City of Richmond

5165Q

REQUEST FOR QUOTATION 5165Q

SUPPLY AND DELIVERY OF POOL AIR HANDLING UNITS AND HEAT RECOVERY VENTILATOR FOR WATERMANIA UPGRADE

Quotations will be received at the Information Counter, Main Floor, Richmond City Hall, addressed to the Purchasing Section, 6911 No. 3 Road, Richmond, BC, V6Y 2C1,

until local time 12 noon on Wednesday, April 23rd, 2014.

NOTES:

1. Three (3) copies of quotations and 1 (one) softcopy shall be in a sealed envelope or package marked with the Bidder's Name, the RFQ Title and Number.

2. The Closing time will be conclusively deemed to be the time shown on the clock used by the City for this purpose.

3. Faxed or emailed quotations will not be received or considered.

4. The lowest or any quote will not necessarily be accepted.

All queries related to the RFQ shall be submitted
in writing to the attention of:

Daianna Panni – Buyer 1

email: purchasing@richmond.ca

The deadline for all enquiries is: **12:00 pm, Tuesday, April 15th, 2014**
The City reserves the right not to answer any questions received after this time.

TABLE OF CONTENTS

PART A – INSTRUCTIONS TO BIDDERS

1.0 Description of Requirement

1.1 Quotations are invited for Supply and Delivery of Pool Air Handling Unit and Heat Recovery Ventilator (the "Units") as set out herein, for the City of Richmond, (the "City").

1.2 Bidders are required to submit a quotation for the full requirement only. Partial responses will be put aside and given no further consideration.

2.0 Pricing

2.1 Prices quoted should be in Canadian currency, exclusive of all taxes, and F.O.B. destination to the sites named herein, with all freight, unloading at destination, import duties, brokerage, royalties, handling, overhead, profit and all other costs included.

3.0 Inquiries and Clarifications

3.1 It is the sole responsibility of the Bidder to thoroughly examine these documents and satisfy itself as to the full requirements of this RFQ. Inquiries are to be in written form only, faxed or e-mailed to the contact person shown on the cover page. If required, an addendum will be published on the following websites:

a) BC Bid: http://www.bcbid.gov.bc.ca/open.dll/welcome?language=En

b) City's website: http://www.richmond.ca/busdev/tenders.htm

3.2 The City, its agents and employees shall not be responsible for any information given by way of oral or verbal communication.

4.0 Submission of Quotation

4.1 The response to this Request for Quotations (RFQ) with all accompanying schedules, appendices or addenda submitted by the Bidder will be received up to the closing time on the date and in the place shown on the title page of this RFQ (the "Closing Time"). The Quotation shall be submitted on the forms provided in a sealed envelope or package, marked with the Bidder's name and the RFQ title and number.

4.2 Quotations received after the Closing Time or in locations other than the address indicated, will not be accepted and will be returned unopened.

4.3 The Bidder shall submit 3 (three) hardcopies and 1 (one) softcopy of its Quotation in accordance with the instructions stated herein.

4.4 The Bidder should enter its corporate or legal business name on the final page of the Quotation Form. The Quotation Form must be signed in the place provided by an officer or employee having authority to bind the Bidder to the terms and conditions of this RFQ. All other pages of the Quotation Form must be initialled by the authorized signatory in the spaces provided.

4.5 Amendments to a Quotation may be submitted if delivered in writing prior to the Closing Time in a sealed envelope or package, marked with the Bidder's name and the RFQ title and number.

4.6 Quotations may be withdrawn by written notice only, provided such notice is received at the Purchasing Services office prior to Closing Time.

4.7 All costs associated with the preparation and submission of the Quotation, including any costs incurred by the Bidder after the Closing Time, will be borne solely by the Bidder.

4.8 By submitting a Quotation, the Bidder acknowledges and agrees that the City will not be responsible for any costs, expenses, losses, damages (including damages for loss of anticipated profit) or liabilities incurred by the Bidder as a result of or arising out of submitting a Quotation for the proposed Contract, or due to the City's acceptance or non-acceptance of their Quotation or any breach by the City of the bid contract between the City and each of the Bidders or arising out of any contract award not made in accordance with the express or implied terms of the Quotation documents.

5.0 Conflict of Interest

5.1 By submitting a Quotation, the Bidder warrants that neither it nor any of its officers or directors, or any employee with authority to bind the Bidder, has any financial or personal relationship or affiliation with any elected official or employee of the City or their immediate families which might in any way be seen by the City to create a conflict.

6.0 Evaluation of Quotations

6.1 Quotations will be evaluated on the basis of the overall best value to City based on quality, service, price and any other criteria set out herein including, but not limited to:

a) the Bidder's ability to meet the Requirements, qualifications and competencies set out herein;

b) financial offer including but not limited to prices, operating and maintenance costs, warranty, and any life cycle considerations;

c) the Bidder's business and technical reputation and capabilities; experience and where applicable, the experience of its personnel; financial stability; track record; and references of current and former customers;

d) equipment quality, configuration, and operation;

e) any other criteria set out in the RFQ.

6.2 Prior to Contract award, the Bidder may be required to demonstrate financial stability. Should the City so request, the Bidder will be required to provide annual financial reports or a set of financial statements prepared by an accountant and covering the last two (2) fiscal years.

6.3 The City may, prior to Contract award, negotiate changes to the scope of the Work, the materials, the Specifications or any conditions with any one or more of the Bidders without having any duty or obligation to advise any other Bidders or to allow them to vary their prices as a result of changes to the scope of Work, the materials, the Specifications, or any conditions, and the City shall have no liability to any other Bidder as a result of such negotiations or modifications.

6.4 Preference may be given to Quotations offering environmentally beneficial products or services.

7.0 Acceptance and Rejection of Quotations

7.1 Notwithstanding any other provision in the Quotation documents, the City has in its sole discretion, the unfettered right to:

a) accept any Quotation;

b) reject any Quotation;

c) reject all Quotations;

d) accept a Quotation which is not the lowest Quotation;

e) accept a Quotation that deviates from the Requirements, Specifications or the conditions specified in this Quotation;

f) reject a Quotation even if it is the only Quotation received by the City;

g) accept all or any part of a Quotation; and

h) split the Requirements between and award the contract to one or more Bidders.

i) increase or decrease the quantity of each item.

7.2 All Quotations shall remain open for a minimum of sixty (60) days after the Closing Time, whether or not another Quotation has been accepted.

7.3 The City may waive any non-compliance with the RFQ, the Requirements, the Specifications, or any conditions, including the timing of delivery of anything required by this RFQ and may elect to retain for consideration Quotations which are non-conforming, which do not contain the content or form required by the RFQ or which have not complied with the process for submission set out herein.

8.0 Award of Contract

8.1 Award of a Contract is contingent on funds being approved and the contract award being made by the appropriate City authority.

8.2 The purchase order, the Quotation, the RFQ and such other documents including all amendments or addenda, shall form the basis for the Contract between the Contractor and the City. In the event of a conflict between any of the Contract Documents, the following documents will take precedence and govern over each other in the following order of priority from highest to lowest:

a) The City's purchase order including the standard purchase order terms and conditions;

b) Or any mutually agreed to amendments between the Bidder and the City;

c) The Quotation; and

d) The RFQ and any subsequent addenda.

8.3 Where the head office of the successful Bidder is located within the City of Richmond and/or where the successful Bidder is required to perform the Service at a site located within the City of Richmond, the successful Bidder is required to have a valid City of Richmond business license prior to Contract execution.

8.4 The City is not under any obligation to award a Contract and may elect to terminate this RFQ at anytime.

9.0 Publication of the Results of the Request for Quotation

9.1 The City will publish the name of the successful Bidder on the websites listed in section 4.1. No other notices will be issued by the City. Bidders shall visit these websites to obtain the results of this Request for Quotation.

10.0 Quantities

10.1 The quantities stated herein are the City's best estimates of its requirements and should not be relied on. Actual quantities may vary.

11.0 Alternates and/or Variations to Specifications

11.1 Except where stated otherwise herein, the specifications describe what is considered necessary to meet the performance requirements of the City and Bidders should bid in accordance with such specifications.

11.2 The City is not obligated to accept any alternatives.

12.0 Freedom of Information and Protection of Privacy Act (BC)

12.1 Bidders should note that the City of Richmond is subject to the Freedom of Information and Protection of Privacy Act (British Columbia), which impose significant obligations on the City's contractors to protect all personal information acquired from the City in the course of providing any service to the City.

