



101 Hatrz Blvd, Broadway, VA 22815~ Phone 540-896-7182~ Fax 540-896-7185~Commercial, Industrial & Residential Installation & Service

LETTER OF TRANSMITTAL

TO:

Department of Administration
 Building 15
 2019 Washington Street, East
 Charleston WV 25305-0130

DATE: 08/05/2010	JOB NO
ATTN: Purchasing Division	
RE Buyer: 21 REQ # COR61454	

GENTLEMEN/LADIES:

WE ARE SENDING YOU

- Applications
- Copy of letter

- Attached
- Prints
- Change Order

- Via _____ the following items:
- Plans
- Submittals
- Specifications

COPIES	DATE	NO.	DESCRIPTION
1	08/05/10		Request for Bid, Completed – Signed - Notarized
1	08/05/10		Bonding Information

THESE ARE TRANSMITTED as checked below:

- For approval
- For your use
- As requested
- For review and comment
- FOR BIDS DUE
- Approved as submitted
- Approved as noted
- Returned for corrections
- RETURN OF ITEM
- Resubmit ___ copies for approval
- Submit ___ copies for distribution
- Return ___ corrected prints

REMARKS:

RECEIVED

2010 AUG -6 P 2:40

SIGNED: Brian Hitt, Estimator PURCHASING DIVISION
 STATE OF WV

If enclosures are not as noted, kindly notify us at once.



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 COR61462

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 KRISTA FERRELL
 304-558-2596

RFQ COPY
 TYPE NAME/ADDRESS HERE

Wage Scale

DIVISION OF CORRECTIONS
 MARTINSBURG CORRECTIONAL
 CENTER
 38 GRAPEVINE RD
 MARTINSBURG, WV
 25405

4115 Fax
 304-558-8045

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
07/12/2010				

BID OPENING DATE: 08/10/2010 BID OPENING TIME: 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	LS		031-06		37,950. ⁰⁰
<p>AIR CONDITIONING AND HEATING, CENTRAL UNITS</p> <p>THE WEST VIRGINIA PURCHASING DIVISION, FOR THE AGENCY, THE WEST VIRGINIA DIVISION OF CORRECTIONS, IS SOLICITING BIDS FROM RESPONSIBLE VENDORS TO PROVIDE AND INSTALL THREE (3) 7.5 TON ROOFTOP HVAC UNITS AND ONE (1) 5 TON HVAC UNIT PER THE ATTACHED SPECIFICATION</p> <p>MANDATORY PRE-BID A MANDATORY PRE-BID WILL BE HELD 07/27/2010 @ 1:30 PM AT MARTINSBURG CORRECTIONAL CENTER, 38 GRAPEVINE RD, MARTINSBURG, WV 25405, ALL INTERESTED PARTIES ARE REQUIRED TO ATTEND THIS MEETING. FAILURE TO ATTEND THE MANDATORY PRE-BID SHALL RESULT IN DISQUALIFICATION OF THE BID. NO ONE PERSON MAY REPRESENT MORE THAN ONE BIDDER.</p> <p>AN ATTENDANCE SHEET WILL BE MADE AVAILABLE FOR ALL POTENTIAL BIDDERS TO COMPLETE. THIS WILL SERVE AS THE OFFICIAL DOCUMENT VERIFYING ATTENDANCE AT THE MANDATORY PRE-BID. FAILURE TO PROVIDE YOUR COMPANY AND REPRESENTATIVE NAME ON THE ATTENDANCE SHEET WILL RESULT IN DISQUALIFICATION OF THE BID. THE STATE WILL NOT ACCEPT ANY OTHER DOCUMENTATION TO VERIFY ATTENDANCE. THE BIDDER IS RESPONSIBLE FOR ENSURING THEY HAVE COMPLETED THE INFORMATION REQUIRED ON THE ATTENDANCE SHEET. THE PURCHASING DIVISION AND THE STATE AGENCY WILL NOT ASSUME ANY RESPONSIBILITY FOR A BIDDER-S FAILURE TO COMPLETE THE PRE-BID ATTENDANCE SHEET. IN ADDITION, WE REQUEST THAT ALL POTENTIAL BIDDERS INCLUDE THEIR E-MAIL ADDRESS AND FAX NUMBER.</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *Brian Holt* TELEPHONE: 540-896-7182 DATE: 8/4/10

TITLE: *Proj Manager* FEIN: 54-1772958 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
 2. The State may accept or reject in part, or in whole, any bid.
 3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
 4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.
 5. Payment may only be made after the delivery and acceptance of goods or services.
 6. Interest may be paid for late payment in accordance with the *West Virginia Code*.
 7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
 8. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
 9. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
 10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.
 11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
 12. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
 13. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at www.state.wv.us/admin/purchase/vrc/hipaa.htm and is hereby made part of the agreement. Provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
 14. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
 15. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
 16. **ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.
- I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.
2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130
5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
COR61462

