CITY OF PALMER ACTION MEMORANDUM NO. 10-082

SUBJECT: Authorize the City Manager to Execute Change Order No. Three to Lemna Technologies, Inc. to Supply and Install Eight Dissolved Oxygen (DO) Sensor Units and Associated Wiring and Programming for Waste Water Treatment Plant Improvements, Phase I in the Amount of $41,742

AGENDA OF: December 14, 2010

Council action:

Authorized

Approved for presentation by Douglas B. Griffin, City Manager_Douglas B. Griffin

Route To:	Department/Individual:	Initials/Date:	Remarks:
X	Originator – Public Works		
X	City Clerk	12/3/10	
X	City Attorney	12/3/10	
	Director of Administration		
	Director of Community Development		
	Director of Community Services		
	Director of Public Safety		
	Director of Public Works		

Attachment(s): Change Order Three
AM 09-052, Lemna Contract
AM 10-003, Change Order One
AM 10-053, Change Order Two
Environmental Protection Agency Waiver Request Approval from the Buy American Provision

Certification of Funds:

	No fiscal impact.	
X	Funds are budgeted from this account number: 24-40-01-6XXX	$41,742.00
	Funds are not budgeted. Budget modification is required. Affected account number:	
	Unrestricted/undesignated fund balance (after budget modification):	

Director of Administration Signature: _____

Summary statement: Change order three is to supply and install eight dissolved oxygen

(DO) sensor units into lagoons one and two and the associated wiring and programming needed to monitor the probes. This change order also includes the addition of Modbus network module, a Programmable logic Controller (PLC) at the blower building and the presentation of the eight sensors in the Supervisory Control and Data Acquisition (SCADA) system. These additional sensors were not part of change order two, but the installation of these sensors will provide better control to operate the new blowers for lagoons one and two.

On July 27, 2010, AM 10-053, was approved by the Palmer City Council for the purchase and installation of the Atlas blowers. The City obtained the EPA Buy American Waiver for the Atlas blowers on October 20, 2010. The anticipated delivery of the blowers is February 2011.

History: This project is funded 100 percent by Alaska Department of Environmental Conservation (ADEC) Alaska Clean Water Fund (ACWF) 671161.

The City entered into a contract with Lemna Technologies, Inc. in December 8, 2009, for the supply and installation of the insulated covers on pond one in the amount of $662,000. On January 12, 2010, Change Order two was approved to cover pond two in the amount of $597,000. Change Order three was approved on July 27, 2010, with AM 10-053, for the purchase and installation of the blowers in the amount of $623,020.

The administration recommends the award of change order no. two for the DO sensors to Lemna Technologies, Inc. for the amount of $41,472.00.

Administration recommendation: Approve action memorandum 10-082.

CHANGE ORDER

OWNER (X)
CONTRACTOR (X)

PROJECT:	**Palmer WWTP Improvements Phase I, Insulated Floating Cover City of Palmer, AK**	**CHANGE ORDER NUMBER:**	**003**
		INITIATION DATE:	**11/5/2010**
		PROJECT NO:	**915-LC**
TO:	**Lemna Technologies, Inc. 2445 Park Avenue, Minneapolis, MN 55404**	**CONTRACT DATE:**	**12/24/2009**
		NOTICE TO PROCEED:	**12/29/2009**

You are directed to make the following changes to this Contract:

1. ADD the following quantities to the Bid Schedule Time and Materials:

Item	Work Description	Qty	Unit Price	Total Price
CO3-1	Supply and Install of 8 units, non-metallic probe support system within Lagoon 1 and 2. Installation includes network wiring t-taps, pvc/hdpe wiring for network wiring, addition of Modbus network module at blower building PLC, upgrade of PLC at blower building to support the Modbus module, programming and presentation of the (8) sensors in SCADA and provision of proper data for blowers to operate on a PID loop.	1	$ 41,742.000	$ 41,742.00
		TOTAL		**$ 41,742.00**

Note: All work shall be in accordance with the Contact Documents and must be approved by the City Representative and the City of Palmer.

Not valid until signed by the Owner. Signature of the Contractor indicates his agreement herewith, including any adjustments in the Supplier Sum or Contract Time all other conditions of the main Contract remain in force.

The original Contract Sum was	$ 662,000.00
Net change by previously authorized Change Orders	$ 1,220,020.00
The Contract Sum prior to this Change Order was	$ 1,882,020.00
The Contract Sum will be (Increased) by this Change Order	$ 41,742.00
The new Contract Sum including this Change Order will be Not To Exceed	$ 1,923,762.00
The Contract Time will be (Unchanged)	0

Substantial Completion and Final Completion, as of the date of this Change Order, therefore is 1/25/11, respectively.

BY ACCEPTING THIS CHANGE ORDER, THE CONTRACTOR AGREES THAT THE AMOUNT PAID FOR ON THE ABOVE ITEMS IS EQUITABLE AND THAT NO FURTHER COMPENSATION FOR THE ABOVE ITEMS WILL BE MADE.

Accepted:	**Authorized:**
Lemna Technologies, Inc.	**City of Palmer**
SUPPLIER	OWNER
2445 Park Avenue	231 W. Evergreen Ave.
Minneapolis, MN 55404	Palmer, AK 99645
By: _____	By: _____
Date: _____	Date: _____

CITY OF PALMER ACTION MEMORANDUM NO. 09-052

SUBJECT: Authorize the City Manager to Award and Execute a Contract for the Wastewater Treatment Plant Lagoon Cover to Lemna Technologies, Inc. in the Amount of $662,000

AGENDA OF: December 8, 2009

Council action: Authorized

Approved for presentation by B. B. Allen, City Manager_____

Route To:	Department/Individual:	Initials/Date:	Remarks:
X	Originator – Public Works		
X	City Clerk	12/2/09	
X	City Attorney	12/2/09	
X	Director of Administration		
	Director of Community Development		
	Director of Community Services		
	Director of Public Safety		
	Director of Public Works		

Attachment(s):

Certification of Funds:

	No fiscal impact.	
X	Funds are budgeted from this account number: $662,000	24-01-21-6620
	Funds are not budgeted. Budget modification is required. Affected account number:	

Director of Administration Signature: _____

Summary statement: On November 27, 2009, the city received one bids for the wastewater treatment plant lagoon cover. Fifteen companies requested bid packets.

The bid is to purchase an insulated floating cover for lagoon one at the wastewater treatment plant. The bid also includes freight and technical services for the installation of the cover. The bid results are as follows:

Bid Schedule – Lemna Technologies, Inc.				
ITEM	ESTIMATED QUANTITY	DESCRIPTION	UNIT BID PRICE	TOTAL BID PRICE
1	142,625 sq. ft.	Floating Insulated R 14 Cover	Per Sq. Ft. $4,375	$623,985
2	Lump Sum 1	Floating Baffle System	L/S $11,765	$11,765
3	21 Days	Site Supervision for the Installation of the Cover	Per Day $1,250	$26,250

The lowest acceptable bid is from Lemna Technologies, Inc. for the amount of $662,000.00

The manufacture will provide materials, freight to Palmer's Wastewater Treatment Plant and supply the technical installation labor to assist Palmer's work force in completing the installation. Once the material arrives in Palmer, it is anticipated the installation will take approximately two weeks, with an additional week of modifications before the project is done. Once the installation is completed, the manufacturer will provide the City with a five year warranty of the materials and provide a certificate of proper installation.

The project was previously bid using the Design/Build delivery method to meet the City's specific goals. No responsive bids were received from private sector contractors. The private sector response to the project left the City with little option but to proceed with a force account project working with the manufacture to install the insulated cover. In discussion with the manufacturers after the bid, it was clear that no contractors from Alaska had installed any covers like this. The manufacturer suggested that the City do as other Municipalities have done, installing the insulated cover under the direct supervision of the manufacturer.

The manufactures representatives have installed projects in the same manner as the City proposes to use. Since the facility must stay in operation during the installation period, the manufacture prefers to work directly with the owners of the facility. This is another reason the previous solicitation was unsuccessful; the contractor risk was too high. There are not any covers currently installed in Alaska, so there is no experienced installer of this type of system. There are many installations in the cold climates around the country, including Minnesota with temperatures below zero such as in Alaska. The results in these colder climates are achieving the results the City hopes to achieve in Palmer.

The manufacture will work directly with city crews in the installation of the insulated cover. The cover will be installed on the lagoon as soon as possible; this will help reactivate the already dormant pond due to freezing temperatures. It is expected that once the insulated cover is installed over the pond with the new floating baffle system, the pond temperature will increase and therefore reactivate the treatment. This will also allow city employees to have important temperature data for future evaluations and project planning. There may need to be some additional modification to the air system to accommodate the new cover, which will be evaluated after the insulated cover, is installed.

Upon approval of this action memorandum, a formal Notice to Proceed will be issued to the supplier for the insulated cover. All aspects of the installation should be complete by May 30, 2010. This date will allow the City to collect the necessary data and show the results of the

installation and show compliance with EPA standards by the 2011 deadline at the current flow rates. The plant can easily be modified for any future upgrades. After the project is completed and the results known, during the summer of 2010 some additional piping will be installed so that lagoon #3 can be drained and taken off line. By doing this the plant site can be prepped for future planning and expansion when necessary.

Preliminary estimated costs for entire project are as follows:

$	171,250.00	Environmental Assessment WWTP	(previously funded by Council)
$	662,000.00	Cover Material	
$	250,000.00	Installation Costs	
$	400,000.00	Blower modifications	
$	600,000.00	Filtration Improvements	
$	260,406.25	Admin fees	
$	156,343.75	Contingency	
$	2,500,000.00	Total – ARRA Funds	

This project is funded by the Alaska Department of Environmental Conservation (ADEC) Alaska Clean Water Fund (ACWF) no. 671161 for Wastewater Treatment Plant Improvements, Phase I and is 100 percent funded.

Administration recommendation: Approve action memorandum 09-052.