13.0 Bid Bond

13.1 The Bidder must include with their bid submission, a Bid Bond on a form approved by the Insurance Bureau of Canada, issued by a Surety Company(s) licensed to conduct business in the Province of British Columbia. The Bid Bond shall be in an amount not less than ten (10%) percent of the TOTAL QUOTED AMOUNT. Bidders may submit a Bid Deposit, in the form of a certified cheque, in an amount not less than ten (10%) percent of TOTAL QUOTED AMOUNT drawn up in the name of the Owner, in lieu of a Bid Bond.

14.0 Performance Bond

14.1 If requested by the City, the successful Contractor shall, within ten (10) days from the date of acceptance, provide a Performance Bond in the amount of fifty (50%) percent of the total Contract Price. The surety(s), issued by a surety company licensed to transact business in British Columbia, must be in a form and contain terms satisfactory to the City's Director of Legal Services. Cash deposits, certified cheques and letters of credit (in a form satisfactory to the City's Director of Legal Services) in the amount of fifty (50%) percent of the total Contract price are acceptable in lieu of a Performance Bond. No interest will be paid to the Contractor on cash deposits.

PART B – GENERAL CONDITIONS

1.0 Definitions

The following words and terms, unless the context otherwise requires, shall have the meanings set out below. Words including the singular number include the plural and vice versa.

"Act of God" means a cataclysmic phenomenon of nature, including earthquake, flood or cyclone. Rain, snow, wind, high water or any other natural phenomenon, which might reasonably have been anticipated from historical records of the general locality of the City, shall be deemed not to be acts of God;

"Bidder" means the individual, partnership, corporation or combination thereof, including joint venturers, who or which sign the Quotation form set out in Part C of this RFQ;

"City" means the municipal corporation, generally known as the City of Richmond.

"City's Designated Representatives" means the City's employees or representatives who are authorized in writing to deal with the Contractor on behalf of the City in connection with the goods, materials, equipment and services or to make decisions in connection with the Contract;

"Closing Time" means the closing date, time, and place as set out on the title page of this RFQ;

"Contract" means the agreement formed between the City and the Contractor as evidenced by the purchase order issued to the Contractor by the City;

"Contract Documents" means the purchase order, the Contractor's Quotation, the RFQ and such other documents as listed in the purchase order, including all amendments or addenda agreed between the parties;

"Contractor" means the successful Bidder individual, partnership, corporation or combination thereof, including joint venturers, who or which is awarded the Contract;

"Delivery Date" means the date the City requires the Contractor to deliver the goods to the City's Delivery Site;

"F.O.B." means all costs of freight, insurance, brokerage, customs duties and all other costs of delivery to the site named as F.O.B. will be borne by the Contractor and that ownership and title to all goods, materials, and equipment are transferred to the City when same are delivered by the Contractor to the City and the risk of loss or damage to

the goods, materials and equipment transfers to the City only at such time as same are received and accepted by the City at the site named as "F.O.B.";

"GST" means the goods and services tax administered under the Excise Tax Act (Canada) and any successor tax or levy therefor in force from time-to-time;

"OHS Regulation" means the *Workers Compensation Act* (British Columbia), including without limitation, the Occupational Health & Safety Regulation (BC Regulation 296/97, as amended by BC Regulation 185/99) enacted pursuant to such Act, all as such Act or Regulations are amended or re-enacted from time to time.

"PST" means British Columbia provincial sales tax and any successor tax or levies therefore in force from time-to-time;

"Quotation" means the Bidder's offer made on the Quotation form set out on Part C of this RFQ with all appendices or addenda submitted by the Bidder in response to the RFQ;

"RFQ" means this Invitation to Quotation including, but not limited to: Part A - Instructions to Bidders; Part B - General Conditions; Part C- Quotation Form; Part D – Specifications;

"Requirements" means all of the specifications, requirements and services set out in the RFQ that describes the general requirements that the goods, materials, equipment and services must meet and the Contractor must provide;

"Work" means all the labour, materials, equipment, supplies, services and other items necessary for the execution, completion and fulfilment of the Requirements;

"Work Site" means the site where the Work is being performed, Richmond, B.C., unless otherwise stated in this RFQ**.**

2.0 Time of the Essence

2.1 For all requests made by the City pursuant to the Contract, time is of the essence. The acceptance of a late performance, with or without objections or reservations by the City, shall not waive the right to claim damages for such breach nor constitute a waiver of the requirement of timely performance of any obligation remaining to be performed.

3.0 Laws, Permits and Regulations

3.1 The laws of British Columbia shall govern the Contract.

3.2 In carrying out its obligations hereunder, the Contractor shall familiarize itself and comply with all applicable laws, bylaws, regulations, ordinances, codes, specifications and requirements of all regulatory authorities, and shall obtain all necessary licenses, permits and registrations as may be required by law.

4.0 Inspection

4.1 The services are subject to inspection and in case any of the services are not in conformity with the Requirements of the Contract or the Contractors' warranty (expressed or implied), the City shall have the right either to reject them or to require correction.

4.2 The City shall be the final judge of the services and materials in respect of both quality and quantity and its decisions of all questions in dispute with regard thereto will be final.

4.3 The City will not be deemed to have accepted the services by virtue of a partial or full payment for it.

5.0 Responsibility For Supplies

5.1 The Contractor shall be responsible for the supplies covered by this contract until they are delivered at the designated delivery point, regardless of the point of inspection; and the Contractor shall bear all risks of loss or damage to rejected supplies after notice of rejection.

6.0 Quality of Workmanship and Materials

6.1 The Contractor shall perform the services with the degree of care, skill and diligence normally applied in the performance of services of a similar nature and in accordance with sound current professional practices and conforming to the requirements set out in the RFQ.

6.2 The whole of the works and the manner of performing this Contract shall be done to the entire satisfaction and approval of the City, and it shall be the sole judge of the work and materials in respect of both quality and quantity, and its decision with regard to work or materials, or as to the meaning and intention of this Contract, or any part or parts thereof, shall be binding and final upon the Contractor.

6.3 Materials, goods and equipment shall be the products of suppliers or manufacturers of established reputation engaged in the supply or manufacture of such materials of equipment.

6.4 Materials are to be applied in accordance with the manufacturer's directions and shall use the techniques and applications best suited for the type of material being used.

7.0 Warranty

7.1 The Contractor warrants that the goods, materials, equipment and/or services supplied by the Contractor to the City will be in full conformity with the Specifications as well as samples, if any, then this is a sale by sample as well as by description within the meaning of the Sale of Goods Act (BC).

7.2 The Contractor further warrants that the goods, materials and/or equipment are of merchantable quality, and fit for the intended use and will perform according to the requirements set out in the RFQ.

7.3 Equipment and materials shall be new, free and clear of all liens, charges and encumbrances, the latest model, and shall be complete with all necessary accessories for operation. All equipment and materials shall be at the risk of the Contractor until delivered to and accepted by the City.

7.4 The warranty shall commence upon successful start up and demonstration of the equipment to the City, which is scheduled for the last week of September, 2014.

7.5 The warranty shall also include one complete heating and cooling season.

7.6 At a minimum, a one (1) year parts and labour warranty shall be provided on all goods, materials, equipment and/or services provided under the Contract.

7.7 Optional price for a two (2) year extended warranty. Warranty shall be provided on all goods, materials, parts, equipment, services and labour on all unit components.

7.8 The Contractor warrants that its employees have the qualifications, experience, knowledge, skills and abilities necessary for the fulfilment of the Contract.

8.0 Payments

8.1 The Contractor shall be paid net thirty (30) days from receipt of invoice and acceptance of the goods, materials, equipment and/or services, whichever is the later.

9.0 Taxes

9.1 Unless otherwise provided herein, the Contractor shall pay all sales or excise taxes in force during the term of the Contract, provided that any increase or decrease in such taxes shall increase or decrease the amount due under the Contract(s).

9.2 Invoices shall show the appropriate amounts for GST and PST.

10.0 Conduct of the Contract

10.1 The City of Richmond's Manager, Purchasing shall have the conduct of the RFQ and the Contract.

11.0 Delivery

11.1 Deliveries shall be made FOB to Installation Contractor's storage facility. The City is in the process of acquiring an installation Contractor. The exact location will be determined upon contract award by **Friday, August 22nd, 2014**.