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ADDRESS CORRESPONDENCE TO ATTENTION OF
KRISTA FERRELL 804-558-2596

RFQ COPY
 TYPE NAME/ADDRESS HERE

DIVISION OF CORRECTIONS
 MARTINSBURG CORRECTIONAL
 CENTER
 38 GRAPEVINE RD
 MARTINSBURG, WV
 25405 304-558-8045

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
07/12/2010				

BID OPENING DATE: 08/10/2010 BID OPENING TIME: 01:30PM

LINE	QUANTITY	UQP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>ALL POTENTIAL BIDDERS ARE REQUESTED TO ARRIVE PRIOR TO THE STARTING TIME FOR THE PRE-BID. BIDDERS WHO ARRIVE LATE, BUT PRIOR TO THE DISMISSAL OF THE TECHNICAL PORTION OF THE PRE-BID WILL BE PERMITTED TO SIGN IN. BIDDERS WHO ARRIVE AFTER CONCLUSION OF THE TECHNICAL PORTION OF THE PRE-BID, BUT DURING ANY SUBSEQUENT PART OF THE PRE-BID WILL NOT BE PERMITTED TO SIGN THE ATTENDANCE SHEET.</p> <p>ALL TECHNICAL QUESTIONS MUST BE SUBMITTED IN WRITING TO KRISTA FERRELL IN THE WEST VIRGINIA PURCHASING DIVISIO VIA EMAIL AT KRISTA.S.FERRELL@WV.GOV OR VIA FAX AT 804-558-4115. DEADLINE FOR ALL TECHNICAL QUESTIONS IS 07/30/2010 AT CLOSE OF BUSINESS. ALL TECHNICAL TECHNICAL QUESTIONS WILL BE ADDRESSED BY ADDENDUM AFTER THE DEADLINE.</p> <p>EXHIBIT 5</p> <p>WEST VIRGINIA CODE 21-1D-5 PROVIDES THAT: ANY SOLICITATION FOR A PUBLIC IMPROVEMENT CONSTRUCTION CONTRACT REQUIRES EACH VENDOR THAT SUBMITS A BID FOR THE WORK T SUBMIT AT THE SAME TIME AN AFFIDAVIT OF COMPLIANCE WITH THE BID. THE ENCLOSED DRUG-FREE WORKPLACE AFFIDAVIT MUST BE SIGNED AND SUBMITTED WITH THE BID AS EVIDENCE OF THE VENDOR'S COMPLIANCE WITH THE PROVISIONS OF ARTI-CLE 1D, CHAPTER 21 OF THE WEST VIRGINIA CODE. FAILURE TO SUBMIT THE SIGNED DRUG-FREE WORKPLACE AFFIDAVIT WIT THE BID SHALL RESULT IN DISQUALIFICATION OF SUCH BID.</p> <p>NOTICE TO PROCEED: THIS CONTRACT IS TO BE PERFORMED WITHIN 45 CALENDAR DAYS AFTER THE NOTICE TO PROCEED IS RECEIVED. UNLESS OTHERWISE SPECIFIED, THE FULLY EXECUTED PURCHASE ORDER WILL BE CONSIDERED NOTICE TO</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TITLE	FEIN	TELEPHONE	DATE
<i>Brian Hitt</i>	<i>Proj. Manager</i>	54-1772958	540-896-7182	8/4/10

ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
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 Purchasing Division
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Request for Quotation

RFQ NUMBER
COR61462

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VENDOR

SHIP TO

DIVISION OF CORRECTIONS
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 CENTER
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 MARTINSBURG, WV
 25405 304-558-8045

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<p>PROCEED.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE MATERIALS OR WORKMANSHIP SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM WITH THE SPECIFICATIONS OF THE BID AND CONTRACT HERE IN.</p> <p>WAGE RATES: THE CONTRACTOR OR SUBCONTRACTOR SHALL PAY THE HIGHER OF THE U.S. DEPARTMENT OF LABOR MINIMUM WAGE RATES AS ESTABLISHED FOR BERKELEY COUNTY, PURSUANT TO WEST VIRGINIA CODE 21-5A, ET, SEQ. (PREVAILING WAGE RATES APPLY TO THIS PROJECT)</p> <p>ARBITRATION: ANY REFERENCES MADE TO ARBITRATION OR INTEREST FOR PAYMENTS DUE (EXCEPT FOR ANY INTEREST REQUIRED BY STATE LAW) CONTAINED IN THIS CONTRACT OR IN ANY AMERICAN INSTITUTE OF ARCHITECTS DOCUMENTS PERTAINING TO THIS CONTRACT ARE HEREBY DELETED.</p> <p>WORKERS' COMPENSATION: VENDOR IS REQUIRED TO PROVIDE A CERTIFICATE FROM WORKERS' COMPENSATION OF SUCCESSFUL</p> <p>ALL OF THE ITEMS CHECKED BELOW WILL BE A REQUIREMENT OF THIS CONTRACT:</p> <p>(XX) INSURANCE: SUCCESSFUL VENDOR SHALL FURNISH PROOF OF COMMERCIAL GENERAL LIABILITY INSURANCE PRIOR TO ISSUANCE OF CONTRACT. UNLESS OTHERWISE SPECIFIED IN THE BID DOCUMENTS, THE MINIMUM AMOUNT OF INSURANCE COVERAGE REQUIRED IS \$250,000.</p> <p>() BUILDERS RISK INSURANCE: SUCCESSFUL VENDOR SHALL FURNISH PROOF OF BUILDERS RISK - ALL RISK INSURANCE IN AN AMOUNT EQUAL TO 100% OF THE AMOUNT OF THE CONTRACT.</p>						

SIGNATURE <i>Brian Witt</i>		TELEPHONE 540-896-7182	DATE 8/14/10
TITLE <i>Proj. Manager</i>	FEIN 54-1772958	ADDRESS CHANGES TO BE NOTED ABOVE	

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<p>(XX) BONDS: FIVE PERCENT (5%) OF THE TOTAL AMOUNT OF THE BID PAYABLE TO THE STATE OF WEST VIRGINIA, SHALL BE SUBMITTED WITH EACH BID AS A BID BOND. THE SUCCESSFUL BIDDER SHALL ALSO FURNISH A PERFORMANCE BOND AND LABOR/MATERIAL BOND FOR 100% OF THE AMOUNT OF THE CONTRACT. BONDS MAY BE PROVIDED IN THE FORM OF A CERTIFIED CHECK, IRREVOCABLE LETTER OF CREDIT, OR BOND FURNISHED BY A SOLVENT SURETY COMPANY AUTHORIZED TO DO BUSINESS IN THE STATE OF WEST VIRGINIA. A LETTER OF CREDIT SUBMITTED IN LIEU OF A BOND WILL ONLY BE ALLOWED FOR PROJECTS UNDER \$100,000. PERSONAL OR BUSINESS CHECKS ARE NOT ACCEPCTABLE IN LIEU OF THE 5% BID BOND, PERFORMANCE BOND, OR LABOR AND MATERIAL BOND.</p> <p>() MAINTENANCE BOND: A TWO (2) YEAR MAINTENANCE BOND COVERING THE ROOFING SYSTEM WILL BE A REQUIREMENT OF THE SUCCESSFUL VENDOR.</p> <p>REV. 11/00</p> <p>EXHIBIT 7</p> <p>DOMESTIC ALUMINUM, GLASS & STEEL IN PUBLIC WORKS PROJECTS</p> <p>IN ACCORDANCE WITH WEST VIRGINIA CODE 5-19-1 ET. SEQ., EVERY CONTRACT FOR CONSTRUCTION, RECONSTRUCTION, ALTERATION, REPAIR, IMPROVEMENT OR MAINTENANCE OF PUBLIC WORKS WHERE THE COST IS MORE THAN \$50,000 AND, IN THE CASE OF STEEL ONLY, WHERE THE COST OF STEEL IS MORE THAN \$50,000 OR WHERE MORE THAN 10,000 POUNDS OF STEEL ARE REQUIRED, THE STATE WILL ACCEPT ONLY ALUMINUM, GLASS, OR STEEL PRODUCTS PRODUCED IN THE UNITED STATES. IN ADDITION, ITEMS OF MACHINERY OR EQUIPMENT PURCHASED</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Hill</i>	TELEPHONE 540-896-7182	DATE 8/11/10
TITLE <i>Proj. Manager</i>	FEIN 54-1772958	ADDRESS CHANGES TO BE NOTED ABOVE