CITY OF PALMER ACTION MEMORANDUM NO. 10-003

SUBJECT: Authorize the City Manager to Execute Change Order One for the Wastewater Treatment Plant Lagoon Cover to Lemna Technologies, Inc. in the Amount of $597,000

AGENDA OF: January 12, 2010

Council action:	Authorized

Approved for presentation by B. B. Allen, City Manager_____

Route To:	Department/Individual:	Initials/Date:	Remarks:
X	Originator – Public Works		
X	City Clerk	12/31/09	
X	City Attorney	12/31/09	
X	Director of Administration		
	Director of Community Development		
	Director of Community Services		
	Director of Public Safety		
	Director of Public Works		

Attachment(s): Preliminary Flow Charts .5 MGD and 1.0 MGD and Change Order 1

Certification of Funds:

	No fiscal impact.	
X	Funds are budgeted from this account number: ARRA WWTP	24-01-21-6620
	Funds are not budgeted. Budget modification is required. Affected account number:	

Director of Administration Signature: _____

Summary statement: Change Order One will purchase an insulated floating cover for lagoon two at the Palmer Wastewater Treatment Plant in the amount of $597,000.

Lemna Technologies, Inc. will provide materials, the freight to Palmer's Wastewater Treatment Plant and supply the technical installation labor to assist Palmer's work force to complete the installation. Once the material arrives in Palmer, it is anticipated the installation will take approximately two weeks after the installation of the insulated cover on Lagoon #1, with an additional week of modifications before the project is done. Once the installation is completed, the manufacturer will provide the City with a five year warranty of the materials and provide a

certificate of proper installation.

On December 8, 2009, the city awarded the contract to Lemna Technologies, Inc. for the insulated floating cover for lagoon one at the wastewater treatment plant. The bid included freight and technical services for the installation of the cover. At that time the City reported the preliminary estimate cost for the entire project were as follows:

	Cost	Description	Funded
$	171,250.00	Environmental Assessment WWTP	(previously funded by Council)
$	662,000.00	Cover Material	
$	250,000.00	Installation Costs	
$	400,000.00	Blower Modifications	
$	600,000.00	Filtration Improvements	
$	260,406.25	Admin fees	
$	156,343.75	Contingency	
$	2,500,000.00	Total - American Recovery and Reinvestment Act (ARRA) Funds	

After discussions with Alaska Department of Environmental Conservation (ADEC), Ecological Engineering Group, Inc. and Lemna Technologies, Inc. it seems that due to the funding constraints it is in the City's best interest to cover both lagoon one and two at this time. The constraint requires that all ARRA funds be assigned and properly identified how they will be spent by January 17, 2010. It is not certain the other modifications to the blowers and filtration would even be needed to be done at this point in time. The second insulated cover is easy to justify because it will allow us the future capacity with it in place up to about 2 MGD (Million Gallons per Day). This would be the maximum capacity of the existing facility head works building.

Lemna Technologies suggested covering both lagoons earlier as a solution to handle up to two million gallons with current influent temperatures. After the project bid, a proposal for the second cover was requested. The consensus of the project team is that purchasing the second cover is more beneficial then guessing at other modifications that may or may not need to be made to the first cover.

ADEC has agreed that if blower modification and filtration improvements are needed in the future, they could be funded thru the ADEC Municipal Matching Grants. The City must show ADEC how all the ACWF 671161 money will be spent by January 17, 2009. With the approval of changer order #1, the adjusted breakdown below would do that.

After approving Change Order One to Lemna Technologies, Inc. the preliminary estimate project cost has been revised as follows:

	Cost	Description	
$	171,250.00	Environmental Assessment WWTP	(previously funded by Council)
$	662,000.00	Cover Material	(previously funded by Council)
$	597,000.00	Cover Material, Change Order 1	
$	500,000.00	Installation Costs	
$	280,212.50	Admin fees	
$	289,537.50	Contingency	
$	2,500,000.00	Total - ARRA Funds	

This project is funded by the Alaska Department of Environmental Conservation (ADEC) Alaska Clean Water Fund (ACWF) no. 671161 for Wastewater Treatment Plant Improvements, Phase I and is 100 percent funded.

Administration recommendation: Approve action memorandum 10-003.

CHANGE ORDER

OWNER (X)
CONTRACTOR (X)

PROJECT:	**Palmer WWTP Improvements Phase I, Insulated Floating Cover City of Palmer, AK**	**CHANGE ORDER NUMBER:**	**001**
		INITIATION DATE:	**12/29/2009**
		PROJECT NO:	**915-LC**
TO:	**Lemna Technologies, Inc. 2445 Park Avenue, Minneapolis, MN 55404**	**CONTRACT DATE:**	**12/24/2009**
		NOTICE TO PROCEED:	**12/29/2009**

You are directed to make the following changes to this Contract:

1. ADD the following quantities to the Bid Schedule Time and Materials:

Item	Work Description	Qty	Unit Price	Total Price
CO1-1	Add Floating Insulated R14 Cover 123,750 SF for Pond no. 2 at WWTP	123,750 SF	$ 4.375	$ 541,406.25
CO1-2	Increase Line Item 2 - Floating Baffle System for Pond no. 2 at WWTP	1 LS	$ 31,843.75	$ 31,843.75
CO1-3	Increase Line Item 3 - Site Supervision for the Installation of the Floating Cover at Pond no. 2 at WWTP	19 Days	$ 1,250.00	$ 23,750.00
		TOTAL		**$ 597,000.00**

Note: All work shall be in accordance with the Contact Documents and must be approved by the City Representative and the City of Palmer.

Not valid until signed by the Owner. Signature of the Contractor indicates his agreement herewith, including any adjustments in the Supplier Sum or Contract Time all other conditions of the main Contract remain in force.

The original Contract Sum was	$ 662,000.00
Net change by previously authorized Change Orders	$ -
The Contract Sum prior to this Change Order was	$ 662,000.00
The Contract Sum will be (Increased) by this Change Order	$ 597,000.00
The new Contract Sum including this Change Order will be Not To Exceed	$ 1,259,000.00
The Contract Time will be (Remain Unchanged)	0

Substantial Completion and Final Completion, as of the date of this Change Order, therefore is 08/25/09 and 09/25/09, respectively.

BY ACCEPTING THIS CHANGE ORDER, THE CONTRACTOR AGREES THAT THE AMOUNT PAID FOR ON THE ABOVE ITEMS IS EQUITABLE AND THAT NO FURTHER COMPENSATION FOR THE ABOVE ITEMS WILL BE MADE.

Accepted:

Lemna Technologies, Inc.
SUPPLIER
2445 Park Avenue
Minneapolis, MN 55404

By: _____

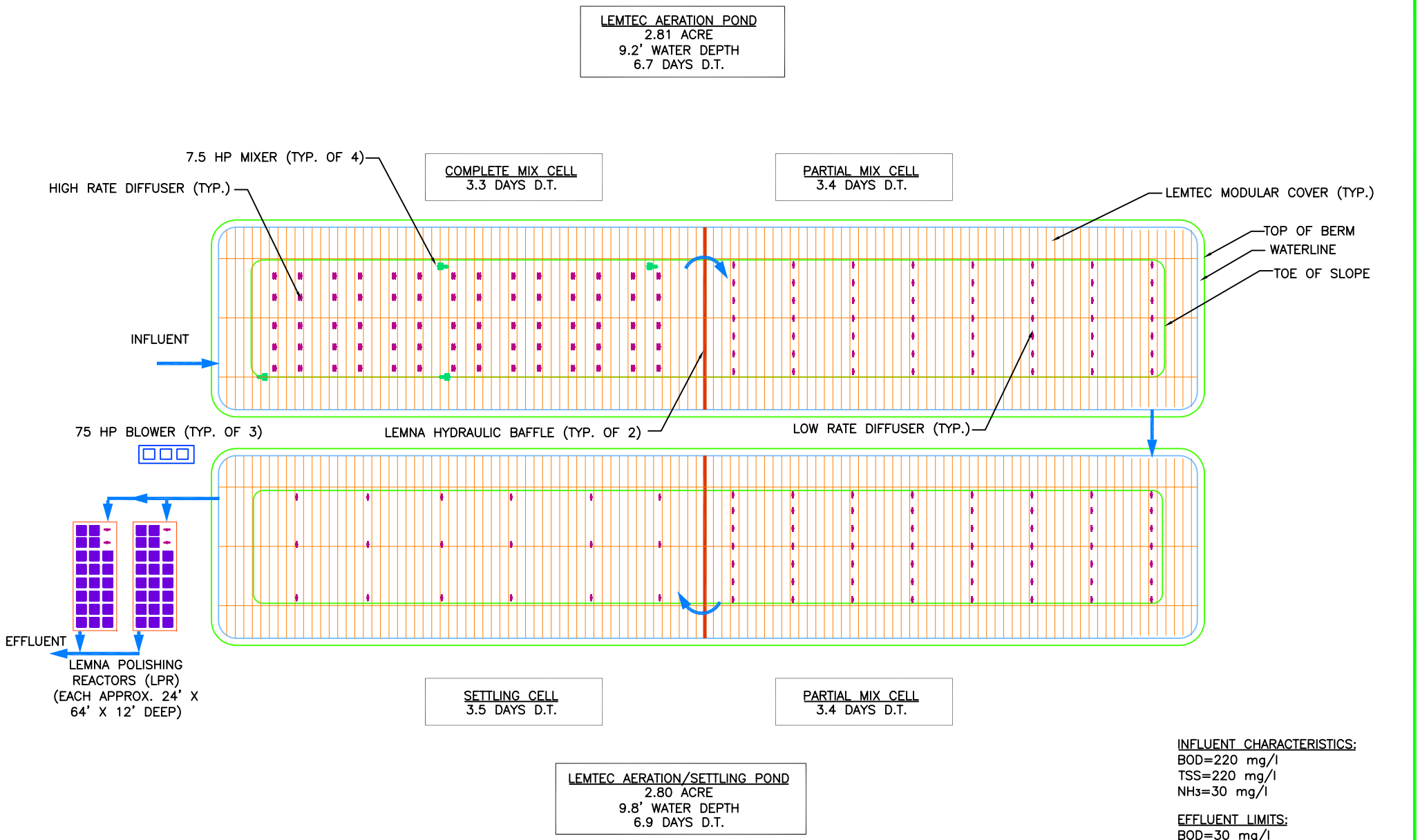
Date: _____

Authorized:

City of Palmer
OWNER
231 W. Evergreen Ave.
Palmer, AK 99645

By: _____

Date: _____



INFLUENT CHARACTERISTICS:
BOD=220 mg/l
TSS=220 mg/l
NH_3=30 mg/l

EFFLUENT LIMITS:
BOD=30 mg/l
TSS=30 mg/l
NH_3=1.7 mg/l (summer)
NH_3=8.7 mg/l (winter)

DESIGN FLOW: 1.0 MGD

NOTE: DESIGN BASED ON MINIMUM INFLUENT TEMPERATURE OF 9.17°C

THIS DESIGN IS PROPRIETARY TO LEMNA TECHNOLOGIES, INC. AND IS SOLELY INTENDED FOR APPLICATION AT PALMER, ALASKA BY LEMNA TECHNOLOGIES, INC. THIS DESIGN CANNOT BE USED BY A THIRD PARTY NOR REPRODUCED, IN FULL OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF LEMNA TECHNOLOGIES, INC.

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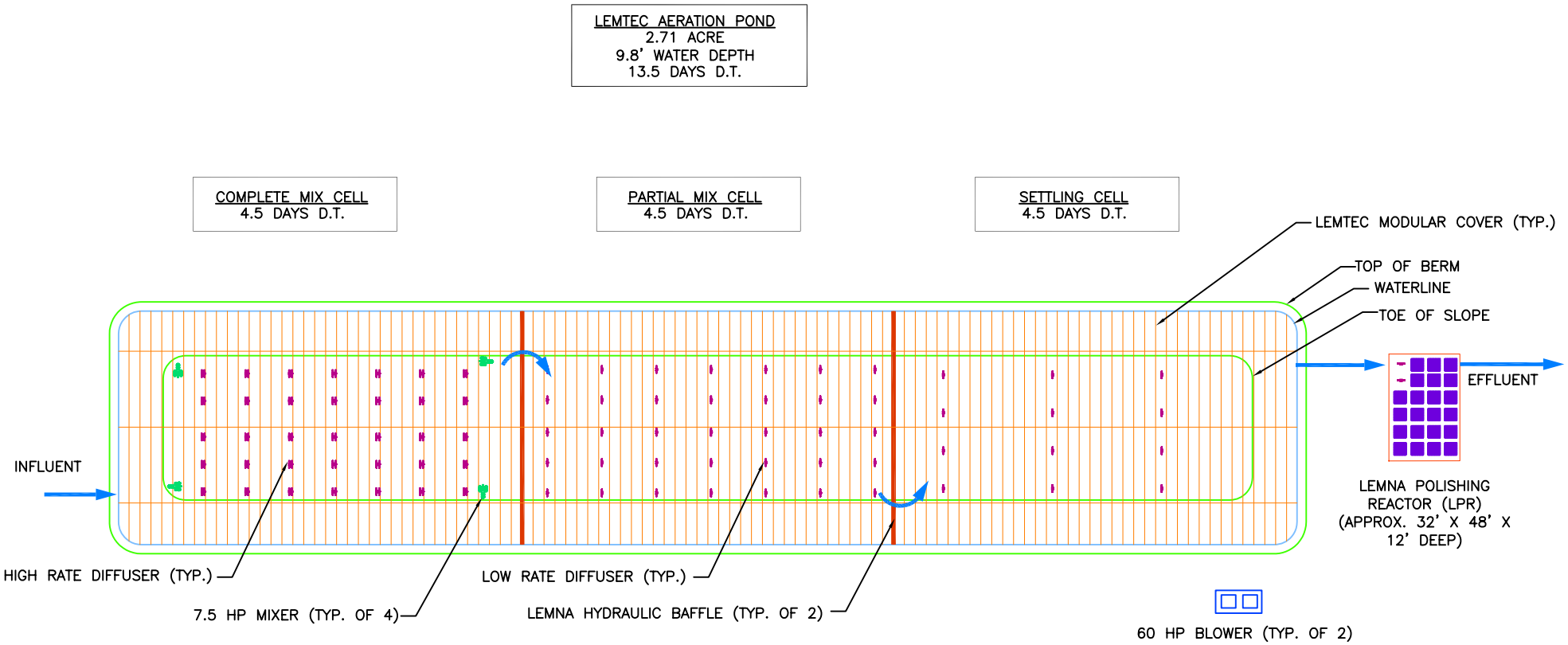
DRAWN BY: MS/DAP
APPROVED BY: MMH / JAM
SCALE: NOT TO SCALE
DATE: AUGUST 6, 2009
SHEET NO: 1 OF 1

LEMTEC™ BIOLOGICAL TREATMENT PROCESS
PALMER, ALASKA

LEMNA TECHNOLOGIES
2445 PARK AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55404
TEL:(612) 253-2002
FAX:(612) 253-2003



INFLUENT CHARACTERISTICS:
BOD=220 mg/l
TSS=220 mg/l
NH_3=30 mg/l

EFFLUENT LIMITS:
BOD=30 mg/l
TSS=30 mg/l
NH_3=1.7 mg/l (summer)
NH_3=8.7 mg/l (winter)

DESIGN FLOW: 0.5 MGD

NOTE: DESIGN BASED ON MINIMUM INFLUENT TEMPERATURE OF 8°C

THIS DESIGN IS PROPRIETARY TO LEMNA TECHNOLOGIES, INC. AND IS SOLELY INTENDED FOR APPLICATION AT PALMER, ALASKA BY LEMNA TECHNOLOGIES, INC. THIS DESIGN CANNOT BE USED BY A THIRD PARTY NOR REPRODUCED, IN FULL OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF LEMNA TECHNOLOGIES, INC.

K:\Propus\

DRAWN BY: MS/DAP
APPROVED BY: MMH / JAM
SCALE: NOT TO SCALE
DATE: AUGUST 6, 2008
SHEET NO: 1 OF 1

LEMTEC™ BIOLOGICAL TREATMENT PROCESS
PALMER, ALASKA

LEMNA TECHNOLOGIES
2445 PARK AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55404
TEL:(612) 253-2002
FAX:(612) 253-2003

CITY OF PALMER ACTION MEMORANDUM NO. 10-053

SUBJECT: Authorize the City Manager to Execute Change Order No. 2 to Lemna Technologies, Inc. for the Wastewater Treatment Plant Improvements Phase I in the Amount of $623,020

AGENDA OF: July 27, 2010

Council action: Authorized

Approved for presentation by B. B. Allen, City Manager_____

Route To:	Department/Individual:	Initials/Date:	Remarks:
X	Originator – Public Works	7-7-2010	
X	City Clerk	7/21/10	
X	City Attorney	7/21/10	
	Director of Administration		
	Director of Community Development		
	Director of Community Services		
	Director of Public Safety		
	Director of Public Works		

Attachment(s): Change Order 2
Photos of Lagoons
Blower Specifications

Certification of Funds:

	No fiscal impact.	
X	Funds are budgeted from this account number: 24-40-01-6XXX	$623,020
	Funds are not budgeted. Budget modification is required. Affected account number:	
	Unrestricted/undesignated fund balance (after budget modification):	

Director of Administration Signature: _____

Summary statement: The City entered into a contract with Lemna Technologies Inc. in December 8, 2009, for the supply and installation expertise of insulated covers, with the actual installation done with force account labor. The insulated covers have now been installed on Ponds 1 and 2 which allowed the necessary data to be collected and make the proper sizing of the blowers.

It has been determined the new blower selections will increase the operation of the waste water treatment plant up to a two million gallons per day (MGD) with the newly installed insulated covers. With the completion of the blowers, new insulated covers, and new UV unit previously completed, this will make the facility capable of treating up to 2 MGD.

With the new blowers and new covers, the City anticipates a 58% reduction in the power consumption at the waste water treatment plant blower system. This will provide a reduction in the power used at the facility.

The change order was anticipated as part of the project as stated in AM 09-052; since the exact modification was not know at the time, the work was put off until later in the project to get the known air requirements.

Future legislation will be submitted for the tasks associated with renewing the Alaska Pollutant Discharge Elimination System (APDES) permit later in 2010. The permit is anticipated to be renewed in 2011 before the deadline for compliance.

The revised project budget is below:

Administration	$	80,000.00
Engineering Design Svcs.	$	350,000.00
Construction	$	2,070,000.00
Total	$	2,500,000.00

The administration recommends the award of change order no. 2 for the blower modifications to Lemna Technologies Inc. for the amount of $623,020.00.

Administration recommendation: Approve action memorandum 10-053.

CHANGE ORDER

OWNER (X)
CONTRACTOR (X)

PROJECT:	**Palmer WWTP Improvements Phase I, Insulated Floating Cover City of Palmer, AK**	**CHANGE ORDER NUMBER:**	**002**
		INITIATION DATE:	**7/28/2010**
		PROJECT NO:	**915-LC**
TO:	**Lemna Technologies, Inc. 2445 Park Avenue, Minneapolis, MN 55404**	**CONTRACT DATE:**	**12/24/2009**
		NOTICE TO PROCEED:	**12/29/2009**

You are directed to make the following changes to this Contract:

1. ADD the following quantities to the Bid Schedule Time and Materials:

Item	Work Description	Qty	Unit Price	Total Price
CO2-1	Supply and Install Two ZX37+VSD Model Blowers and Two ZS110+VSD Model Blowers (supply does not include concrete, valves, ductile iron piping, pipe support fittings and all piping downstream of the shut-off valve next to the blower discharge pipe) at the Palmer Waste Water Treatment Plant.	1	$ 623,020.000	$ 623,020.00
		TOTAL		**$ 623,020.00**

Note: All work shall be in accordance with the Contact Documents and must be approved by the City Representative and the City of Palmer.