11.2 Craning and installation of the unit will be performed by the above noted Contractor.

12.0 Assembly

12.1 Any required assembly of the air-handling unit components, (if not able to be delivered as one complete package), must be performed by the manufacturer under the direction of the Prime Contractor.

13.0 Testing/ Factory Visit

13.1 The City and/or consultants, at their discretion may require a factory visit and inspection of the unit prior to shipping to ensure it meets specifications. Performance testing of the fan system will also be required prior to shipping. The manufacturer shall pay for travel costs to the factory for the City (one representative) and the consultant (one representative) for a one day visit.

14.0 Changes in Requirements

14.1 The City, without invalidating the Contract, may make changes to the Contract by altering, adding or deducting from the Requirements. Subject to mutual agreement, the Contractor shall proceed with the amended Requirements and the amended Requirements shall be executed under the provisions of the Contract.

14.2 The Contractor must not make any changes to from the terms of the Contract unless it shall first have received the written consent of the City and no claims for additional compensation shall be valid unless the change is so ordered.

15.0 Requirements

15.1 The equipment shall be delivered to the Installation Contractor's storage facility by **Friday, August 22nd, 2014**. Prime Contractor and location is to be determined at a later date.

15.2 Please refer to the following Appendices for the Specifications and Schedules of the Work, appended to this RFQ document:

a) Appendix A: *Watermania AHU Schedules & Specifications* prepared by Rocky Point Ltd.

15.3 Preliminary shop drawings of units to be submitted as part of RFQ.

15.4 The Work includes the following:

a) Base Price – Supply & delivery of two (2) Air handling Units and one (1) Heat Recovering Ventilator

b) Optional Price – Two (2) year extended warranty

Quotation Form

Purchasing Section
City of Richmond
6911 No. 3 Road
Richmond, BC V6Y 2C1

The undersigned Bidder, having carefully read and examined the Instructions to Bidders, General Conditions, Requirements, Quotation Form, and Undertaking of Liability Insurance and having full knowledge of the work required, does hereby offer to provide all necessary materials in strict accordance with the Requirements and to do all therein called for on the terms and conditions and under the provisions therein set forth at the:

Description	Price
Pool Air Handling Units AHU-1 & AHU-2	$ _____
Heat Recovery Ventilator AHU-13	$ _____
SUBTOTAL	**$** _____
GST	$ _____
PST	$ _____
TOTAL	**$** _____

The above price includes and covers duties, handling and transportation charges, and all other charges incidental to and forming part of this Quotation **including** for GST and PST.

DELIVERY TIMES: _____ Weeks

TERMS:

PAYMENT TERMS_____% discount if invoice paid within _____days
(otherwise Net 30 days from acceptance of the equipment)

ADDENDA:

The City may issue and Addendum. It is requested that receipt of any Addenda be acknowledged as follows:

I/We acknowledge receipt of the following applicable Addenda to the Request for Quotation:

ADDENDUM	DATE OF ADDENDUM	FROM PAGES	TO PAGES
Addendum # 1			
Addendum # 2			

The undersigned Bidder agrees to supply the equipment by **Friday, August 22nd, 2014**.

Name of Bidder: _____

Address: _____

Telephone No: _____

Name, Signature, and Title of Signing Officer: _____

Date: _____

E-mail: _____

Web Address: _____

_____
Initials of Signing Officer

Options

As per, Part B – General Conditions, Section 7.7 Warranty.

The City is requesting pricing for two (2) year extended warranty. Warranty shall be provided on all goods, materials, parts, equipment, services and labour on all unit components.

(Note: details of warranty section should be completed)

Two (2) year extended warranty

Description	Price
Two (2) year extended warranty	$ _____
GST	$ _____
TOTAL	**$** _____

Details of warranty

(If additional space is required, attach additional documentation)

List of Previous Contracts

The Bidder has recently undertaken and completed the Contracts described following and authorizes the City of Richmond to inquire as to the nature of the Bidder's performance on these contracts.

YEAR	PROJECT TITLE	OWNER PHONE # CONTACT	SCOPE	BUDGET Original / Actual		SCHEDULE Proposed / Actual		OTHER RELEVANT INFO

(If additional space is required, attach additional)

Appendix A: Watermania - AHU Schedules & Specifications

Prepared by Rocky Point Ltd.

MECHANICAL
EQUIPMENT SCHEDULES --
POOL AIR HANDLING UNIT

EQUIPMENT DATA

UNIT NO.	AHU-1 & AHU-2
SERVICE	POOL VENTILATION / DEHUMDIFICATION
LOCATION	ROOF

FAN DATA		**SUPPLY**		**RETURN**
AIRFLOW	(L/s)	18880		19352
	(CFM)	40000		41000
EXTERNAL	(Pa)	375		312.5
STATIC PR	(Inches)	1.50		1.25
FAN TYPE		VSD		VSD
DRIVE TYPE		DIRECT		DIRECT
FAN	RPM	882		850
MOTOR	HP	30		20
VOLTAGE/PHASE		600/3/60		600/3/60

COIL DATA		**COOLING (DEHUMIDIFICATION)**	**REHEAT (FROM HEAT RECOVERY UNIT)**	**REHEAT (FROM BOILER)**
	(L/s)	18880	18880	18880
AIR FLOW	(CFM)	40000	40000	40000
TOTAL	(kW)	126.6	172.2	220.1
CAPACITY	(MBH)	432.0	587.5	751.0
ENT AIR	(Deg C)	26.7	8.9	8.9
	(Deg F)	80.0	48.0	48.0
LEAVING AIR	(Deg C)	21.1	16.7	40.0
	(Deg F)	70.0	62.0	104.0
AIR FLOW	(Pa)	47.5	47.5	47.5
PRESS DROP	(Inches)	0.19	0.19	0.19
WATER FLOW	(L/s)	10.90	14.81	5.17
	(USGPM)	173.0	235.0	82.0
ENT WATER	(Deg C)	12.8	35.0	82.2
	(Deg F)	55	95	180
LEAV WATER	(Deg C)	10.0	32.2	71.1
	(Deg F)	50	90	160
WATER FLOW	(kPa)	25.35	25.8	25.8
PRESS DROP	(Feet)	8.45	8.6	8.6

NOTES

1) REFER TO MECHANICAL SPECIFICATION FOR DETAILS

MECHANICAL
EQUIPMENT SCHEDULES --
HEAT RECOVERY VENTILATOR

EQUIPMENT DATA

UNIT NO.		AHU-13		
SERVICE		CHANGE ROOM		
LOCATION		ROOF		
MANUFACTURER MODEL		ENGINEERED AIR		

FAN DATA			SUPPLY	EXHAUST	
AIR FLOW	(L/s)		3068	2974	
	(CFM)		6500	6300	
EXTERNAL	(Pa)		200	125	
STATIC PR	(Inches)		0.80	0.50	
SUPPLY FAN TYPE			AIRFOIL	AIRFOIL	
DRIVE TYPE			BELT	BELT	
FAN	RPM		850	850	
MOTOR	HP		5	5	

ELECTRICAL SERVICE

CONNECTION VOLTAGE/PHASE			575/3/60	575/3/60	
FLA	(AMPS)				
BREAKER	(AMPS)				

HEAT EXCHANGER DATA

HEATING	(kW)		175.8		
INPUT	(MBH)		600.0		
HEATING	(kW)		140.7		
OUTPUT	(MBH)		480.0		
ENT AIR	(Deg C)		-9.4		
	(Deg F)		15.0		
LEAVING AIR	(Deg C)		21.1		
	(Deg F)		70.0		

NOTES (1)

1) REFER TO SPECIFICATIONS FOR DETAILS.
2) MAKE UP AIR UNIT WITH HEAT RECLAIM AND GAS FIRED BACK-UP.

1. GENERAL

.1 SCOPE

.1 AHU-1 and AHU-2

.1 Custom rooftop air handling unit with internal motor mounting.

.2 Dehumidification unit with cooling coil, preheat, re-heat coil, filter section, mixing section

.3 Pool quality unit complete with epoxy coated corrosion resistant construction and herisite epoxy coated coils.

.2 Vibration isolation and seismic restraint.

.3 Controls

.4 Shop drawings.

.5 Unit to be delivered on site no later than August 22, 2014.