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State of West Virginia
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ADDRESS CORRESPONDENCE TO ATTENTION OF
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PURCHASER

SHIP TO

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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
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<p>FOR USE AT THE SITE OF PUBLIC WORKS SHALL BE MADE OF DOMESTIC ALUMINUM, GLASS OR STEEL, UNLESS THE COST OF THE PRODUCT IS LESS THAN \$50,000 OR LESS THAN 10,000 POUNDS OF STEEL ARE USED IN PUBLIC WORKS PROJECTS.</p> <p>FOREIGN MADE ALUMINUM, GLASS OR STEEL PRODUCTS MAY BE ACCEPTED ONLY IF THE COST OF DOMESTIC PRODUCTS IS FOUND TO BE UNREASONABLE. SUCH COST IS UNREASONABLE IF IT IS 20% OR MORE HIGHER THAN THE BID PRICE FOR FOREIGN MADE PRODUCTS. IF THE DOMESTIC ALUMINUM, GLASS OR STEEL PRODUCTS TO BE SUPPLIED OR PRODUCED IN A "SUBSTANTIAL LABOR SURPLUS AREA", AS DEFINED BY THE UNITED STATES DEPARTMENT OF LABOR, FOREIGN PRODUCTS MAY BE SUPPLIED ONLY IF DOMESTIC PRODUCTS ARE 30% OR MORE HIGHER IN PRICE THAN THE FOREIGN MADE PRODUCTS.</p> <p>IF, PRIOR TO THE AWARD OF A CONTRACT UNDER THE ABOVE PROVISIONS, THE SPENDING OFFICER OF THE SPENDING UNIT DETERMINES THAT THERE EXISTS A BID FOR LIKE FOREIGN ALUMINUM, GLASS OR STEEL THAT IS REASONABLE AND LOWER THAN THE LOWEST BID DOMESTIC PRODUCTS, THE SPENDING OFFICE MAY REQUEST, IN WRITING, A REEVALUATION AND REDUCTION IN THE LOWEST BID FOR SUCH DOMESTIC PRODUCTS. ALL VENDORS MUST INDICATE IN THEIR BID IF THEY ARE SUPPLYING FOREIGN ALUMINUM, GLASS OR STEEL.</p> <p>REV. 3/88</p> <p>EXHIBIT 9</p> <p>NOTICE FOR ISSUANCE & ACKNOWLEDGEMENT OF CONSTRUCTION PROJECT ADDENDA</p> <p>THE ARCHITECT/ENGINEER AND/OR AGENCY SHALL BE REQUIRED TO ABIDE BY THE FOLLOWING SCHEDULE IN ISSUING</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Witt</i>	TELEPHONE 540-826-7182	DATE 8/4/10
TITLE <i>Proj. Manager</i>	FEIN 54-1772958	ADDRESS CHANGES TO BE NOTED ABOVE

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ADDRESS CORRESPONDENCE TO ATTENTION OF
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VENDOR

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BID OPENING DATE: **08/10/2010** BID OPENING TIME **01:30PM**

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<p>CONSTRUCTION PROJECT ADDENDA FOR STATE AGENCIES:</p> <p>(1) THE ARCHITECT/ENGINEER SHALL PREPARE THE ADDENDUM AND A LIST OF ALL PARTIES THAT HAVE PROCURED DRAWINGS AND SPECIFICATIONS FOR THE PROJECT. THE ADDENDUM AND LIST SHALL BE FORWARDED TO THE BUYER IN THE STATE PURCHASING DIVISION. THE ARCHITECT/ENGINEER SHALL ALSO SEND A COPY OF THE ADDENDUM TO THE STATE AGENCY FOR WHICH THE CONTRACT IS ISSUED.</p> <p>(2) THE BUYER SHALL SEND THE ADDENDUM TO ALL INTERESTED PARTIES AND IF NECESSARY, EXTEND THE BID OPENING DATE. ANY ADDENDUM SHOULD BE RECEIVED BY THE BUYER WITHIN FOURTEEN (14) DAYS PRIOR TO THE BID OPENING DATE.</p> <p>(3) ALL ADDENDA SHOULD BE FORMALLY ACKNOWLEDGED BY ALL BIDDERS AND SUBMITTED TO THE STATE PURCHASING DIVISION. THE SAME RULES AND REGULATIONS THAT APPLY TO THE ORIGINAL BIDDING DOCUMENT SHALL ALSO APPLY TO AN ADDENDUM DOCUMENT. THE ONLY EXCEPTION MAY BE FOR AN ADDENDUM THAT IS ISSUED FOR THE SOLE PURPOSE OF CHANGING A BID OPENING TIME AND/OR DATE.</p> <p>REV. 11/96</p> <p>EXHIBIT 10</p> <p>ADDENDUM ACKNOWLEDGEMENT</p> <p>I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Hitt</i>	TELEPHONE <i>540-896-7182</i>	DATE <i>8/4/10</i>
TITLE <i>Proj Manager</i>	FEIN <i>54-1772958</i>	ADDRESS CHANGES TO BE NOTED ABOVE

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ADDENDUM NOS. :						
NO. 1		NA				
NO. 2		NA				
NO. 3		NA				
NO. 4		NA				
NO. 5		NA				
I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF THE BIDS.						
VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.						
<i>Brian Hitt</i>				SIGNATURE		
Air Quality Systems, Inc.				COMPANY		
8/4/10				DATE		
REV. 11/96						
CONTRACTORS LICENSE						
WEST VIRGINIA STATE CODE 21-11-2 REQUIRES THAT ALL PERSONS DESIRING TO PERFORM CONTRACTING WORK IN THIS						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Hitt</i>	TELEPHONE 540-826-7182	DATE 8/4/10
TITLE <i>Proj. Manager</i>	FEIN 54-1772958	ADDRESS CHANGES TO BE NOTED ABOVE

