALTERNATE DESIGN POINT 1	
Volume (CFM)	: 3400.00
Disch Press (PSIG)	: 8.750
Power (kW)	: 110.32
Power (HP)	: 147.94

ALTERNATE DESIGN POINT 2	
Volume (CFM)	: 0.00
Disch Press (PSIG)	: 0.000
Power (kW)	:
Power (HP)	: #VALUE!



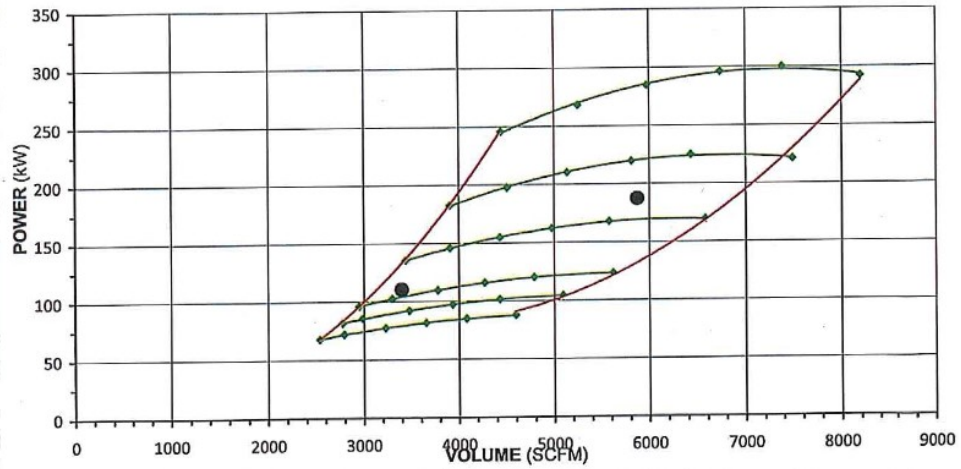


Exhibit D

Notice of Final Acceptance
Project: Blower Replacement

This document shall serve as agreement of acceptance and substantial completion for equipment and services provided by Contractor under the SETTLEMENT AGREEMENT AND MUTUAL RELEASE between Norman Utilities Authority and Atlas Copco Compressors, LLC.

Owner: Norman Utilities Authority (NUA)

Contractor: Atlas Copco Compressors, LLC

The Work to which this Certificate applies has been observed by authorized representatives of NUA and that Work is hereby declared to be substantially complete in accordance with SETTLEMENT AGREEMENT AND MUTUAL RELEASE.

If needed, a tentative list of items to be completed or corrected are provided below: This list may not be all inclusive, and failure to include an item does not alter the responsibility of the Contractor to complete all the Work in accordance with the SETTLEMENT AGREEMENT AND MUTUAL RELEASE.

The items in the tentative list shall be completed or corrected by Contractor within 120 calendar days of the signed date of Final Acceptance.

1.
2.
3.
4.
5.

The responsibilities of NUA:
Upon Final Acceptance, NUA may initiate 5-year Preventative Maintenance Plan with the Contractor within sixty (60) days as outlined in Exhibit E to obtain a 5 year extended warranty from Final Acceptance. However, should the NUA decide not to purchase the Preventative Maintenance Plan, the warranty periods outlined in Section 5: EQUIPMENT WARRANTIES included within this Agreement shall remain in effect.

Exhibit D

IN WITNESS THEREOF, we have here unto set our hands and seals this 2nd day of February in 2023.

NORMAN UTILITIES AUTHORITY

Authorized Agent Signature

[Print Name]

[Title]

Sworn to and subscribed before me this ____ day of _____, 2023.

Notary Public

My Commission Expires:

ATLAS COPCO COMPRESSORS LLC
successor to Houston Service Industries

Robert Eshelman
[Print Name]

President
[Title]

Sworn to and subscribed before me this 2nd day of February, 2023.

Katherine A. Blanton
Notary Public

My Commission Expires: 9/24/2024

Exhibit E
ATLAS COPCO SERVICE PLAN REQUIRED FOR 5 YEAR EXTENDED WARRANTY

Standard Preventative Maintenance Plan

- Model: ZB6
- Plan Duration: 5 years from Final Acceptance
- Visit Schedule over first 5 years of operation: B/B/C/F/B

B Visit: 8,000 hours of operation
C Visit: 24,000 hours of operation
F Visit: 48,000 hours of operation

Visit Details:

Visit Activities

Description	A	B	C	D	E	F	I	T
Follow Customer Specific Safety Rules		x	x			x		
Replace cubicle filters		x	x			x		
Take service reading(air,oil,water T+ P)		x	x			x		
Inspect blow-off valve calibration			x					
Check compensator			x					
Overhaul air discharge valve								
Inspect impeller(s),edges,cleanliness			x					
Inspect impeller+shroud (rubs,corrosion)			x					
Change radial cooling fan assembly						x		
Change lubrication oil								
Clean impellers, as required								
Carry out daily check-up		x	x			x		
Replace victaulic coupling elements oil circuit								
Replace the seal ring of the pump								
Change thermostatic valve								
Check condition of cooling fan assy (AC)								
Inspect+clean diffuser vanes,check pos								
Inspect+record all t°, P and flows		x	x			x		
Check and record cooling water T		x	x			x		
Check inlet air diff press.(reading)		x	x			x		
Check coolers and clean externally		x	x			x		
Inspect all hoses		x	x			x		
Change air filter element(s)		x	x			x		
Change cartridge		x	x			x		

Annual Pricing: **$5,182 each (fixed price for the term of this Agreement if implemented in first year of operation)**
Pricing subject to change based on date of final agreement