.2 QUALITY ASSURANCE

.1 Unit and major components shall be product of manufacturers regularly engaged in production of such units who issues complete catalogue data on such products.

.2 Unit shall be factory built, and carry all necessary approvals. Coils shall be water tested and ARI certified. Fan shall be run and tested to performance. Test results shall be submitted for all scheduled criteria. Right is reserved to observe tests on 3 days notice.

.3 Equipment shall be manufactured in an ISO-9001-2008 accredited manufacturing facility.

.4 Fans shall conform to AMCA standards for sound and air performance. Airfoil fans shall bear AMCA certified rating seals. Fan sound ratings shall be AMCA rated and third party certified. Sound ratings, without third party verification are unacceptable.

.5 Coils shall have ARI 410 certification.

.6 The equipment casing shall be tested by an independent third party to ASTM E90-90 for transmission loss and ASTM C423-90A for sound absorption.

.7 All equipment shall be listed in accordance to the applicable UL requirements for custom air handlers and be labeled CSA, UL or ETL. Individual component listing is not acceptable.

.8 The equipment shall meet the scheduled performance for airflow rates, static pressure and sound value. Coil and filter face velocities scheduled are maximum and are not to be exceeded. The coil flow rates and pressure drops shall be within 10% of the specified values.

.9 The unit casing shall meet a leakage rate of 0.75% or less of the total airflow, on both positive and negative pressure sections at 10 "w.g.. The casing deflection shall be less than or equal to L/300 of the total span at the section operating pressure.

.10 Fan and drive bearings shall have a rating of L10-80K at design operating conditions in accordance with AMSI B3.15.

.11 Review project schedule and ensure that shop drawing review and unit delivery is compatible with project requirements. Allow a minimum of 3 weeks for shop drawing review process.

.12 Manufacturers shall provide construction methods to achieve sound data as specified and provide data obtained by either:

.1 AMCA lab simulation

.2 Test data of actual unit

.13 The manufacturer and local representative shall provide assistance to the

mechanical contractor to ensure the assembly of the modules is as per the manufacturer's requirements and recommendations.

.14 Start up assistance shall also be part of the tender package, to ensure the controls are as per the manufacturers requirements and as per the tender documents.

.15 Provide an allowance for on-site factory reviews for the owner and the engineering consultant in order to the review the manufacturing construction process of the AHU's prior to final shop drawing approval and subsequence fabrication.

.3 SUBMITTALS

.1 The following is to be provided and failure to provide complete information will result in the submittal being returned without review. The supplier is responsible for highlighting any variances in the equipment submitted to that specified whether or not pre-approval has been obtained. The cost to review subsequent submissions will be charged to the party submitting.

.2 Unit dimensions, weights including center of gravity of all sections, and location of components. Equipment drawings shall show plan and elevation and be to scale. Indicate all required clearances for service of the equipment.

.3 Provide equipment material gauges, finishes, and construction details. Include all relevant technical information of components to be provided, including but not limited to, the information noted in the schedule of this specification.

.4 Fan performance curves with the operating condition clearly noted. All fan curves are to be corrected for elevation. Include fan sound power levels. Provide a static pressure summary clearly indicating internal and external pressures for the equipment. Submit fan curves and indicate pressures and air flows available at unit casing inlet and outlet for actual operating conditions.

.5 Provide equipment sound power levels at the inlet, discharge, and radiated. If the unit exceeds the scheduled power levels at the specified operating point, the manufacturer shall provide sound attenuators and meet the scheduled BHP.

.6 Provide manufacturer's coil selections to ARI 410 corrected for elevation. Clearly indicate materials of construction, fluid properties, and pressure drops.

.7 Provide filter information including: initial APD, recommended final APD, dust spot efficiency, MERV rating, media, and frame description.

.8 Provide motor ratings, enclosure type, electrical characteristics, and efficiencies.

.9 Provide requirements for power supply wiring including diagrams clearly indicating factory-installed and field-installed wiring.

.10 Submit each air handling unit on clearly legible drawings showing construction details and dimensions of entire unit and internal components, minimum size of 11" x 17" (280 x 431 mm).

.11 Number of tube rows, air and water pressure drops, and such features as cleanability, drainability, same or opposite end connections, support and venting of alternate manufacturer's coils shall be same as type specified.

.12 Provide noise data for unit inlet, unit outlet and casing radiation in accordance with AMCA.

.13 Shop drawings shall be submitted within 3 weeks of date of signing of

contract.

.4 Operation and Maintenance Data

.1 The manufacturer shall submit both hard copy and an electronic copy of the operation and maintenance data for the equipment. The information shall include lubrication instructions, filter replacement, belt adjustment, motor maintenance, split attachment, spare parts list, and a wiring diagram.

.5 Delivery Storage and Handling

.1 The contractor shall store and protect the equipment under provisions of Division 1. The contractor shall store the products in a clean, dry place, protect them from the elements, and shall handle them carefully to avoid damage to enclosures, components, and finish.

.2 The manufacturer shall deliver the products to site on a factory base rail and encapsulated in a minimum 6 mil poly shrink wrap. If a unit is shipped in split sections, each section shall be individually wrapped. Sections shall be wrapped regardless of whether the unit is for indoor or outdoor use.

.3 The contractor shall follow rigging instructions provided by the manufacturer and shall use all lifting points provided on the channel base of the unit

2. PRODUCTS

.1 APPROVED MANUFACTURERS

.1 Scott Springfield Mfg Inc.
.2 Engineered Air
.3 Huntair
.4 Haakon

.2 BASE

.1 Unit shall be constructed on a structural C-channel perimeter base with intermediate channel and angle support. Units that exceed 24 ft. shall have an 8" minimum base rail. Regardless of the frame size, the channel shall meet a deflection criteria of 1/240" for an unsupported span.

.2 Provide floor fully welded to the intermediate support members and all seams shall be continuously welded. Floors that are attached with screws or adhesive sealants are not acceptable.

.3 The base shall be insulated with polyurethane foam or fibreglass sheeted with an unpainted, galvanized liner.

.4 The base shall be full perimeter, seismically rated base, constructed of heavy gauge metal. Provide, 25-mm (1-inch) deep by 50-mm (2-inch) wide neoprene gasket on top of base, to provide vibration isolation between the unit casing from the housekeeping pad.

.5 The base pan shall have an integral 1.5" water dam including all floor penetrations. Base shall be provided with a minimum four (4) structural lifting lugs per section. Manufacturers who cannot provide a water dam constructible are not acceptable.

.6 All drain connections shall be extended through the unit base rail and capped. Minimum drain size shall be 1.25". Drains shall be steel or copper pipe.

.7 Provide secure attachment points for seismic anchors.

.3 FLOORS

.1 Provide a heavy gauge 3 mm galvanized steel floor welded to sub-floor with all seams continuously welded reinforced so no oil canning of floor occurs. Provide 40 mm perimeter waterproof collar. Floor shall be completely flooded after assembly and written certification submitted by the manufacturer indicating that there are no leaks. Install waterproof dividers between sections. Paint floor with anti-skid coating.

.2 No penetrations shall occur through 40 mm perimeter collar. All drains shall be run within the base of the unit to the perimeter with sufficient height to trap the drain.

.3 All pipe/duct penetrations through AHU casing floor shall have minimum 40 mm sleeve up-stand, welded.

.4 CASING

.1 4" wall and roof, 16 gauge steel exterior casing shall be acoustic panels with panel sizes not to exceed 24". Provide a double wall unit with wall seams that are turned inward to provide a clean, flush unit exterior. All wall panels shall be secured on 8" centers without the use of mechanical fasteners. All panel seams shall be caulked with clear silicone applied after the unit has been painted.

.2 20 gauge aluminum washdown interior liner shall be of thermal break construction with gasket between inner and outer wall skin. All mechanical fasteners shall have rubber washers.

.3 The insulation minimum density shall be 3 lbs/ft^3 and a minimum conductivity factor shall be 0.23 Btu.in/ft^2.hr.$^\circ$F Insulation minimum sound absorption coefficient shall be 1.05. All insulation and accessories including sealants must have a composite fire and smoke hazard rating of 25/50 per ASTM E-84 and UL 723.