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<p>STATE MUST BE LICENSED. THE WEST VIRGINIA CONTRACTORS LICENSING BOARD IS EMPOWERED TO ISSUE THE CONTRACTORS LICENSE. APPLICATIONS FOR A CONTRACTORS LICENSE MAY BE MADE BY CONTACTING THE WEST VIRGINIA DIVISION OF LABOR CAPITOL COMPLEX, BUILDING 3, ROOM 319, CHARLESTON, WV 25305. TELEPHONE: (304) 558-7890.</p> <p>WEST VIRGINIA STATE CODE '21-11-11 REQUIRES ANY PROSPECTIVE BIDDER TO INCLUDE THE CONTRACTORS LICENSE NUMBER ON THEIR BID.</p> <p>BIDDER TO COMPLETE: CONTRACTORS NAME: ... <i>Air Quality Systems Inc.</i> CONTRACTORS LICENSE NO.: <i>WV030311</i></p> <p>THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FURNISH A COPY OF THEIR CONTRACTORS LICENSE PRIOR TO ISSUANCE OF A PURCHASE ORDER/CONTRACT</p> <p>APPLICABLE LAW</p> <p>THE WEST VIRGINIA STATE CODE, PURCHASING DIVISION RULE AND REGULATIONS, AND THE INFORMATION PROVIDED IN THE "REQUEST FOR QUOTATION" ISSUED BY THE PURCHASING DIVISION IS THE SOLE AUTHORITY GOVERNING THIS PROCUREMENT.</p> <p>ANY INFORMATION PROVIDED IN SPECIFICATION MANUALS, OR ANY OTHER SOURCE, VERBAL OR WRITTEN, WHICH CONTRADICTS OR ALTERS THE INFORMATION PROVIDED FROM THE SOURCES AS DESCRIBED IN THE ABOVE PARAGRAPH IS VOID AND OF NO EFFECT.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Hill</i>	TELEPHONE <i>540-896-2182</i>	DATE <i>8/4/10</i>
TITLE <i>Proj. Manager</i>	FEIN <i>54-1772958</i>	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 COR61462

PAGE
 9

ADDRESS CORRESPONDENCE TO ATTENTION OF
 KRISTA FERRELL
 304-558-2596

RFQ COPY
 TYPE NAME/ADDRESS HERE

VENDOR

SHIP TO

DIVISION OF CORRECTIONS
 MARTINSBURG CORRECTIONAL
 CENTER
 38 GRAPEVINE RD
 MARTINSBURG, WV
 25405 304-558-8045

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
07/12/2010				

BID OPENING DATE: 08/10/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>FOR BANKRUPTCY PROTECTION, THE STATE MAY DEEM THE CONTRACT NULL AND VOID, AND TERMINATE SUCH CONTRACT WITHOUT FURTHER ORDER.</p> <p>REV. 5/2009</p> <p style="text-align: center;">NOTICE</p> <p>A SIGNED BID MUST BE SUBMITTED TO:</p> <p style="text-align: center;">DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:</p> <p>SEALED BID</p> <p>BUYER: 21</p> <p>REQ. NO.: COR61454</p> <p>BID OPENING DATE: 08/10/2010</p> <p>BID OPENING TIME: 1:30 PM</p> <p>PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:</p> <p style="text-align: right;">Fax 540-886-7185</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Hill</i>	TELEPHONE 540-886-7182	DATE 8/4/10
TITLE <i>Proj. Manager</i>	FERN 54-1772958	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
COR61462

PAGE
10

ADDRESS CORRESPONDENCE TO ATTENTION FOR
**KRISTA FERRELL
 304-558-2596**

RFQ COPY
 TYPE NAME/ADDRESS HERE

**DIVISION OF CORRECTIONS
 MARTINSBURG CORRECTIONAL
 CENTER
 38 GRAPEVINE RD
 MARTINSBURG, WV
 25405 304-558-8045**

DATE PRINTED 07/12/2010	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
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BID OPENING DATE: **08/10/2010** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
PLEASE PRINT OR TYPE NAME OF PERSON TO CONTACT CONCERNING THIS QUOTE: <i>Brian Hitt 540-896-7182</i>						
***** THIS IS THE END OF RFQ COR61462 ***** TOTAL:						<i>37,950.⁰⁰</i>

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Brian Hitt</i>	TELEPHONE <i>540-896-7182</i>	DATE <i>8/4/10</i>
TITLE <i>Proj. Manager</i>	FBN <i>54-1772958</i>	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

RFQ#: COR61462
Specifications

To provide all labor, materials, equipment and all incidentals necessary to furnish and install (4) Rooftop HVAC units and roof curb adapters as specified herein.

Specifications:

Replace the existing Carrier 7.5 ton rooftop HVAC units #1, #2, and #5 with new units. (3) total. York brand or equal. Must include: ~~economizer~~, roof curb adapter, recovery of refrigerant from old units, disposal of old units, reconnection of electrical, gas, and drain lines.

Manual air Damper

Replace the Carrier 5 ton Rooftop HVAC unit #2 with new unit. (1) total. York brand or equal. Must include: manual damper, roof curb adapter, recovery of refrigerant from old unit, disposal of old unit, reconnection of electrical, gas, and drain lines.

REQUEST FOR QUOTATION-COR61462

I. GENERAL INFORMATION: "Will", "must", and "shall" listed herein this document denotes a mandatory requirement.

- 1.1 Request for Quotation to provide all labor, materials, equipment and anything incidental necessary to furnish and install rooftop HVAC units and roof curb adapters as specified at Martinsburg Correctional Center, 38 Grapevine Rd., Martinsburg WV 25405.
- 1.2 All work will be in compliance with the Fire Marshall regulations and all other building codes and industry standards. Final payment will be withheld if installed components are not in compliance, or any portion of this overall project is not 100% complete. The award will be made to the overall low bid that complies with the specifications.