Not valid until signed by the Owner. Signature of the Contractor indicates his agreement herewith, including any adjustments in the Supplier Sum or Contract Time all other conditions of the main Contract remain in force.

The original Contract Sum was	$ 662,000.00
Net change by previously authorized Change Orders	$ 597,000.00
The Contract Sum prior to this Change Order was	$ 1,259,000.00
The Contract Sum will be (Increased) by this Change Order	$ 623,020.00
The new Contract Sum including this Change Order will be Not To Exceed	$ 1,882,020.00
The Contract Time will be (Increased)	97

Substantial Completion and Final Completion, as of the date of this Change Order, therefore is 09/25/10 and 12/31/10, respectively.

BY ACCEPTING THIS CHANGE ORDER, THE CONTRACTOR AGREES THAT THE AMOUNT PAID FOR ON THE ABOVE ITEMS IS EQUITABLE AND THAT NO FURTHER COMPENSATION FOR THE ABOVE ITEMS WILL BE MADE.

Accepted:

Lemna Technologies, Inc.
SUPPLIER
2445 Park Avenue
Minneapolis, MN 55404

By: _____

Date: _____

Authorized:

City of Palmer
OWNER
231 W. Evergreen Ave.
Palmer, AK 99645

By: _____

Date: _____

Insulated Floating Cover
Pond 1 at the WWTP

Insulated Floating Cover
Pond 2 at the WWTP

Atlas Copco

Oil-free positive displacement screw blowers

ZS 18-132 / ZS 37+-160+ VSD

18-160 kW / 25-215 hp

Proven technology in a leading design

Low pressure compressed air is the backbone of many production processes. The ZS is the latest addition to Atlas Copco's air blowing solutions, manufactured to the highest standards of quality and reliability. Built to ensure complete product safety, ZS blowers guarantee a continuous, highly reliable, energy-efficient and 100% oil-free air supply for years on end.

Wastewater Treatment

First-rate efficiency for wastewater treatment plants (WWTP)

Many WWT plants use aerobic biological processes to digest waste by-products. Typically, the major energy consumers in these plants are the aeration blowers. To permit energy optimization and substantially reduce energy bills in these continuously operating plants, Atlas Copco's innovative ZS blowers incorporate the latest technologies in the most efficient design.

Pneumatic Conveying

Cost efficiency & 100% oil-free air for industrial processing

In many industrial processes, dilute phase pneumatic conveying is used to transport goods. A cost-efficient stream of low pressure oil-free compressed air – 100% certified according to ISO 8573-1 CLASS 0 (2001) – is essential to avoid contamination and keep the production running smoothly. ZS blowers are designed as fully integrated and compact packages to ensure optimum cost efficiency. Combined with low noise and vibration levels this makes the ZS the perfect air solution for dilute phase pneumatic conveying.

Flue Gas Desulphurization

High reliability for coal-fired power plants

In coal-fired power plants, a continuous flow of low pressure air is used to remove sulphur dioxide from the exhaust flue gases. To guarantee uninterrupted pollution control and make sure these plants are up and running 24/7, the used compressed air solution needs to be highly reliable. Atlas Copco's ZS blowers fulfill this demand by offering a constant air flow at minimal energy costs.

Industrial Applications

Cutting-edge blower technology for industrial applications

With the ZS+ VSD, Atlas Copco offers a state-of-the-art ready-to-run package with completely integrated VSD convertor and proven Elektronikon® controller. Noise levels are significantly reduced, resulting in a more pleasant working environment for operators. The unique ZS+ VSD stands for optimized energy efficiency and easy installation as well as continuous monitoring and control.

Keeping your production up and running

A reliable supply of compressed air is critical to ensure production continuity. Incorporating Atlas Copco's proven screw technology and long standing internal engineering practices, the ZS guarantees exceptional reliability. Designed, manufactured and tested in accordance with ISO 9001 stipulations, the unique ZS stands for uninterrupted production.

Driving down energy costs

Energy costs can amount to 80% of the Life Cycle Costs of a blower. Integrating the proven benefits of screw technology, the ZS range reduces energy costs by an average of 30% when compared to lobe technology. By keeping energy efficiency low and strictly following ISO 14001 standards, Atlas Copco continuously strives to reduce the environmental impact of its compressors and blowers. The integrated Variable Speed Drive (VSD) technology offers extra energy savings by automatically tuning the compressed air flow precisely to the air demand.

Assuring your peace of mind

Through continuous investment in our competent, committed and efficient service organization, Atlas Copco ensures superior customer value by maximizing productivity. With a presence in over 160 countries, we offer professional and timely service through interaction and involvement. Uptime is guaranteed by dedicated technicians and 24/7 availability.

Protecting your reputation and production

In virtually any application, oil contamination of the air supply causes serious productivity issues and increases costs. As the first manufacturer to receive ISO 8573-1 CLASS 0 (2001) certification for its oil-free air blowers, Atlas Copco has set a new standard in air purity. Focusing on the protection of critical applications as well as today's increasing quality demands, Atlas Copco offers TÜV-certified 100% oil-free air.

Easy installation

Delivered ready for use, ZS+ VSD blowers come as all-in-one packages including a PLC based Elektronikon® controller, integrated converter, forklift slots, check valve, air filter, blow-off valve and silencers. The compact design eliminates the need for extras and reduces installation to an absolute minimum, saving you time and money. Built for easy integration in your existing compressed air network, ZS blowers are up and running in no time.

ZS: keeping your production up and running

1 State-of-the-art oil-free screw element

- Incorporating acclaimed screw technology, years of experience and innovation.
- Precision timing gears for proven reliability and increased uptime.
- Industry proven element coating for closer tolerances and increased lifetime.

2 Integrated gearbox

- Compared to lobe technology, screw technology does not require belt and pulley replacement.
- Reduced maintenance costs and increased uptime.

3 TEFC IP55 motor

- TEFC IP55 motor designed for continuous operation in dusty and humid environments.

4 Oil system

- Longer lifetime of bearings and gears due to lower oil temperature which is achieved by optimum oil system design including an oil pump, oil cooler and filter.

5 Air inlet filter

- By filtering particles up to 3µ at a performance of 99.9%, the lifetime of the blower is increased.

6 Pressure gauge

7 Check valve

8 Pulsation damper

- Included as standard.
- No hidden costs.

9 Base frame with forklift slots

- Simple, time-saving installation.
- Reduced start-up costs.

ZS+ VSD: intelligent design that is built to last

1 TEFC IP55 inverter duty motor

- Specifically designed VSD motors to operate ideally during flexible air demands.
- Special motor design to protect against bearing currents and optimize motor cooling at lower speeds.

2 Electrical cubicle with integrated VSD converter and soft starter

- Proven design integrating all required electrical components for optimum reliability (EMC filter, Variable frequency drive, RFI filter, Elektronikon® controller).
- Integrated VSD with soft starter to increase the turndown compared to stand-alone VSD.
- Reduced installation and start-up costs thanks to complete integration.

3 Elektronikon® controller

- To ensure maximum machine safety and easy networking, the Elektronikon® system controls both the compressor and the integrated converter.
- Monitoring of all parameters to ensure maximum reliability for your blower installation.

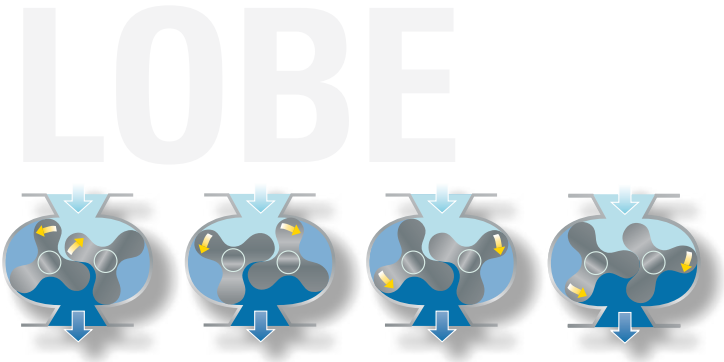
4 Noise enclosure with internal baffling

- Intelligent internal baffling design coupled with 6 sided canopy providing reduced sound levels to 72 dB(A) for an improved working environment.
- Reduced installation costs as there is no need for noise insulated rooms and doors.

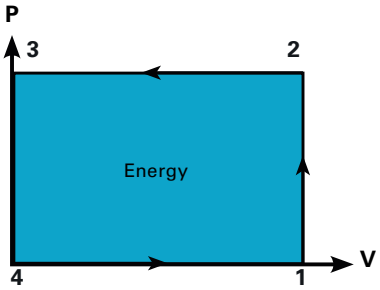
Minimize energy costs with the ZS screw blower

The ZS screw blower was developed in Atlas Copco's drive for innovation and its commitment to sustainable technology, and is on average **30% more energy efficient** compared to a traditional 'Roots' type lobe blower.

Energy losses by lobe technology



Pressure/Volume diagram of a lobe blower



Thermodynamic energy consumption

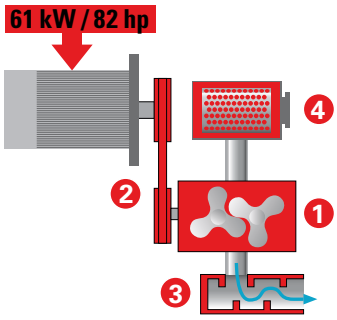
4 ➔ 1 Suction. Air enters the compression chamber. The air volume remains constant while the lobe rotors turn.

1 ➔ 2 External compression. The air is compressed externally due to back-pressure of the connected pipeline.

2 ➔ 3 Discharge. Air is pushed out into the pipeline.