.4 The unit shall meet a deflection criteria of 1/300 of the panel span at 10 "w.g. and the air handling unit manufacturer shall provide a casing deflection test (upon request) to indicate compliance. If the casing cannot meet the deflection criteria; the manufacturer shall provide additional internal reinforcement

.5 The unit casing shall meet a leakage rate of 0.75% or less of the total airflow, on both positive and negative pressure sections at 10 "w.g..

.6 Casing panels shall be tested in accordance to ASTM Standard C-423 for sound absorption and ASTM E90-90 for transmission loss. NRC minimum of 1.1 and STC minimum of 38.

.5 DRAIN PANS

.1 Coil drain pans of 1.47 mm [16 ga] minimum stainless steel shall be recessed into the floor and shall be an integral part of the floor paneling, a minimum of 150 mm and 50 mm deep respectively with welded corners. Drain pans under each “wet” coil must extend upstream and downstream as required to ensure no carryover.

.2 The drain pan shall be sloped to outlet and outlet pipe bottom invert shall be below bottom of pan. The drain pan shall be provided with an interior 32 mm copper pipe drain piped to the outside of the unit.

.3 Provide drain pans under all coil banks (heating / heat recovery coils) to allow for cleaning. Cap all drain connections at exterior of unit for dry coils.

.4 Install drain ball valve c/w hose bibb connection and cap on all drain connections at exterior of unit for dry coils.

.5 Provide information to Contractor indicating minimum required exterior

trap depths.

.6 INSULATION

.1 Inside of exterior casing to be completely lined with fiberglass plenum liner, Manville Permacote Linacoustic R-300 or approved equal, minimum 50-mm thick, neoprene coated on the air side and held in place by 22-gauge perforated metal liner

.2 The underside of the base shall be insulated with 25 mm thick 72.2 kg/m3 density acoustic insulation.

.7 ACCESS DOORS

.1 Access doors shall be double walled with 16 gauge galvanized steel exterior and 22 gauge solid interior panel. Doors must be of the same thickness as the wall. Provide a reinforced door frame so that the opening remains square during manufacturing and installation. Door frames which are formed from the casing wall are not acceptable. Door insulation shall be 3 lbs/ft^3. For door options, please see equipment detail sheet.

.2 Doors shall be sealed continuously with a double gasket arrangement with a neoprene "knife edge" seal and a 3/4" automotive bulb seal. Seals requiring pop rivet or screwed attachment are not acceptable. Doors with a single gasket sealing system are not acceptable. Minimum door opening to be 24" x 72", height permitting.

.3 Doors shall have a minimum of two (2) glass-reinforced Ultramid nylon handle. The handles shall be operable from either side of the door. AND Provide fan section doors with a locking device that is part of the handle. Fan section minimum door width must allow for removal of the fan motor.

.4 Access doors shall open against system pressure, wherever feasible. In the event unit size does not allow for in-swing doors on positive pressure compartments, provide a safety pressure relief latch.

.5 Doors shall be of insulated double wall construction with perforated metal liner, secure airtight gasket, airtight frame, heavy duty hinges, heavy duty door securing handles, and wired glass window 300 mm in each dimension. Doors shall be 600 mm wide by 1500 mm high unless casing size requires a shorter door or equipment removal requires a wider door.

.6 Man sized access hatches may be used for infrequently accessed areas.

.8 COILS

.1 Coils shall be rated in accordance with ARI Standard 410. Minimum capacity and sizes are as scheduled.

.2 Coils shall be tested to 315 psi and be suitable for operation at 250 psi.

.3 Tube Material shall be 5/8" OD tube diameter with 0.020" copper tube wall.

.4 Fin Material shall be 0.0075" aluminum with a maximum 10 fins per inch.

.5 Casing Material shall be a galvanized casing.

.6 Coil Connection shall be red brass MPT

.7 Coils shall be coated for protection of the fins and casing in corrosive environments. Coating shall be applied by dipping the coil. Treatment of the coil after assembly in the air handler shall not be allowed.

.8 Coils shall be fully enclosed within the casing and cooling coil drain pans shall extend fully under the coil header and return bends. Coils shall be mounted on angle racks such that the coils may be individually removed. Cooling coil racks shall be 304 stainless steel and heating coil racks shall be galvanized steel.

.9 Coil connections shall be extended through the unit casing. Provide grommet seals where the coils penetrate the casing and completely safe off the internal side of the coil penetration.

.10 Coils shall be fully drainable. Provide a drain and vent connection on each coil and extend to the outside of the unit casing.

.11 Provide a continuously welded 16 gauge 304 stainless steel drain pan double sloped for positive drainage under all cooling coils. Intermediate drain pans for stacked coil configurations are to be the same material as the primary drain pan interconnected with 1" copper drain line.

.12 Coils shall be sized for maximum face velocity of 2.5 m/s (500 FPM).

.13 Provide factory installed manual air vents at high points and drain valves at low points. Provide factory installed freeze relief plugs.

.9 FANS, MOTORS AND DRIVES

.1 Internally mounted motor shall be provided with adjustable slide base to allow adjustment of belt tension.

.2 Motors shall be high efficiency NEMA design B, insulated for 104 °F ambient continuous duty conditions. Motor service factor to be 1.15. Motors to be tested and rated to IEEE standard 112 test method B and NEMA MG1 12.53. All motors to be mounted on an adjustable motor mount base. Motors with a 256T frame size or larger, shall have a dual bolt slide adjustable base.

.3 Fan motors shall be heavy duty premium efficiency, inverter ready, operable at the rated voltage scheduled.

.1 TEFC motor enclosure.

.2 Fan motors shall be suitable for operation with VFD and meet NEMA STD MG1 Part 31.4.4.2. Motor shall have Class F insulation, low-loss electrical grade lamination steel, ISR magnet wire and a three year warranty. Fan motors shall be inverter ready.

.4 Motor removal railh v shall be constructed from ASTM I-Beam and shall be designed and constructed according to the guidelines outlined in ANSI MH27.1 and ASME B30.11. Loads to be considered are the motor weight, trolley/rigging weight and a 10% allowance for impact loading. Maximum beam deflection for the rigged weight shall be L/450. All welded joints must be performed by a CWB certified or equivalent welder and must adhere to CSA Standard W47.1 or equivalent. A maximum load rating label must be clearly affixed to the rail. Rigging to be supplied by others. Trolley shall be suitable to operate on the contour of the beam and shall be a minimum 4-wheel style to the rated load. Extension beam must be the designed and built to the same standards as the fixed rail and must extend to allow the motor to be removed from a door or access panel.

.5 All motors shall be totally enclosed air over, (TEAO), T-frame motors selected at the specified operating voltage, and RPM as specified or as scheduled elsewhere. Each direct drive fan/motor cartridge shall be dynamically balanced to meet AMCA standard 204-96, category BV-5, to meet or exceed Grade 2.5 residual unbalance.

.6 The supply fan motors shall be internally factory wired from the motor to a flush mounted NEMA 1 enclosure. Conduits shall be sealed air tight.

.7 FANS

.1 Fan assembly shall be supplied with a complete flow measuring system, which indicates airflow in CFM. The flow measuring station shall not obstruct the inlet of the fan and shall have no effect on fan performance (flow or static) or sound power levels.

.2 Fans shall be centrifugal plenum fan incorporating a wheel; heavy gauge reinforced steel inlet plate with removable spun inlet cone. Fan wheels up to and including 22" diameter shall be aluminum (or steel upon request). The fan shall be provided in an AMCA Arrangement 1 configuration OR AMCA Arrangement 3 OR fans shall be direct drive AMCA Arrangement 4 with aluminum wheel. The blades shall be continuously welded, die-formed Airfoil type, designed for maximum efficiency and quiet operation. Partial welding is not acceptable on airfoil blades. Fan impellers shall be statically and dynamically balanced and the complete fan assembly test balanced at operating speed prior to shipment. The manufacturer shall provide balance report to owner (upon request)

.1 Fans to be coated for corrosive environment operation.

.3 Fan sections shall be equipped with a formed steel channel base for the integral mounting of the fan, motor and casing panels. The fan scroll, wheel, shaft and bearings shall be mounted on a structural steel frame rigidly secured to the channel base.

.4 Fan bearings shall be self-aligning, pillow block, regreaseable ball type.

.5 Fan motor shall be mounted within the fan section casing on slide rails having two adjusting screws.

.6 Fans to be of a construction class to suit the specified conditions.

.7 Fan wheel and inlet cone shall be aluminum.