2. BIDDER REQUIREMENTS:

- 2.1 All qualified bidders, being familiar with and understanding the bidding documents and also having examined the site and being familiar with all local conditions affecting the project hereby propose to furnish all labor, material, equipment, supplies and to perform all work in accordance with the bidding documents within the time set forth below.
- 2.2 It is the bidder's responsibility to verify all field conditions and limitations prior to bidding. It is also the bidder's responsibility to notify the West Virginia Division of Corrections, Martinsburg Correctional Center in writing, of conditions detrimental to proper and timely completion of the repair/upgrade. Do not proceed until nonconforming conditions have been corrected.

3. SCOPE OF WORK:

- 3.1 Minor deviations from the stated specifications not listed as mandatory (must, shall, or will) are acceptable to facilitate a competitive bid atmosphere, provided the intent of the Request for Quotation, the effectiveness of the system or the product manufacturer's warranty is not compromised.
- 3.2 Contractor shall furnish and install three (3) 7.5 ton and one (1) 5 ton rooftop units and curb adapters.
- ~~3.3~~ Contractor shall roof in curbs and make water tight.
- 3.4 Contractor shall furnish and install necessary electrical and gas piping connections. Contractor shall disconnect electric, gas and drain lines from old units. Contractor will be responsible for recovery of refrigerant from old units and disposal of old units.
- ~~3.5~~ Contractor shall separate duct system from existing unit and install dampers in existing unit to control air distribution. The damper is manual and back draft. The duct size that the damper will go into is 14" by 30".

4. INSPECTION:

- 4.1 Contractor shall inspect existing conditions governing this work during pre-bid site inspection to determine conditions and extent of work required. No allowance will be made subsequently on behalf of the contractor for any error or negligence on his part in connection with this requirement.
- 4.2 The Contractor shall inspect all elements subject to movement or damage prior to commencing work.

6. TEMPORARY FACILITIES:

- 6.1 The Owner will provide normal electrical supply from the currently installed electrical system in the building for the use of the contractor. However, the Owner provides no guarantee or warranty as to the systems condition or capabilities. The Contractor shall assure himself that the electrical system is adequate for his requirements or supply additional temporary electrical power at his own expense.
- 6.2 Any damage to the electrical system resulting from misuse or abuse to the existing electrical system shall be repaired or replaced by the contractor at no expense to the owner.

7. COORDINATION OF WORK:

- 7.1 The Contractor shall provide submittal data showing detailed drawings of the units that they will be providing, to ensure that it meets all requested specifications.
- 7.2 The Contractor shall coordinate with the Maintenance Supervisor for the proper relation of the work to the building structure and to the employees therein. In the event of conflict the Project Manager shall prevail.
- 7.3 The Contractor shall take all necessary precautions to protect the interior of the building from debris, dust or any residue occurring from the scope of work.
- 7.4 The Contractor shall provide the Owner with a schedule of work seven calendar days prior to the start of the work. The Owner shall be notified of any variances to the work schedule two (2) working days prior to the change.

8. WARRANTY: (GUARANTEE)

- 8.1 The Vendor must provide a minimum ten (10) year warranty on heat exchanger and a five (5) year warranty on compressors ~~and motors~~ and a minimum of a one (1) year warranty on all other materials and equipment and labor. All material will be new, and all work will be of good quality, free from faults and defects in conformance with the contract documents. All work not conforming to these requirements may be considered defective.
- 8.2 All materials and equipment shall be of current year production of manufacturer and manufactured for commercial usage.

9. PERMITS:

- 9.1 The Contractor shall secure and pay for the building permit and for all other permits, governmental fees and licenses which are necessary for the proper execution and completion of the work as specified.

10. CLEAN UP:

- 10.1 The Contractor shall keep the work area as clean as possible during the entire progress of work, and shall be responsible to remove from the site, the packaging materials from his products and other debris as it accumulates. All items of equipment that are removed to allow the installation of new items will become the property of the contractor to dispose of at a landfill or location authorized to accept the items as waste or recycled parts.

11. PAYMENT SCHEDULE:

- 11.1 One payment will be permitted, at 100% completion as determined by the Owner.
- 11.2 The Owner reserves the right to refuse payment in the event the completed work is not in accordance with industry standards or sub-standard in any way, or, if the amount requested is not within the agreed upon terms of the contract.

12. TERM OF WORK:

- 12.1 All work shall be complete within 45 calendar days upon receipt of Notice to Proceed.

13. SAFETY EQUIPMENT:

- 13.1 The Contractor shall provide safety barriers around work areas where heavy equipment may be in operation when placing materials in the building or as required by OSHA.

14. DAMAGES:

- 14.1 Any damages occurring to the building or property resulting from the contractor's performance of this work shall be the responsibility of the contractor to repair at his expense, either by using his own forces or that of an approved sub-contractor. The repair method and finished product will be subject to the approval of the owner.

15. PRE-BID MEETING

- 15.1 There will be a pre-bid meeting at the Martinsburg Correctional Center on July 27 at 1.30 pm. If you have any questions please contact Jo Anne Hume at 304-267-0156.



SUBMITTAL

Project

Martinsburg Correctional Facility

Date

July 30, 2010

Mechanical Contractor

Air Quality Systems Inc.

Unit Feature Sheet for RTU-1-2-5

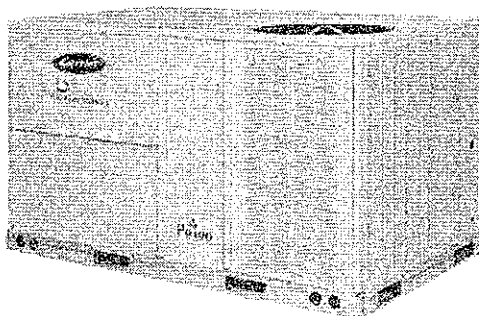
Project: ~Untitled32
Prepared By:

07/30/2010
01:05PM



WeatherMaker® – 48TC

PACKAGED ROOFTOP GAS HEATING/ELECTRIC COOLING UNITS
3, 4, 5, 6, 7.5, 8.5, 10, 12.5 TONS



Optional Louvered Rail Guard Shown



WEATHERMAKER SERIES

WeatherMaker (48TC) units are one-piece gas heating, electric cooling units that are pre-wired and charged with Puron (R-410A) refrigerant. They are factory tested in both heating and cooling modes, and rated in accordance with ARI Standards 210 (04-06 sizes) and 360 (07-14 sizes). WeatherMaker units are designed in accordance with UL Standard 1995, and listed by the Underwriters' Laboratories.