As shown in the Pressure/Volume diagram, the compression work is represented by the blue area and is proportional to the energy consumed.

Energy losses in packaging



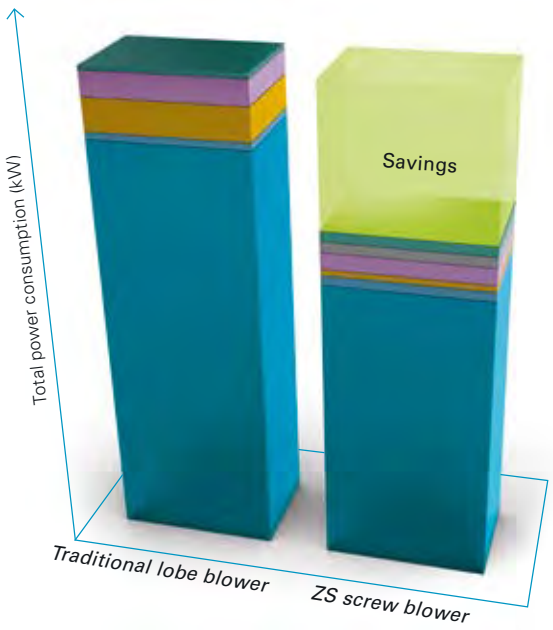
High resistance to the internal air flow leads to high pressure drops and increased energy consumption.

Losses by:

1. External compression
2. Belt/pulley
3. Silencer
4. Inlet filter

To deliver a flow of 1600 m³/hr (942 cfm) at a pressure of 0.8 bar(e) (11.6 psig), the tri-lobe blower consumes 61 kW (82 hp) on average.

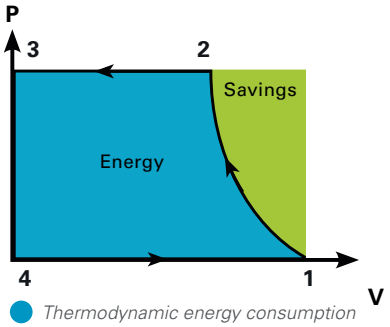
True package power comparison



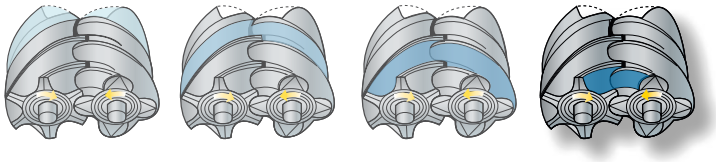
- *Savings*
- *Oil Pump, Cooling Fan, Ventilation Fan*
- *Motor*
- *Frequency Convertor*
- *Transmission (drive gear vs belt)*
- *Pressure Drops*
- *Compression*

Energy savings by screw technology

Pressure/Volume diagram of a screw blower



- *Thermodynamic energy consumption*
- *Energy savings*



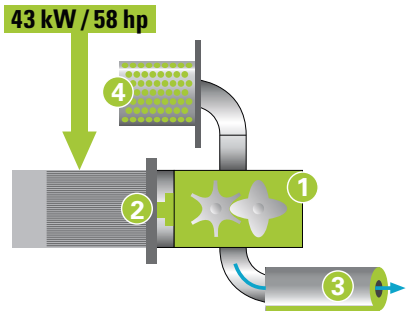
4 ➔ 1 Suction. Air enters the compression chamber.

1 ➔ 2 Internal compression. As the rotors move towards each other, the air volume decreases.

2 ➔ 3 Discharge. Air is pushed out into the pipeline.

As shown in the Pressure/Volume diagram, the compression work is represented by the blue area and is proportional to the energy consumed. The green area represents energy savings of a screw blower compared to a traditional 'Roots' type rotary lobe blower. This is due to the internal compression.

Energy savings by integration



In the ZS screw blower, the internal air flow path is optimized to reduce pressure drops and air turbulence.

Maximum savings by:

1. Internal compression
2. Integrated gearbox
3. Smooth silencer
4. Inlet filter

To deliver a flow of 1600 m³/hr (942 cfm) at a pressure of 0.8 bar(e) (11.6 psig), the screw blower consumes 43 kW (58 hp) on average.

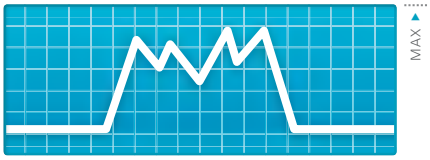
VSD: driving down energy costs

Energy consumption typically represents over 80% of a compressor's and blower's Life Cycle Cost. Looking continuously to innovate and reduce customer costs, Atlas Copco pioneered the Variable Speed Drive technology (VSD) in 1994. VSD stands for major energy savings, while protecting the environment for future generations. Due to our ongoing investments in R&D, Atlas Copco offers the widest range of integrated VSD compressors and blowers on the market.

Varying air demand in 92% of all installations

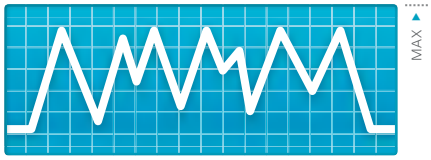
In almost every production environment, air demand fluctuates depending on different factors (time of the day, week or even month). Extensive measurements and studies of compressed air demand profiles show that 92% of all compressor and blower installations have substantial variations in air demand. Only 8% of all installations have a more stable air demand. Tests prove that, even in this case, VSD compressors and blowers save energy.

Profile 1



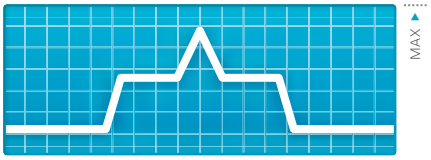
- 64% of all installations
- Factory working 24 hrs/day: low demand at night & high demand during the day

Profile 2

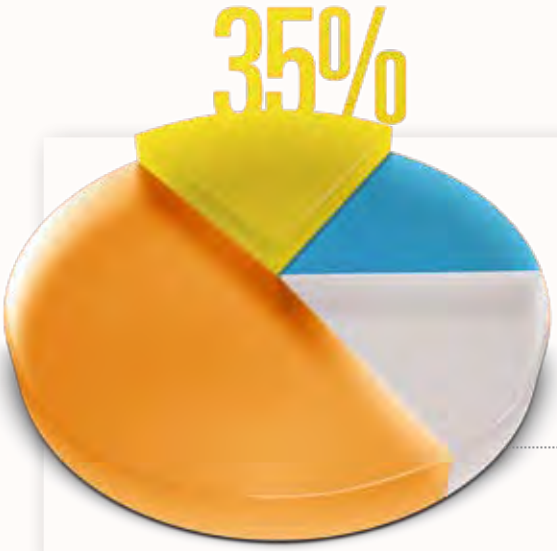


- 28% of all installations
- Factory working 2 shifts/day, no weekend work: erratically varying air demand

Profile 3



- 8% of all installations
- Factory working 2 shifts/day, no weekend work: typical 'fixed' speed application



Energy savings of up to 35%

Atlas Copco's VSD technology closely follows the air demand by automatically adjusting the motor speed. This results in large energy savings of up to 35%. The Life Cycle Cost of a compressor and blower can be cut by an average of 22%. In addition, lowered system pressure with VSD minimizes energy use across your production dramatically.

Total compressor and blower Life Cycle Cost

- *Energy*
- ***Energy savings with VSD***
- *Investment*
- *Maintenance*

Find out how much you can save

Atlas Copco can help you map the load/air demand profile of your current compressor and blower installation and indicate potential energy savings with VSD compressors and blowers. **For more information, please contact your local Atlas Copco representative.**

CLASS 0: the industry standard

Oil-free air is used in all kinds of industries where air quality is paramount for the end product and production process. These applications include food and beverage processing, pharmaceutical manufacturing and packaging, chemical and petrochemical processing, semiconductor and electronics manufacturing, the medical sector, automotive paint spraying, textile manufacturing and many more. In these critical environments, contamination by even the smallest quantities of oil can result in costly production downtime and product spoilage.

First in oil-free air technology

Over the past sixty years Atlas Copco has pioneered the development of oil-free air technology, resulting in a range of air compressors and blowers that provide 100% pure, clean air. Through continuous research and development, Atlas Copco achieved a new milestone, setting the standard for air purity as the first manufacturer to be awarded ISO 8573-1 CLASS 0 certification.

Eliminating any risk

As the industry leader committed to meeting the needs of the most demanding customers, Atlas Copco requested the renowned TÜV institute to type-test its range of oil-free compressors and blowers. Using the most rigorous testing methodologies available, all possible oil forms were measured across a range of temperatures and pressures. The TÜV found no traces of oil at all in the output air stream. Thus Atlas Copco is not only the first compressor and blower manufacturer to receive CLASS 0 certification, but also exceeds ISO 8573-1 CLASS 0 specifications.

CLASS	Concentration total oil *(aerosol, liquid, vapor)* mg/m^3
0	**As specified by the equipment user or supplier and more stringent than class 1**
1	< 0.01
2	< 0.1
3	< 1
4	< 5

Current ISO 8573-1 (2001) classes (the five main classes and the associated maximum concentration in total oil content).

CLASS 0 means:

Zero risk of contamination.

Zero risk of damaged or unsafe products.

Zero risk of losses from operational downtime.

Zero risk of damaging your company's hard-won professional reputation.

Choose the most suitable unit for your application

With the ZS range, Atlas Copco provides an opportunity to choose the best blower for your specific application. Basic, standard and premium variants are available to keep your production running in the most efficient way.