.8 Fan assembly shall have expanded metal cage. Screens at doors are not acceptable. Provide inlet screen at suction side of plug fans.

.9 Fan shafts shall be solid, ground and polished, carbon steel, SAE 1045 sized so the first critical speed is a minimum 125% of the maximum operating speed for the class of fan. Provide rust inhibiting coating on the fan shaft.

.10 Bearings shall be heavy-duty grease lubricated, self aligning ball or pillow block rated for a minimum life (L-10) in excess of 150,000 hours at the maximum operating speed. Provide extended lubrication lines for the bearings to motor side of the fan

.11 Fan and motor shall be mounted on a welded structural steel epoxy coated isolation base. Formed metal isolation bases are not acceptable

.12 Vibration isolation for the entire fan motor and drive assembly shall be provided by spring mounts selected for 50 mm static deflection. The spring mounts together with a flexible fan discharge connection and Mason Model SSLFM springs shall be installed in the fan casing at the factory. Provide mounting bracket to ensure no floor base penetrations.

.13 Provide a minimum of four seismically restrained OSHPOD approved isolators. Minimum isolation efficiency acceptable is 98%. Manufacturer is to provide isolation selection as part of the submittal

.10 ACOUSTIC ATTENUATION

.1 The unit shall be provided with acoustical attenuation that reduces the bare fan discharge sound power levels by a minimum of 15 db re 10^-12 watts throughout the eight octave bands with center frequencies of 125, 250, 1000, 2000, 4000 and 8000 HZ when compared to the same unit without the attenuation. The attenuation shall not increase the fan total static pressure, nor shall it increase the airway tunnel length of the Air Handling Unit when compared to the same FWT unit without the attenuation. Sound levels shall not exceed any of the first four (4) octave band specified as follows:

Octave Band Frequency Sound Power dB	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**	**LWA**
Discharge opening	81	78	80	68	69	69	64	52	76
Casing radiated	74	71	70	58	52	46	39	26	64

.11 FILTERS

.1 Each filter section shall be designed and constructed to house the specific type of filter indicated on the equipment schedule. Each filter section shall be provided with a universal filter frame designed to only receive standard sized filters' width and height only. The frame depth and side holding clips shall allow a variety of standard size filter thicknesses. The use of odd-sized filters is not permitted.

.2 Filters shall be mounted in filter manufacturer supplied frames. Reinforce filter bank as required. No air bypass around filter frames will be allowed. Provide access space for servicing all filters. Install filter slide rails and doors for side access where required. Install magnahelic gauges across each filter bank. Provide one magnahelic gauge across each filter when installed in common section. Wire to 120/1/60 power (Dwyer 3000 Series).

.3 Pre-filters shall be pleated disposable filters with minimum efficiency and area as scheduled. Each filter shall consist of non-woven synthetic media, support grid and frame. Filters shall be listed UL Class II. 4" pleated type with a rating of Merv 8

.4 Provide industry standard size filters only in all air handling equipment. Filters to comply with the requirements of ASHRAE Standard 52.1. With minimum MERV 13 rating.

.5 Allow for mid life filters use 0.65" APD as part of the internal static pressure.

.6 Provide space between filter banks for pressure sensing.

.7 Provide one complete spare set of filters.

.12 DAMPERS

.1 Damper frames and blades shall be a minimum 12 gauge extruded aluminum. Blades shall be single unit airfoil design 6" wide

.2 Frames shall be extruded aluminum channel with grooved inserts for vinyl seals. The standard frame shall be 2"x4"x5/8" on the linkage side, 1"x4"x1" on all other sides.

.3 Pivot rods shall be 7/8" hexagon extruded aluminum interlocking into the blade section. Bearings shall be designed to eliminate metal to metal contact. Bearings shall one of a double seal type with a Celcon inner bearing fixed to hexagon headed aluminum pivot rod rotating within Polycarbonate outer bearing inserted into the damper frame to prevent the outer bearing from rotating.

.4 Blade hardware and linkage shall be installed within the frame so as to not to be exposed to the air stream. All hardware shall be non-corrosive, reinforced cadmium plated steel

.5 Dampers are designed for minimum air leakage by means of overlapping seals

.6 Jackshaft assemblies are to be provided for multiple damper assemblies

.7 Damper blades shall be thermally insulated with injected polyurethane foam and shall contain thermal breaks along the blades to isolate the cold and warm sides of the damper

MIXING BOX

.1 Mixing boxes shall have parallel blade, interconnecting outside-air and return-air dampers. Damper blades shall be Ruskin CD-50 or equal. Arrange dampers to enhance mixing of air streams.

.2 Saw-cut ends of all damper shafts, aligned with blades, for positive visual indication of damper position.

.3 Damper shafts to be extended through unit casing for mounting of control actuators on exterior of unit. Provide rubber grommet at shaft penetration.

.4 Return air will shall be oriented from bottom of unit (custom plenum at base of unit) and outdoor air from top of unit.

.13 LIGHTS

.1 Fan, access and mixing sections to have marine style protected lights installed and wired by manufacturer, c/w extra long life 60 W. krypton bulbs or compact flourescent lamps of equivalent wattage.

.2 Switch and indicating light to be mounted at access door.

.3 Provide wiring for lights and other 120/1/60 components to a single point for connection by Division 16.

.14 FINISH

.1 The units shall be air dried finish - SW 2114 Gris Grey

.2 The finish shall be zero induction epoxy prime coat with a non-isocynate acrylic finish. The system shall be chemical curing to assure a hard, chemical resistant surface with strong color stability, UV resistance and gloss protection. Results for final paint thickness test results shall be submitted upon request

.15 ELECTRICAL:

.1 The air handling units are to be factory pre-wired as follows.

.2 The air handling units are to have the following electrical circuitry factory installed and routed in conduit to connection points at the base of the unit for connection by Division 16.

.1 3-phase power connection for supply fan

.2 Marine lights

.3 Single point power connection

.3 Starter and contactors provided. Conduit also to be provided within casing wall, terminating at exterior of casing to allow electrical Contractor to provide weatherproof installation of exterior mounted disconnect.
.4 Each compartment of the air handling units to have marine lights, protected with heavy gauge steel protective covers.
.5 The air handling unit is to have the following electrical circuitry factory installed and routed in conduit to connection points at the base of the unit for connection by Division 16.
.6 3-phase power connection for supply fan

.17 VARIABLE FREQUENCY DRIVE
.1 Supply and install inherent to air handling unit casing a variable frequency drive.
.2 Drive to be mounted against the unit. Drives to be enclosed in a NEMA 4 enclosure
.3 Motors shall be controlled by variable frequency drive with microprocessor and PWM adjustable frequency. VFD shall be complete with 3% impedance input reactor, PID setpoint controller, under-voltage relay. AND three contactor bypass OR electronic bypass. Outdoor units shall include an integral ventilated control panel recessed within the air handler casing. Access door construction shall be identical to air handler access doors. Control cabinet shall be vented to positive, treated (cooled) air and to negative return air using 1" diameter conduit
.4 Acceptable products: P1000 Series by Yaskawa. No other VFDs will be accepted.
.5 Include start-up of the VFD's by a factory-trained technician, with a complete start-up report submitted to the commissioning agent for approval. The report shall include input and output voltages and currents for each leg, transistor switching frequency, minimum and maximum speed setting, maximum amperage warning, alarm, and shut-down limits, DDC input vs drive output test, and all other drive set-up parameters.
.6 Provide a **2 year** manufacturer's warranty for the VFD's, beginning at the date of substantial completion, covering all defects of manufacture and installation. The warranty shall include parts, labour, travel costs and living expenses incurred to provide factory authorized representative on-site service. Supply one signed and dated copy of this manufacturer's warranty at substantial completion.
.7 Provide a light within each service section. Lights shall be in vapour proof enclosure with guard and a 25W compact fluorescent bulb. Wire lights to single switch mounted at 48" above the installed level of the equipment. Provide adjacent to the supply fan a GFI duplex service receptacle. Light and service receptacle to remain powered when the unit disconnect is open

3. EXECUTION
.1 ASSEMBLY
.1 Assemble unit with gaskets by bolting sections together to make single airtight unit.
.2 Upon completion of the air handler internal assembly, the fans shall be high potential tested for electrical connectivity. Power connection shall be connected to the motors by means of the VFD or junction box. Fans shall be verified for current draw, rotation direction, and RPM

.3 Install fan on seismic restraint vibration isolators to the standard specified in Sections 15160 and 15200 of this specification.