Approved and certified by:



Sizes 04-06



Sizes 07-14

Certified to ISO 9001:2000

STANDARD FEATURES INCLUDE:

- Puron (R-410A) HFC refrigerant
- ASHRAE 90.1 compliant and Energy Star qualified
- Scroll compressors with internal line break and overload protection
- Single-stage cooling capacity control on 04-12 models
- Two-stage cooling capacity control on 08-14 models
- SEER's up to 13.0, EER's up to 11.1 and ISEER's up to 11.3
- Acculink™ refrigerant metering system
- Exclusive non-corrosive composite condensate pan in accordance with ASHRAE Standard 62, sloping design, side or center drain
- Standard cooling operation up to 115°F (46°C) and down to 40°F (4°C) - down to 28° F (-4° C) with winter start kit.
- Pre-painted exterior panels and primer-coated interior panels tested to 500 hours salt spray protection
- Fully insulated cabinet
- Exclusive IGC solid-state control for on-board diagnostics with LED error code designation burner control logic and energy saving indoor fan motor delay
- Low NOx models that meet California Air Quality Management
- Induced draft gas heat combustion design
- Redundant gas valves with up to two stages of heating
- Low pressure and high pressure switch protected.

MAINTENANCE FEATURES:

- Access panels with easy grip handles
- Innovative easy starting, no-slip screws on unit access panels
- Two-inch disposable return air filters and Tool-less filter access door
- Belt drive evaporator-fan motor and pulley combinations
- New terminal board facilitating simple safety circuit troubleshooting and simplified control box arrangement
- Exclusive IGC solid-state control for on-board diagnostics with LED error code designation, burner control logic and energy saving indoor fan motor delay.

INSTALLATION FEATURES:

- Thru-the-bottom power entry capability
- Single point gas and electric connections
- Full perimeter base rail with built-in rigging adapters and fork slots
- Convertible from vertical to horizontal airflow for slab mounting

STANDARD WARRANTY:

- 10-year heat exchanger - 15-year stainless steel option
- 5-year compressor
- 1-year parts
- 3-year parts on Novation Condenser coils - where available
- Many optional upgrades also available

OPTIONS INCLUDE BUT ARE NOT LIMITED TO:

- PremierLink™ and Multi Protocol Direct Digital Controls (DDC)
- Supply and Return Air Smoke Detectors, high static motors
- Louvered condenser coil guards
- Economizer, disconnect and convenience outlet options
- Stainless Steel heat exchanger option
- Corrosion resistant coil coating
- Exclusive Humid-Mizer® adaptive dehumidification system available on all sizes - Motor Master I controller included

For a complete list of options and accessories refer to the Product Data Catalog for this unit.

Unit Report For RTU-1-2-5

Project: ~Untitled32
 Prepared By:

07/30/2010
 01:06PM

Unit Parameters

Unit Model: 48TCED09A2A5-0A0A0
 Unit Size: 09 (8.5 Tons)
 Voits-Phase-Hertz: 208-3-60
 Heating Type: Gas
 Duct Cfg: Vertical Supply / Vertical Return
 Heating Capacity:
 Medium Heat

Dimensions (ft. in.) & Weight (lb.) ***

Unit Length: 7' 4.125"
 Unit Width: 4' 11.5"
 Unit Height: 4' 1.375"
 Base Unit Weight: 930 lb

*** Weights and Dimensions are approximate. Weight does not include roof curbs, unit packaging, field installed accessories or factory installed options. Approximate dimensions are provided primarily for shipping purposes. For exact dimensions and weights, refer to appropriate product data catalog.

Unit Configuration

Medium Static Option
 Al/Cu - Al/Cu
 Electro-mechanical controls
 Standard Packaging

Warranty Information

No standard warranties.

No optional warranties were selected.

NOTE: Please see Warranty Catalog 500-089 for explanation of policies and ordering methods.

Ordering Information

Part Number	Description	Quantity
48TCED09A2A5-0A0A0	Rooftop Unit	3
	Base Unit	
	Medium Static Option	
	Al/Cu - Al/Cu	
	Electro-mechanical controls	
	Standard Packaging	
	Accessories	
CRMANDPR002A03	25% Open Manual Outdoor Air Damper Package	3
33CS400-01	Debonair 400 Slimline - Non-Programmable Thermostat	3

Performance Summary For RTU-1-2-5

Project: ~Untitled32
 Prepared By:

07/30/2010
 01:06PM

Part Number:48TCED09A2A5-0A0A0

ARI EER:	11.00	
IEER:	11.7	
Base Unit Weight:	930	lb
Base Unit Dimensions		
Unit Length:	88.1	in
Unit Width:	59.5	in
Unit Height:	49.4	in
Unit Voltage-Phase-Hertz:	208-3-60	
Air Discharge:	Vertical	
Fan Drive Type:	Belt	
Actual Airflow:	3000	CFM
Site Altitude:	0	ft

Cooling Performance

Condenser Entering Air DB:	95.0	F
Evaporator Entering Air DB:	80.0	F
Evaporator Entering Air WB:	67.0	F
Entering Air Enthalpy:	31.44	BTU/lb
Evaporator Leaving Air DB:	56.4	F
Evaporator Leaving Air WB:	56.1	F
Evaporator Leaving Air Enthalpy:	23.83	BTU/lb
Gross Cooling Capacity:	102.75	MBH
Gross Sensible Capacity:	76.33	MBH
Compressor Power Input:	7.30	kW
Coil Bypass Factor:	0.000	

Heating Performance

Heating Airflow:	3000	CFM
Entering Air Temp:	70.0	F
Leaving Air Temp:	115.6	F
Gas Input Capacity:	120.0 / 180.0	MBH
Gas Heating Capacity:	147.60	MBH
Temperature Rise:	45.6	F
NOTE:	Second Stage	

Supply Fan

External Static Pressure:	0.50	in wg
Fan RPM:	689	
Fan Power:	1.01	BHP
NOTE:	Standard Static Fan Option	