Scope of supply

Air circuit

- Coated screw element
- Air intake filter
- Flexible air intake pipe
- Discharge pulsation damper
- Check valve
- Starting/safety valve
- Outlet air flange

Oil circuit

- Supplied oil-filled
- Completely pre-piped oil circuit
- Oil pump
- Oil cooler
- Oil filter
- Built-in oil breather system

Connections

- ANSI flanges
- DIN flanges

Electrical components

- Pre-mounted TEFC IP55 motor

Framework

- Base frame with forklift slots

Mechanical approval

- ASME approval
- CE approval

Additional features & options

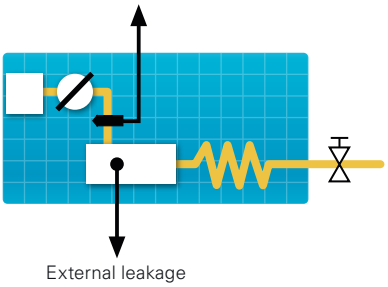
	ZS BASIC	ZS STANDARD	ZS+ VSD PREMIUM
Pressure gauge	■	■	
Sound enclosure 78 dB(A)		■	
Sound enclosure 72 dB(A)			■
Integrated Variable Speed Drive (VSD)			■
Flow control via 4-20 mA (external source)			■
LAN or Internet control/monitoring			■
Control system (Elektronikon®)			■
EMC filter			■
RFI filter			■

True performance

Atlas Copco's ZS blowers are measured according to ISO 1217 Ed. 4, stipulating the FAD measurement at the outlet of the package, net of all losses. Atlas Copco specifications correspond to the capacity and pressure the customer receives, not to the intake volume of the blower. Differences are substantial.

INTAKE VOLUME

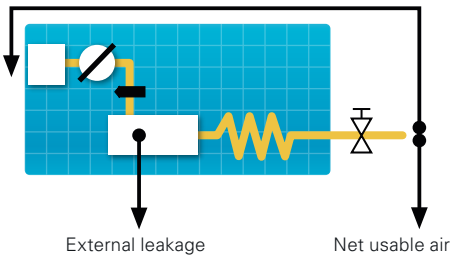
Intake Volume - l/s - m³/min - cfm



Inlet flow referred to blower element inlet conditions. Seal leakages and inlet losses should not deprive you of the air you paid for.

DELIVERED VOLUME

FAD - l/s - m³/min - cfm



FAD according to ISO 1217 Ed. 4.
A ZS blower truly delivers what is promised.

Technical specifications

ZS 37+-160+ VSD

	Pressure	Motor power	Free Air Delivery				Sound level
	mbar*(e)*	kW	m³/hr		cfm		dB*(A)*
			min.	max.	min.	max.	
ZS 37+ VSD	800	37	284	947	167	557	71
ZS 45+ VSD	1200	45	259	1145	152	674	71

Dimensions *(L x W x H)*: 2040 x 970 x 1804 mm

	Pressure	Motor power	Free Air Delivery				Sound level
	mbar*(e)*	kW	m³/hr		cfm		dB*(A)*
			min.	max.	min.	max.	
ZS 55+ VSD	800	55	731	2310	430	1360	70
ZS 55+ VSD	1200	55	949	1688	559	994	70
ZS 75+ VSD	1200	75	776	2289	457	1347	70

Dimensions *(L x W x H)*: 2288 x 1080 x 1940 mm

	Pressure	Motor power	Free Air Delivery				Sound level
	mbar*(e)*	kW	m³/hr		cfm		dB*(A)*
			min.	max.	min.	max.	
ZS 110+ VSD	800	110	1500	4300	883	2530	72
ZS 160+ VSD	1200	160	1600	4578	941	2695	72

Dimensions *(L x W x H)*: 3200 x 1630 x 2000 mm

Technical specifications

ZS 18-30 - 50 Hz

	Gear designation		A	B	C	D	E	F	G	H	I	J	K
	Sound pressure level at 0.6 bar*(e)*	**dB*(A)***	**74**	**74**	**75**	**75**	**75**	**76**	**76**	**77**	**78**	**78**	**78**
0.3 bar*(e)*	Free Air Delivery	l/s	89	106	121	145	167	196	226	254	280	319	346
		m³/h	320	383	436	523	600	707	813	916	1007	1149	1244
	Outlet temperature	°C	48	49	49	49	49	50	51	51	52	53	54
	Shaft power	kW	3.6	4.2	4.7	5.6	6.4	7.6	8.9	10.0	11.0	12.8	14.1
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
0.4 bar*(e)*	Free Air Delivery	l/s	87	104	119	144	165	195	224	253	278	318	344
		m³/h	313	376	430	517	594	702	808	912	1002	1145	1240
	Outlet temperature	°C	59	59	59	59	59	59	60	61	62	64	65
	Shaft power	kW	4.6	5.3	5.9	7.0	8.0	9.3	10.8	12.2	13.4	15.5	16.9
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
0.5 bar*(e)*	Free Air Delivery	l/s	85	103	118	142	164	194	223	252	277	317	343
		m³/h	306	369	424	511	589	697	804	907	998	1141	1235
	Outlet temperature	°C	69	68	68	67	67	67	68	69	70	72	73
	Shaft power	kW	5.5	6.4	7.1	8.4	9.5	11.1	12.8	14.4	15.8	18.2	19.8
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	30
0.6 bar*(e)*	Free Air Delivery	l/s	83	101	116	140	162	192	222	251	276	316	342
		m³/h	299	363	417	505	583	692	799	903	994	1136	1230
	Outlet temperature	°C	78	77	76	75	75	74	74	74	75	76	77
	Shaft power	kW	6.5	7.5	8.4	9.8	11.1	12.9	14.8	16.6	18.2	20.9	22.7
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	30	30
0.7 bar*(e)*	Free Air Delivery	l/s	81	99	114	139	161	191	221	250	275	314	340
		m³/h	292	356	411	500	578	687	794	899	990	1132	1225
	Outlet temperature	°C	88	86	85	83	82	81	80	80	80	81	82
	Shaft power	kW	7.5	8.6	9.6	11.2	12.6	14.6	16.8	18.8	20.6	23.6	25.6
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	18.5	30	30	30	30
0.8 bar*(e)*	Free Air Delivery	l/s	79	97	113	137	159	189	219	248	274	313	339
		m³/h	285	349	405	494	572	682	789	894	986	1128	1221
	Outlet temperature	°C	98	96	95	93	91	90	89	89	89	90	92
	Shaft power	kW	8.4	9.7	10.8	12.6	14.2	16.4	18.7	21.0	23.0	26.3	28.5
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	30	30	30	30	30
0.9 bar*(e)*	Free Air Delivery	l/s	77	95	111	136	158	188	218	247	273	312	338
		m³/h	278	343	398	488	567	677	784	890	981	1124	1216
	Outlet temperature	°C	107	105	103	101	99	97	96	95	96	97	99
	Shaft power	kW	9.4	10.8	12.0	14.0	15.7	18.1	20.7	23.3	25.4	29.0	31.4
	Motor size	kW	18.5	18.5	18.5	18.5	18.5	18.5	30	30	30	30	30
1 bar*(e)*	Free Air Delivery	l/s	75	93	109	134	156	187	216	246	271	311	
		m³/h	271	336	392	482	561	672	779	886	977	1119	
	Outlet temperature	°C	117	114	112	109	107	105	103	102	102	104	
	Shaft power	kW	10,3	11,9	13,2	15,4	17,3	19,9	22,7	25,5	27,8	31,7	
	Motor size	kW	18,5	18,5	18,5	18,5	18,5	30	30	30	30	30	

Dimensions *(L x W x H)*: 1610 x 1060 x 1228 mm

Technical specifications

ZS 18-30 - 60 Hz

	Gear designation		A	B	C	D	E	F	G	H	I
	Sound pressure level at 8.7 psig	**dB*(A)***	**74**	**74**	**75**	**75**	**75**	**76**	**76**	**77**	**78**
4.35 psig	Free Air Delivery	cfm	239	282	322	383	434	509	582	656	721
		m³/h	406	479	547	651	737	865	989	1115	1225
	Outlet temperature	°F	120	120	120	121	122	124	125	127	129
	Shaft power	hp	5.9	7.0	7.9	9.4	10.7	12.6	14.4	16.5	18.5
	Motor size	hp	25	25	25	25	25	25	25	25	25
5.80 psig	Free Air Delivery	cfm	236	279	318	380	431	507	580	654	718
		m³/h	401	474	540	646	732	861	985	1111	1220
	Outlet temperature	°F	137	137	138	138	139	141	143	146	149
	Shaft power	hp	7.5	8.7	9.8	11.6	13.1	15.4	17.6	20.1	22.3
	Motor size	hp	25	25	25	25	25	25	25	25	25
7.25 psig	Free Air Delivery	cfm	232	275	315	377	428	504	577	652	716
		m³/h	394	467	535	641	727	856	980	1108	1216
	Outlet temperature	°F	154	154	153	153	153	155	157	160	163
	Shaft power	hp	9.0	10.4	11.7	13.8	15.6	18.3	20.8	23.6	26.1
	Motor size	hp	25	25	25	25	25	25	25	25	40
8.70 psig	Free Air Delivery	cfm	228	272	312	374	425	502	575	649	713
		m³/h	387	462	530	635	722	853	977	1103	1211
	Outlet temperature	°F	170	169	167	166	165	165	166	168	171
	Shaft power	hp	10.5	12.2	13.7	16.0	18.0	21.1	24.0	27.2	30.0
	Motor size	hp	25	25	25	25	25	25	25	40	40
10.15 psig	Free Air Delivery	cfm	224	268	308	370	422	499	572	647	710
		m³/h	381	455	523	629	717	848	972	1099	1206
	Outlet temperature	°F	186	183	181	179	177	175	175	176	178
	Shaft power	hp	12.1	13.9	15.6	18.2	20.5	23.9	27.2	30.7	33.8
	Motor size	hp	25	25	25	25	25	25	40	40	40
11.60 psig	Free Air Delivery	cfm	220	264	305	367	419	496	570	644	707
		m³/h	374	449	518	624	712	843	968	1094	1201
	Outlet temperature	°F	204	200	198	195	193	191	192	193	196
	Shaft power	hp	13.6	15.7	17.5	20.4	22.9	26.7	30.4	34.2	37.6
	Motor size	hp	25	25	25	25	25	40	40	40	40
13.05 psig	Free Air Delivery	cfm	216	261	302	364	416	494	567	642	705
		m³/h	367	443	513	618	707	839	963	1091	1198
	Outlet temperature	°F	220	216	213	208	206	204	204	206	209
	Shaft power	hp	15.2	17.4	19.4	22.6	25.3	29.5	33.6	37.8	41.4
	Motor size	hp	25	25	25	25	40	40	40	40	40
14.50 psig	Free Air Delivery	cfm	213	257	298	361	413	491	565	640	
		m³/h	362	437	506	613	702	834	956	1087	
	Outlet temperature	°F	236	231	227	222	219	217	216	218	
	Shaft power	hp	16.7	19.2	21.4	24.8	27.8	32.3	36.8	41.3	
	Motor size	hp	25	25	25	40	40	40	40	40	