.4 Demonstrate water-tightness of unit prior to delivery to site.

.2 PERFORMANCE

.1 Refer to schedule in the Specifications.

.3 INSTALLATION

.1 Make ductwork, piping, and wiring connections to the unit in accordance with the drawings with sufficient space for equipment maintenance and repair.

.2 Install unit so that the required trap occurs above the floor. Provide trap primer.

.3 All on-site adjustments or additions to the unit shall be carried out in a manner similar to the unit construction to maintain air tightness.

.4 Install suspended unit with bracing or cable restraints to accommodate seismic loading.

.5 Install floor mounted unit welded to steel plate(s) imbedded in slab (or housekeeping pad) to accommodate seismic loading. Ensure housekeeping pad is securely attached to structure.

.6 Construct unit in sections to facilitate shipping and moving into place. Assemble sections on site as per manufacturer's recommendations.

.7 The air handling unit shall be assembled and installed to provide free, clear and unencumbered access to all components that require routine servicing. This includes all motors, bearings, dampers, damper actuators, coils, and control devices.

END OF SECTION

1. GENERAL

.1 SCOPE

.1 AHU-13

.1 Packaged rooftop Heat Recovery Ventilator serving the pool change rooms.

.2 Unit to be complete with heat pipe heat reclaim and gas fired back-up system

.3 Pool quality unit complete with epoxy coated corrosion resistant construction and herisite epoxy coated coils.

.2 Vibration isolation and seismic restraint.

.3 Controls

.4 Shop drawings.

.5 Unit must be delivered on site no later than August 22, 2014

.2 QUALITY ASSURANCE

.1 Unit and major components shall be product of manufacturers regularly engaged in production of such units who issues complete catalogue data on such products.

.2 Unit shall be factory built, and carry all necessary approvals. Coils shall be water tested and ARI certified. Fan shall be run and tested to performance. Test results shall be submitted for all scheduled criteria. Right is reserved to observe tests on 3 days notice.

.3 Equipment shall be manufactured in an ISO-9001-2008 accredited manufacturing facility.

.4 Fans shall conform to AMCA standards for sound and air performance. Airfoil fans shall bear AMCA certified rating seals. Fan sound ratings shall be AMCA rated and third party certified. Sound ratings, without third party verification are unacceptable.

.5 Coils shall have ARI 410 certification.

.6 The equipment casing shall be tested by an independent third party to ASTM E90-90 for transmission loss and ASTM C423-90A for sound absorption.

.7 All equipment shall be listed in accordance to the applicable UL requirements for custom air handlers and be labeled CSA, UL or ETL. Individual component listing is not acceptable.

.8 The equipment shall meet the scheduled performance for airflow rates, static pressure and sound value. Coil and filter face velocities scheduled are maximum and are not to be exceeded. The coil flow rates and pressure drops shall be within 10% of the specified values.

.9 The unit casing shall meet a leakage rate of 0.75% or less of the total airflow, on both positive and negative pressure sections at 10 "w.g.. The casing deflection shall be less than or equal to L/300 of the total span at the section operating pressure.

.10 Fan and drive bearings shall have a rating of L10-80K at design operating conditions in accordance with AMSI B3.15.

.11 Review project schedule and ensure that shop drawing review and unit delivery is compatible with project requirements. Allow a minimum of 3 weeks for shop drawing review process.

.12 Manufacturers shall provide construction methods to achieve sound data as specified and provide data obtained by either:

.1 AMCA lab simulation

.2 Test data of actual unit

.13 The manufacturer and local representative shall provide assistance to the mechanical contractor to ensure the assembly of the modules is as per the manufacturer's requirements and recommendations.

.14 Start up assistance shall also be part of the tender package, to ensure the controls are as per the manufacturers requirements and as per the tender documents.

.15 Provide an allowance for on-site factory reviews for the owner and the engineering consultant in order to the review the manufacturing construction process of the AHU's prior to final shop drawing approval and subsequence fabrication.

.3 SUBMITTALS

.1 The following is to be provided and failure to provide complete information will result in the submittal being returned without review. The supplier is responsible for highlighting any variances in the equipment submitted to that specified whether or not pre-approval has been obtained. The cost to review subsequent submissions will be charged to the party submitting.

.2 Unit dimensions, weights including center of gravity of all sections, and location of components. Equipment drawings shall show plan and elevation and be to scale. Indicate all required clearances for service of the equipment.

.3 Provide equipment material gauges, finishes, and construction details. Include all relevant technical information of components to be provided, including but not limited to, the information noted in the schedule of this specification.

.4 Fan performance curves with the operating condition clearly noted. All fan curves are to be corrected for elevation. Include fan sound power levels. Provide a static pressure summary clearly indicating internal and external pressures for the equipment. Submit fan curves and indicate pressures and air flows available at unit casing inlet and outlet for actual operating conditions.

.5 Provide equipment sound power levels at the inlet, discharge, and radiated. If the unit exceeds the scheduled power levels at the specified operating point, the manufacturer shall provide sound attenuators and meet the scheduled BHP.

.6 Provide manufacturer's coil selections to ARI 410 corrected for elevation. Clearly indicate materials of construction, fluid properties, and pressure drops.

.7 Provide filter information including: initial APD, recommended final APD, dust spot efficiency, MERV rating, media, and frame description.

.8 Provide motor ratings, enclosure type, electrical characteristics, and efficiencies.

.9 Provide requirements for power supply wiring including diagrams clearly indicating factory-installed and field-installed wiring.

.10 Submit each air handling unit on clearly legible drawings showing construction details and dimensions of entire unit and internal components, minimum size of 11" x 17" (280 x 431 mm).

.11 Number of tube rows, air and water pressure drops, and such features as cleanability, drainability, same or opposite end connections, support and venting of alternate manufacturer's coils shall be same as type specified.

.12 Provide noise data for unit inlet, unit outlet and casing radiation in accordance with AMCA.

.13 Shop drawings shall be submitted within 3 weeks of date of signing of contract.

.4 Operation and Maintenance Data

.1 The manufacturer shall submit both hard copy and an electronic copy of the operation and maintenance data for the equipment. The information shall include lubrication instructions, filter replacement, belt adjustment, motor maintenance, split attachment, spare parts list, and a wiring diagram.

.5 Delivery Storage and Handling

.1 The contractor shall store and protect the equipment under provisions of Division 1. The contractor shall store the products in a clean, dry place, protect them from the elements, and shall handle them carefully to avoid damage to enclosures, components, and finish.

.2 The manufacturer shall deliver the products to site on a factory base rail and encapsulated in a minimum 6 mil poly shrink wrap. If a unit is shipped in split sections, each section shall be individually wrapped. Sections shall be wrapped regardless of whether the unit is for indoor or outdoor use.

.3 The contractor shall follow rigging instructions provided by the manufacturer and shall use all lifting points provided on the channel base of the unit

2. PRODUCTS

.1 GENERAL

.1 Provide, where indicated on the drawings, packaged, indoor, heat recovery ventilator. Unit shall be capable of transferring mainly sensible energy as listed in equipment schedule. Packaged, heat recovery ventilator shall consist of ventilation air fan, exhaust air fan, necessary dampers, temperature sensors and microprocessor controls, air-to-air heat pipe exchanger, condensate drains and gas fired heating, all to be factory installed in unit. Unit is designed to be used as a stand-alone heat recovery ventilator. Unit shall have 1 year warranty on all parts not including heat pipe exchanger

.2 APPROVED MANUFACTURERS

.1 Engineered Air
.2 Reznor
.3 Governair

.3 CONSTRUCTION

.1 Unit base shall be constructed of structural perimeter channel iron frame with intermediate channel and angle iron supports. Provide 18 gauge steel floor with all seams continuously welded. Floor to have epoxy non-slip impregnated painted finish. Floors to be watertight with drains on both sides of coils. Provide lifting brackets on the unit section bases to accept cable or chain hooks.

.2 Walls and roof shall be constructed of double break design 18 Ga galvanized and painted steel panels with overlapped seams gasketed and caulked, not exceeding 610mm [24"]. All required holes in casing for controls, electrical, etc. shall have grommets. Seal all openings neatly and airtight. Site sealed openings shall be to a standard set by manufacturer.