Electrical Data

Minimum Voltage:	187
Maximum Voltage:	253
Compressor #1 LRA:	98
Compressor #2 RLA:	13.7
Compressor #2 LRA:	33
Compressor #A1 RLA:	14.5
Outdoor Fan Motor Qty:	2
Outdoor Fan FLA (ea):	1.5
Indoor Fan Motor Type:	MED
Indoor Fan Motor FLA:	5.2
Combustion Fan Motor FLA (ea):	0.48
Power Supply MCA:	40
Power Supply MOCP (Fuse or HACR):	50
Min. Unit Disconnect FLA:	42

Performance Summary For RTU-1-2-5

Project: ~Untitled32
 Prepared By:

07/30/2010
 01:06PM

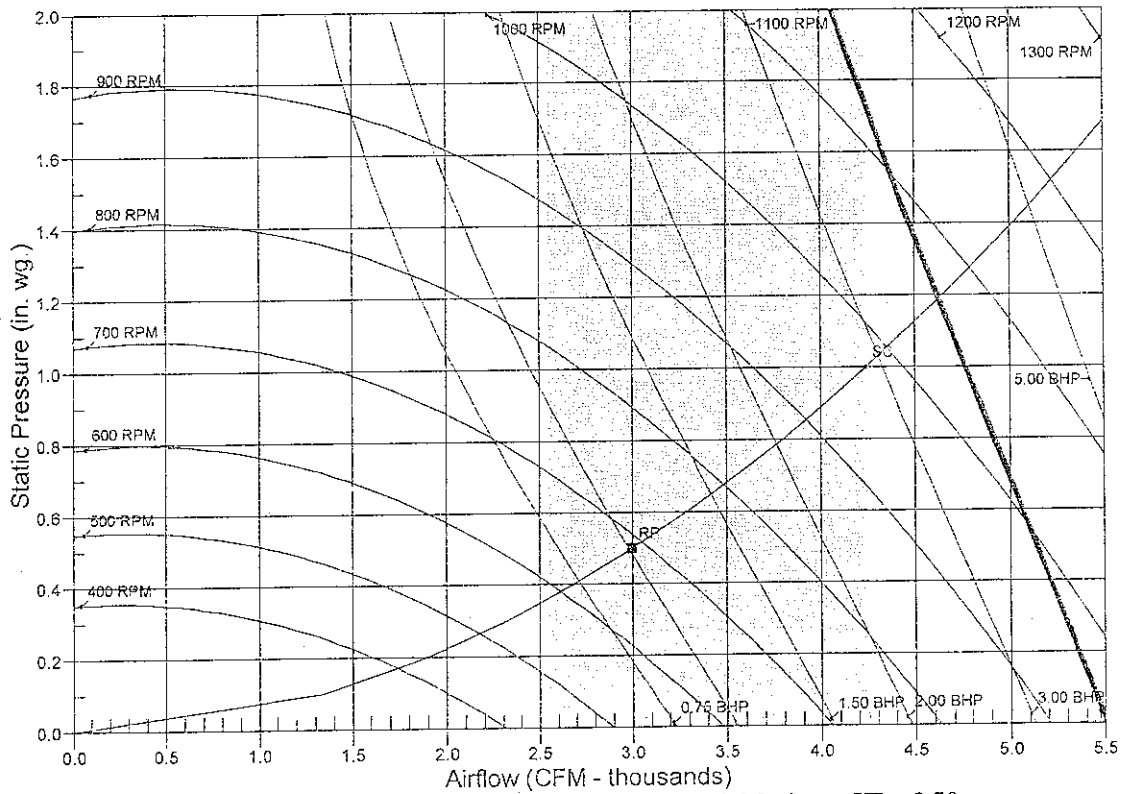
Min. Unit Disconnect LRA: 219
 Electrical Convenience Outlet: None

Acoustics

Sound Power Levels, db re 10E-12 Watts

	Discharge	Inlet	Outdoor
63 Hz	96.1	93.4	91.2
125 Hz	90.3	83.2	86.4
250 Hz	74.3	66.3	81.9
500 Hz	68.3	63.2	81.0
1000 Hz	63.0	60.6	78.3
2000 Hz	60.9	55.7	73.9
4000 Hz	63.9	54.7	71.4
8000 Hz	63.6	54.2	67.3
A-Weighted	77.1	71.5	83.0

Fan Curve



RPM = 689 BHP = 1.01 Maximum RPM = 936 Maximum HP = 3.70

Note: Please contact application engineering for selections outside the shaded region.
 SC - System Curve RP - Rated Point

Certified Drawing for RTU-1-2-5

Project: -Untitled32
Prepared By:

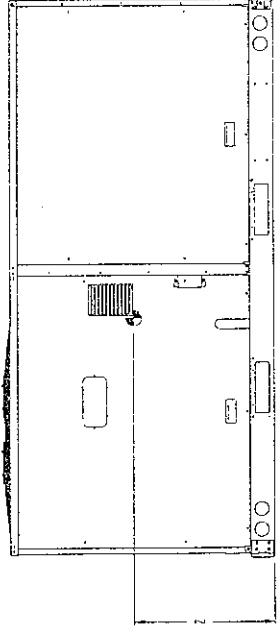
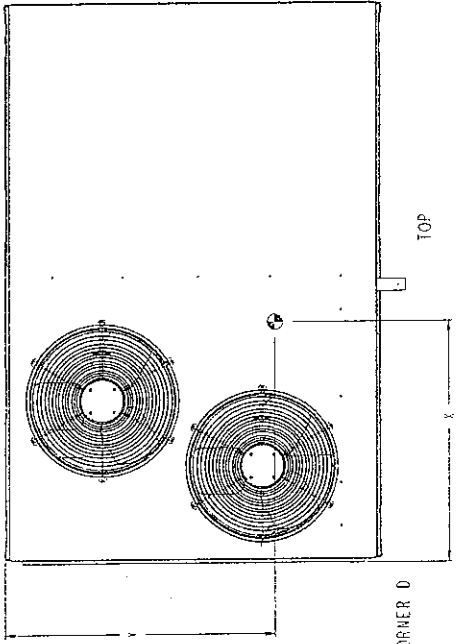
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UNITED TECHNOLOGIES STRAINE, IN CORP. (1927)
P.O. BOX 406
GARDNER, MA 01450