Dimensions *(L x W x H)*: 1610 x 1060 x 1228 mm

Technical specifications

ZS 37-75 - 50 Hz

	Gear designation		A	B	C	D	E	F	G	H	I	J	K
	Sound pressure level at 0.6 bar*(e)*	**dB*(A)***	**74**	**74**	**75**	**75**	**75**	**76**	**76**	**77**	**78**	**78**	**78**
0.3 bar*(e)*	Free Air Delivery	l/s	213	261	310	349	397	433	483	515	561	597	640
		m³/h	768	939	1116	1258	1429	1560	1737	1855	2018	2150	2303
	Outlet temperature	°C	54	53	53	53	53	53	53	53	54	54	55
	Shaft power	kW	8.7	10.3	12.1	13.8	16.0	17.7	20.0	21.6	23.9	26.0	28.8
	Motor size	kW	37	37	37	37	37	37	37	37	37	37	55
0.4 bar*(e)*	Free Air Delivery	l/s	209	257	307	347	394	431	480	513	558	595	638
		m³/h	751	925	1106	1249	1420	1551	1728	1846	2010	2143	2296
	Outlet temperature	°C	61	61	60	60	60	60	61	61	62	63	64
	Shaft power	kW	10.8	12.8	14.9	17.0	19.5	21.4	24.1	26.0	28.6	31.0	34.1
	Motor size	kW	37	37	37	37	37	37	37	37	37	55	55
0.5 bar*(e)*	Free Air Delivery	l/s	204	253	304	344	392	428	478	511	556	593	636
		m³/h	733	911	1096	1239	1410	1542	1720	1838	2002	2135	2289
	Outlet temperature	°C	68	68	67	67	67	68	68	69	70	71	72
	Shaft power	kW	13.0	15.3	17.8	20.1	23.0	25.2	28.2	30.3	33.3	36.0	39.4
	Motor size	kW	37	37	37	37	37	37	37	37	55	55	55
0.6 bar*(e)*	Free Air Delivery	l/s	199	249	301	341	389	426	475	508	554	591	634
		m³/h	716	897	1085	1229	1401	1533	1711	1830	1994	2128	2283
	Outlet temperature	°C	75	74	74	74	74	74	74	75	76	77	79
	Shaft power	kW	15.2	17.8	20.7	23.3	26.5	29.0	32.3	34.7	37.9	41.0	44.7
	Motor size	kW	37	37	37	37	37	37	37	55	55	55	55
0.7 bar*(e)*	Free Air Delivery	l/s	194	245	297	339	387	423	473	506	552	589	632
		m³/h	698	883	1075	1220	1392	1524	1703	1821	1986	2121	2276
	Outlet temperature	°C	82	81	80	80	80	80	80	81	82	83	84
	Shaft power	kW	17.4	20.3	23.6	26.5	30.0	32.7	36.5	39.0	42.6	45.9	50.0
	Motor size	kW	37	37	37	37	37	37	55	55	55	55	55
0.8 bar*(e)*	Free Air Delivery	l/s	189	241	296	336	384	421	471	504	549	587	630
		m³/h	681	869	1065	1210	1383	1516	1694	1813	1978	2114	2269
	Outlet temperature	°C	90	88	87	86	86	85	86	86	87	88	90
	Shaft power	kW	19.6	22.8	26.4	29.6	33.5	36.5	40.6	43.4	47.3	50.9	55.3
	Motor size	kW	37	37	37	37	37	55	55	55	55	55	75
0.9 bar*(e)*	Free Air Delivery	l/s	184	238	293	333	382	419	468	501	547	585	628
		m³/h	663	855	1054	1200	1374	1507	1686	1805	1969	2106	2262
	Outlet temperature	°C	96	94	92	91	91	91	91	91	92	93	94
	Shaft power	kW	21.7	25.4	29.3	32.8	36.9	40.3	44.7	47.7	52.0	55.9	60.6
	Motor size	kW	37	37	37	37	55	55	55	55	55	75	75
1 bar*(e)*	Free Air Delivery	l/s	179	233	290	331	379	416	466	499	545	583	626
		m³/h	646	841	1044	1190	1365	1498	1677	1796	1961	2099	2255
	Outlet temperature	°C	102	100	98	97	96	96	95	96	96	97	98
	Shaft power	kW	23.9	27.9	32.2	35.9	40.4	44.0	48.9	52.1	56.6	60.9	65.8
	Motor size	kW	37	37	37	37	55	55	55	55	75	75	75

Dimensions *(L x W x H)*: 1910 x 1240 x 1558 mm

Technical specifications

ZS 37-75 - 60 Hz

	Gear designation		A	B	C	D	E	F	G	H
	Sound pressure level at 8.7 psig	**dB*(A)***	**74**	**74**	**75**	**75**	**75**	**76**	**76**	**77**
4.35 psig	Free Air Delivery	cfm	574	691	811	910	1029	1119	1239	1321
		m³/h	976	1173	1378	1547	1747	1900	2104	2244
	Outlet temperature	°F	120	120	121	121	122	124	125	127
	Shaft power	hp	14.2	17.1	20.6	23.4	27.0	29.9	33.9	37.2
	Motor size	hp	50	50	50	50	50	50	50	50
5.80 psig	Free Air Delivery	cfm	566	685	806	905	1024	1114	1234	1317
		m³/h	962	1163	1369	1538	1739	1892	2097	2237
	Outlet temperature	°F	137	137	138	138	139	141	143	146
	Shaft power	hp	17.7	21.1	25.1	28.5	32.5	35.8	40.4	44.1
	Motor size	hp	50	50	50	50	50	50	50	50
7.25 psig	Free Air Delivery	cfm	559	679	800	900	1019	1109	1230	1312
		m³/h	949	1153	1360	1529	1730	1884	2089	2230
	Outlet temperature	°F	154	154	153	153	153	155	157	160
	Shaft power	hp	21.2	25.1	29.7	33.5	38.1	41.8	47.0	51.0
	Motor size	hp	50	50	50	50	50	50	50	75
8.70 psig	Free Air Delivery	cfm	551	673	795	895	1014	1104	1225	1308
		m³/h	936	1143	1350	1520	1722	1875	2082	2223
	Outlet temperature	°F	170	169	167	166	165	165	166	168
	Shaft power	hp	24.6	29.1	34.2	38.5	43.7	47.7	53.5	58.0
	Motor size	hp	50	50	50	50	50	50	75	75
10.15 psig	Free Air Delivery	cfm	543	667	789	889	1009	1099	1221	1304
		m³/h	922	1133	1341	1511	1713	1867	2074	2216
	Outlet temperature	°F	186	183	181	179	177	175	175	176
	Shaft power	hp	28.1	33.2	38.7	43.5	49.2	53.7	60.1	64.9
	Motor size	hp	50	50	50	50	50	75	75	75
11.60 psig	Free Air Delivery	cfm	535	661	784	884	1004	1094	1216	1300
		m³/h	909	1123	1332	1502	1705	1859	2066	2209
	Outlet temperature	°F	204	200	198	195	193	191	192	193
	Shaft power	hp	31.6	37.2	43.3	48.5	54.8	59.5	66.6	71.9
	Motor size	hp	50	50	50	50	75	75	75	75
13.05 psig	Free Air Delivery	cfm	527	655	778	879	999	1089	1212	1296
		m³/h	896	1113	1323	1493	1697	1850	2059	2202
	Outlet temperature	°F	220	216	213	208	206	204	204	206
	Shaft power	hp	35.0	41.2	47.8	53.5	60.4	65.6	73.2	78.8
	Motor size	hp	50	50	50	75	75	75	75	100
14.50 psig	Free Air Delivery	cfm	519	649	773	874	994	1084	1207	1292
		m³/h	882	1103	1313	1485	1688	1842	2051	2195
	Outlet temperature	°F	236	231	227	222	219	217	216	218
	Shaft power	hp	38.5	45.2	52.4	58.6	65.9	71.5	79.7	85.8
	Motor size	hp	50	50	75	75	75	75	100	100