.3 Insulate all unit with 50 mm rigid 48 Kg/cu.m density [2", 3 lb./cu.ft.] neoprene coated fibreglass insulation. All edges of insulation shall be covered with metal Z-bars. Provide 24 ga. galvanized steel perforated liner in all supply sections. Provide 22 ga. galvanized steel solid liner in all exhaust sections

.4 Doors shall be of insulated double wall construction and shall be sealed continuously using a double gasket arrangement with a neoprene knife edge seal and a 3/4 " automotive bulb seal fastened to the door frame. Door opening width to be 24" and height maximized to suit unit height. Where full door size is not possible, door width may be reduced only as necessary to not less than 18 " and to not less than the width needed for motor removal through the door. Door shall be provided with heavy duty Leverlock door securing handles. All access doors shall open against system pressure, wherever feasible. In the event unit size does not allow for in-swing doors on positive pressure compartments, provide a safety pressure relief latch and suitable labels

.5 Air handling units shall be weatherproofed and equipped for installation outdoors. This shall include generally for the prevention of infiltration of rain and snow into the unit, louvers or hoods on air intakes and exhaust openings with 1"(25mm) galvanized inlet screens; rain gutters or diverters over all access doors; all joints caulked with a water resistant sealant; roof joints turned up 2" (51mm) with three break interlocking design; outer wall panels extend a minimum of ¼"(6mm) below the floor panel; drain trap(s) connections for field supply and installation of drain traps. Units mounted on roof curbs incorporate welded floor to base construction. Floors are of three break upstanding design with welded corners and free of penetrations

.6 Provide 12" high seismic rated roof curb of minimum 14 GA. construction with tie-down points for unit to curb and curb to structure

.7 Fan shall be forward curved, backward inclined or air foil as scheduled, selected for the quietest operation at the scheduled performance conditions. Wheel to be double width, double inlet, multiblade type as produced by the unit manufacturer. Fan shall be equipped with self-aligning, antifriction bearings with an L-50 life of 200,000 hours. Fan performance shall be certified as complying with ARI Standard 430-89

.8 Fan and motor assembly shall be internally isolated from the unit casing with 25mm [1"] deflection spring isolators, furnished and installed by the unit manufacturer

.9 Motor shall be mounted integral to an isolated fan assembly furnished by the unit manufacturer. Motor shall be mounted inside the unit casing on a slide base to permit adjustment of drive belt tension. Drives shall be variable pitch, suitable for adjustment within ±5 percent of specified rpm. Motor shall be high efficiency T-frame, squirrel cage, totally enclosed fan cooled with size, type and electrical characteristics as shown on equipment schedule

.10 Heat pipe exchanger shall be QDT as manufactured by Engineered Air. Alternative heat pipe manufacturers shall provide at the Engineer's

request, samples of tubes with the internal wick before and after expansion of the tubes. Heat pipe exchanger shall have the following features

.1 Heat exchanger core shall be of 5/8" (16 mm) seamless aluminum tubing permanently expanded into fins. Each tube shall be an individually sealed heat pipe filled with a working fluid conforming to Group 1 in the American National Standard Safety Code for Mechanical Refrigeration. Tubes shall include flow separators whenever vapour and condensate streams interact limiting the heat transfer capacity of the pipe

.2 The secondary surface shall be continuous plate aluminum fins of corrugated design to produce maximum heat transfer efficiency. Spiral fins are not acceptable

.3 The capillary wick of each heat pipe shall be an integral part of the inner wall of the tube to provide a completely wetted surface for maximum heat pipe capacity, with minimum heat transfer resistance. Heat pipes manufactured without capillary wick or where the wick is not acceptable to the Engineer shall have a minimum of 20% additional rows than that shown in the schedule. Where additional rows are provided, the heat pipe shall be increased in face area to provide a pressure drop equal or less than that shown in the schedule.

.4 The supply air side of the TRU shall be equipped with opposed blade face and bypass dampers with accompanying linkage and operating controls to achieve frost prevention on the exhaust leaving side of the TRU during cold weather.

.5 Underneath heat pipe exchanger on the exhaust side, provide an insulated, double-wall, 304 stainless steel, sloped IAQ drain pan to allow for proper condensate removal

.11 Gas Fired Heating Section:

.1 The gas fired heating section shall be DJ series with a primary drum and multi-tube secondary heat exchanger. Heating sections shall be of titanium stainless steel and shall have high-low-off fire and CETL approved safety controls. Burner shall be blow through positive pressure type with direct spark ignition and solid state flame safety relay. Using duct type furnaces and closed coupled blowers are not acceptable.

.2 The heat exchanger/burner assembly shall include 15:1 turndown for all input ranges from 100MBH to 1400MBH (29.3 kW to 410 kW). The high turn down heat exchanger/burner assembly minimum input shall be capable of controlling 6.7% of its rated input, excluding the pilot assembly, without on/off cycling and include built in electronic linearization of fuel and combustion air. Efficiency shall increase from high to low fire

.3 Inlet dampers shall be TAMCO 1000 series Aluminum airfoil design or equivalent with metal compressible jamb seals and extruded vinyl blade edge seals on all blades. The dampers shall be rated for a maximum leakage rate of less than 1 percent of nominal airflow at 250 Pa. Blades shall rotate on stainless steel sleeve bearings. Dampers shall be arranged in opposed blade configuration, suitable for field mounting of actuators by the

temperature control contractor

.4 Provide 50mm thick Farr 30/30 pleated filter on exhaust side and supply side. Filter sections shall have filter racks, and access doors for filter removal and block-offs as required to prevent air bypass around filters. Filter area shall be as scheduled. Where not scheduled, they shall be designed and selected for a face velocity of less than 2.5m/sec. [500fpm]. Provide 0-250 Pa. [0-1"wg.] magnehelic gauge for each filter bank, complete with static pressure tappings and tubing. Mount in accordance with manufacturer's instructions. All filter media shall be replaced with new filter media upon turn over and acceptance of job. Provide 1 spare set of filters to Owner upon turn over

.5 Units shall be factory wired for single point power connection. Units shall be furnished with dead-front disconnect, motor starters with overload protection and auxiliary contact, H-O-A switch, transformer for 24 volt control circuit with fuse protection. Control enclosure will be NEMA 4 for outdoor application. The manufacturer shall label and number code all wiring and electrical devices in accordance with the unit electrical diagram. The unit shall be labelled and certified to CSA, UL, or NRTL. The manufacturer is to provide proof of this certification at time of submittal. Power supply will be provided under Specification Division 16 (Electrical)

.12 Provide secure attachment points for seismic anchors.

.4 DRAIN PANS

.1 Coil drain pans of 1.47 mm [16 ga] minimum stainless steel shall be recessed into the floor and shall be an integral part of the floor paneling, a minimum of 150 mm and 50 mm deep respectively with welded corners. Drain pans under each “wet” coil must extend upstream and downstream as required to ensure no carryover.

.2 The drain pan shall be sloped to outlet and outlet pipe bottom invert shall be below bottom of pan. The drain pan shall be provided with an interior 32 mm copper pipe drain piped to the outside of the unit.

.3 Provide drain pans under all coil banks (heating / heat recovery coils) to allow for cleaning. Cap all drain connections at exterior of unit for dry coils.

.4 Install drain ball valve c/w hose bibb connection and cap on all drain connections at exterior of unit for dry coils.

.5 Provide information to Contractor indicating minimum required exterior trap depths.

.15 ELECTRICAL:

.1 The air handling units are to be factory pre-wired as follows.

.2 The air handling units are to have the following electrical circuitry factory installed and routed in conduit to connection points at the base of the unit for connection by Division 16.

.1 3-phase power connection for supply fan

.2 Marine lights

.3 Single point power connection

.3 Starter and contactors provided. Conduit also to be provided within casing wall, terminating at exterior of casing to allow electrical Contractor to provide weatherproof installation of exterior mounted disconnect.

.4 Each compartment of the air handling units to have marine lights, protected with heavy gauge steel protective covers.

.5 The air handling unit is to have the following electrical circuitry factory installed and routed in conduit to connection points at the base of the unit for connection by Division 16.

.6 3-phase power connection for supply fan

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3. EXECUTION

.1 PERFORMANCE

.1 Refer to schedule in the Specifications.

END OF SECTION