Dimensions *(L x W x H)*: 1910 x 1240 x 1558 mm

Technical specifications

ZS 90-132 - 50 Hz

	Gear designation		A	B	C	D	E	F	G	H	I	J	K
	Sound pressure level at 0.6 bar*(e)*	**dB*(A)***	**74**	**74**	**75**	**75**	**75**	**76**	**76**	**77**	**78**	**78**	**78**
0.3 bar*(e)*	Free Air Delivery	l/s	748	800	863	915	976	1022	1082	1132	1171	1243	1292
		m³/h	2693	2881	3106	3293	3514	3678	3895	4074	4214	4475	4651
	Outlet temperature	°C	53	53	53	53	53	53	54	54	54	55	55
	Shaft power	kW	30.1	32.5	35.4	37.8	40.8	43.2	46.3	48.9	51.1	55.1	58.7
	Motor size	kW	90	90	90	90	90	90	90	90	90	90	90
0.4 bar*(e)*	Free Air Delivery	l/s	741	794	856	908	970	1016	1076	1126	1166	1239	1287
		m³/h	2669	2858	3083	3270	3492	3656	3875	4055	4197	4462	4633
	Outlet temperature	°C	60	60	60	61	61	61	62	62	62	63	64
	Shaft power	kW	36.8	39.6	43.0	45.8	49.2	51.9	55.4	58.4	60.9	65.7	69.4
	Motor size	kW	90	90	90	90	90	90	90	90	90	90	90
0.5 bar*(e)*	Free Air Delivery	l/s	735	788	850	903	964	1010	1071	1121	1161	1236	1282
		m³/h	2646	2836	3061	3249	3472	3636	3856	4037	4181	4449	4616
	Outlet temperature	°C	67	67	68	68	68	69	69	70	70	71	72
	Shaft power	kW	43.5	46.7	50.6	53.8	57.6	60.6	64.5	67.9	70.8	76.2	80.2
	Motor size	kW	90	90	90	90	90	90	90	90	90	90	90
0.6 bar*(e)*	Free Air Delivery	l/s	729	782	845	897	959	1005	1066	1117	1157	1232	1278
		m³/h	2625	2815	3041	3229	3452	3617	3837	4020	4165	4436	4599
	Outlet temperature	°C	74	74	74	74	75	75	76	76	77	78	79
	Shaft power	kW	50.2	53.8	58.1	61.7	66.1	69.3	73.7	77.5	80.7	86.8	91.0
	Motor size	kW	90	90	90	90	90	90	90	90	90	90	110
0.7 bar*(e)*	Free Air Delivery	l/s	724	777	839	892	954	1000	1061	1112	1153	1229	1273
		m³/h	2605	2796	3022	3210	3434	3599	3820	4003	4149	4423	4583
	Outlet temperature	°C	80	80	80	80	80	81	81	82	82	84	85
	Shaft power	kW	57.0	60.9	65.7	69.7	74.5	78.0	82.8	87.0	90.6	97.3	101.7
	Motor size	kW	90	90	90	90	90	90	90	90	110	110	110
0.8 bar*(e)*	Free Air Delivery	l/s	718	771	834	887	949	995	1056	1108	1148	1225	1269
		m³/h	2586	2777	3004	3193	3417	3582	3803	3987	4134	4410	4569
	Outlet temperature	°C	86	86	85	86	86	86	87	87	88	89	90
	Shaft power	kW	63.7	68.0	73.3	77.6	82.9	86.8	91.9	96.5	100.4	107.8	112.5
	Motor size	kW	90	90	90	90	90	90	110	110	110	110	132
0.9 bar*(e)*	Free Air Delivery	l/s	714	767	830	883	945	991	1052	1103	1144	1221	1265
		m³/h	2569	2761	2988	3177	3401	3567	3788	3972	4119	4396	4555
	Outlet temperature	°C	91	91	91	91	91	91	91	92	92	94	94
	Shaft power	kW	70.4	75.1	80.8	85.6	91.3	95.5	101.1	106.0	110.3	118.4	123.4
	Motor size	kW	90	90	90	90	110	110	110	110	132	132	132
1 bar*(e)*	Free Air Delivery	l/s	709	763	826	879	941	987	1048	1099	1140	1217	1261
		m³/h	2552	2745	2973	3163	3387	3552	3773	3957	4105	4382	4541
	Outlet temperature	°C	97	96	96	95	95	96	96	96	97	98	99
	Shaft power	kW	77.1	82.2	88.4	93.6	99.7	104.2	110.2	115.5	120.2	128.9	134.4
	Motor size	kW	90	90	90	110	110	110	132	132	132	132	132

Dimensions *(L x W x H)*: 2385 x 1650 x 1853 mm

Technical specifications

ZS 90-132 - 60 Hz

	Gear designation		A	B	C	D	E	F
	Sound pressure level at 8.7 psig	**dB(*A*)**	**74**	**75**	**76**	**77**	**78**	**78**
4.35 psig	Free Air Delivery	cfm	1943	2073	2227	2355	2503	2614
		m³/h	3301	3522	3783	4001	4252	4440
	Outlet temperature	°F	128	128	128	129	129	130
	Shaft power	hp	50.9	54.9	59.9	64.1	69.3	73.2
	Motor size	hp	125	125	125	125	125	125
5.80 psig	Free Air Delivery	cfm	1929	2060	2214	2343	2493	2606
		m³/h	3278	3500	3762	3981	4236	4427
	Outlet temperature	°F	141	142	142	143	144	145
	Shaft power	hp	61.6	66.2	71.9	76.6	82.7	87.2
	Motor size	hp	125	125	125	125	125	125
7.25 psig	Free Air Delivery	cfm	1917	2048	2203	2332	2484	2598
		m³/h	3257	3479	3742	3962	4220	4414
	Outlet temperature	°F	154	155	156	157	159	160
	Shaft power	hp	72.3	77.5	83.8	89.1	96.0	101.2
	Motor size	hp	125	125	125	125	125	125
8.70 psig	Free Air Delivery	cfm	1905	2036	2192	2321	2475	2590
		m³/h	3237	3459	3723	3944	4204	4400
	Outlet temperature	°F	165	166	167	169	171	172
	Shaft power	hp	83.0	88.8	95.8	101.6	109.4	115.3
	Motor size	hp	125	125	125	125	125	125
10.15 psig	Free Air Delivery	cfm	1894	2025	2181	2311	2466	2582
		m³/h	3218	3441	3706	3926	4189	4387
	Outlet temperature	°F	176	176	178	179	181	182
	Shaft power	hp	93.7	100.1	107.7	114.1	122.8	129.3
	Motor size	hp	125	125	125	125	150	150
11.60 psig	Free Air Delivery	cfm	1884	2015	2171	2301	2457	2574
		m³/h	3201	3424	3689	3910	4174	4373
	Outlet temperature	°F	186	186	187	189	190	192
	Shaft power	hp	104.4	111.4	119.7	126.7	136.1	143.3
	Motor size	hp	125	125	125	150	150	150
13.05 psig	Free Air Delivery	cfm	1874	2006	2162	2292	2448	2566
		m³/h	3185	3409	3673	3894	4160	4359
	Outlet temperature	°F	195	195	196	197	199	200
	Shaft power	hp	115.1	122.7	131.7	139.2	149.5	157.3
	Motor size	hp	125	150	150	150	200	200
14.50 psig	Free Air Delivery	cfm	1866	1998	2154	2283	2440	2558
		m³/h	3170	3394	3659	3880	4146	4345
	Outlet temperature	°F	204	204	204	205	206	208
	Shaft power	hp	125.8	133.9	143.6	151.7	162.9	171.3
	Motor size	hp	150	150	150	200	200	200

Dimensions *(L x W x H)*: 2385 x 1650 x 1853 mm

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

OFFICE OF THE
REGIONAL ADMINISTRATOR

OCT 20 2010

MEMORANDUM

SUBJECT: Approval of Regional Waiver Request from the Buy American Provision for City of Palmer, Alaska

FROM: Paula vanHaagen, Manager Janette A Pau for PVH
Grants and Strategic Planning Unit

THRU: Mike Bussell, Director
Office of Water and Watersheds

TO: Dennis J. McLerran
Regional Administrator

Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA), Public Law 111-5 (or the "Buy American Provision"), requires that none of the appropriated funds may be used for the construction, alteration, maintenance, or repair of a public building or public work unless all of the iron, steel, and manufactured goods used in the project is produced in the United States. However, under Section 1605(b), a waiver may be provided if EPA determines sufficient and reasonably available quantities and of a satisfactory quality, or (3) inclusion of iron, steel, and the relevant manufactured goods produced in the United States will increase the cost of the overall project by more than 25 percent.

The City of Palmer, Alaska, has requested a waiver from the Buy American Provision for purchasing and incorporating four rotary screw air compressors manufactured outside of the U.S. Based on the technical evaluation conducted by EPA's national contractor and additional research by the City of Palmer, the available evidence supports the applicant's claim that rotary screw air compressors are not available from a domestic manufacturer that will meet the project specifications and performance requirements.

Based on our review, we have determined that the supporting documentation provided by the City of Palmer is sufficient to meet the following criteria listed under Section 1605(b) and in the April 28, 2009 memorandum, *Implementation of Buy American provisions of P.L. 111-5, the "American Recovery and Reinvestment Act of 2009,"* as: "Iron, Steel, and manufactured goods are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality."

We have determined that the City's waiver request can be processed as timely even though the request was made after the construction contract was signed. EPA is authorized under 2 C.F.R. §176.120 to process a waiver request as if it were timely if the need for the

waiver was not reasonably foreseeable. Since the City of Palmer needed to complete a portion of the project and conduct testing to verify aeration compressor requirements, we have evaluated the request as a timely request. We also support the overall basis for the waiver request that the City was unable to find a supplier that could provide American manufactured compressors to meet the project specifications and performance requirements. One domestic manufacturer, Universal Blower Pac (UBP), claimed to be able to meet the required performance specifications. Over the course of several months, the City of Palmer attempted to gather energy performance and independent engineering testing results from UBP to validate a product that would meet the project specifications. Responses from UBP have not included the required information to consider system energy loss and independent engineering testing as identified in the performance specifications. Therefore, we support the City of Palmer's finding that the claim of UBP to produce an acceptable compressor does not meet project specifications. We find that the City of Palmer demonstrated due diligence in their efforts and were ultimately unable to identify an available domestic product of satisfactory quality; therefore, we recommend that you sign the attached approval statement.

As Regional Administrator, EPA Region 10, I am hereby granting a waiver of the Buy American requirements of ARRA Section 1605 under the authority of Section 1605(b)(2) for the City of Palmer, Alaska. This action will allow use of foreign manufactured goods, four rotary screw air compressors, for the City of Palmer's project utilizing ARRA funds.

Approved:

Michael Pickard

Dennis J. McLerran, Regional Administrator for
Office of the Regional Administrator

10/20/10
Date