UNIT	OUTDOOR COIL TYPE	CORNER (A)			CORNER (B)			CORNER (C)			CORNER (D)			C.G.							
		WGT. KG.	WGT. LBS.	WGT. KG.	WGT. LBS.	WGT. KG.	WGT. LBS.	WGT. KG.	WGT. LBS.	WGT. KG.	WGT. LBS.	X	Y	Z							
48TC-006	RTPF	160	354	119	81	156	72	203	85	238	107	41	172	110	341	33	778	1560	20	172	1521
48TC-009	RTPF	560	1234	212	98	183	83	243	110	252	122	40	70	110	331	40	1684	1860	23	176	1587
48TC-012	RTPF	930	2062	216	98	196	89	241	112	272	123	42	106	167	33	1708	1841	24	176	1611	
48TC-008	RTPF	835	1859	164	74	170	77	235	105	246	111	44	78	116	32	1708	1835	19	176	1591	
48TC-017	RTPF	930	2062	226	103	187	85	232	105	263	126	39	374	110	33	1708	1835	18	176	1591	
48TC-004	MCIX	540	1192	231	104	189	85	234	106	266	128	48	109	160	33	1838	1921	16	172	1579	
48TC-012	MCIX	855	1876	185	84	176	79	240	109	269	118	43	110	160	35	172	1502	22	176	1581	

*** STANDARD UNIT WEIGHT IS WITH LOW GAS HEAT AND WITHOUT PACKAGING. FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.

CORNER A CORNER B CORNER C CORNER D



FRONT

UNIT	48TMS00985
DATE	03-08-10
SHEET	2 OF 2
DATE	11-24-08
SERVICES	48TC 08-12 SINGLE ZONE ELECTRICAL COOLING WITH GAS HEAT

NEW UNITS

CARRIER:

48/50 GJ, HJ, TF, TJ 008-014

BRYANT:

548C, 551A, B 558C, D 580C, D
 581A, B 090-150

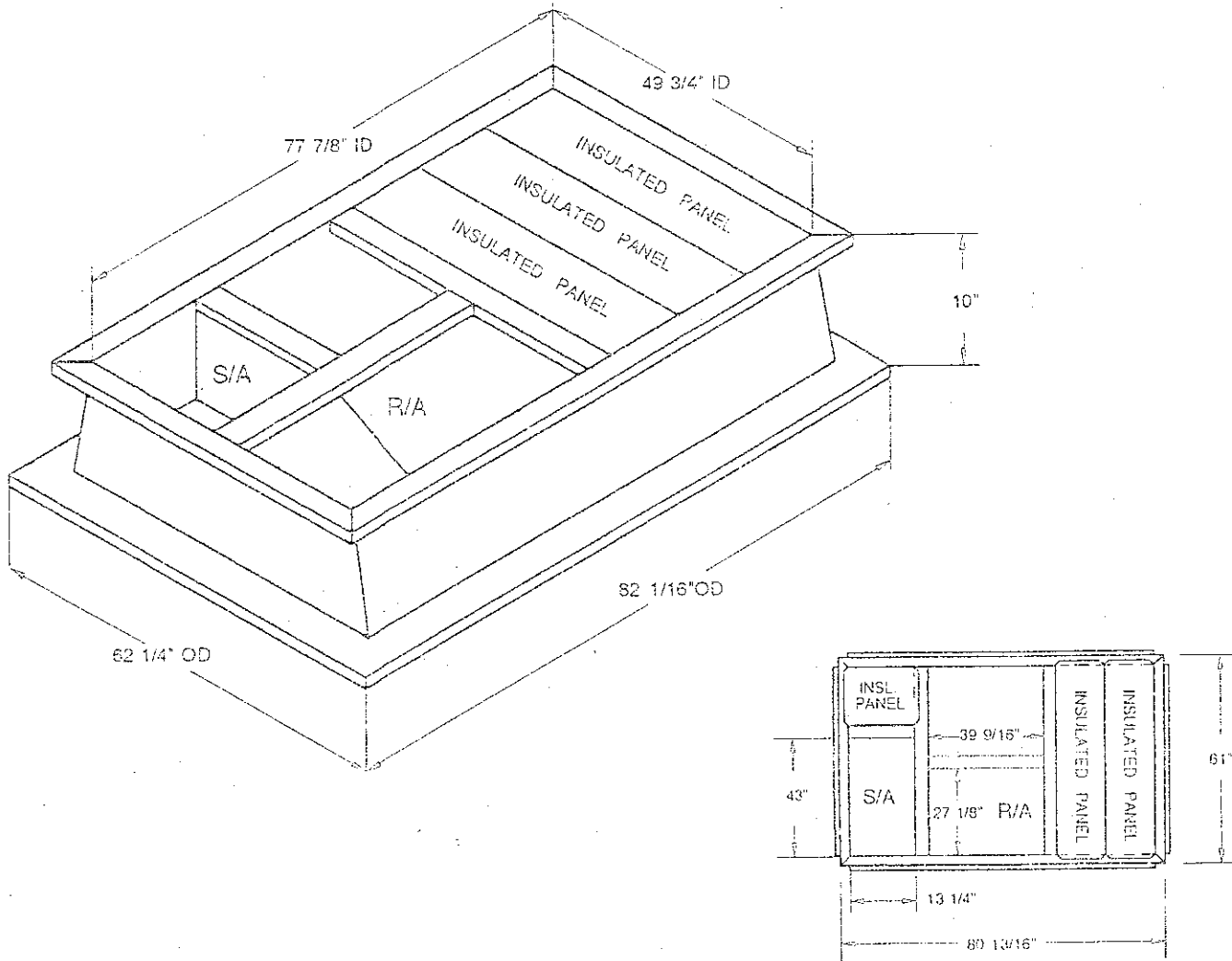
EXISTING UNITS

BRYANT: 579D 090;

CARRIER: 48 HD 008, 009;
 48 HV 006, 008;
 48 LD, LV, HDD, LDD 008

FEATURES

- ▶ One-piece welded construction
- ▶ Curb adapter body fabricated of heavy gauge galvanized steel
- ▶ All welds sprayed with galvanizing compound
- ▶ Factory installed supply transition
- ▶ Gasketing provided for unit to adapter sealing
- ▶ Fully insulated with 1" - 1½ Lb. density insulation
- ▶ Sloped design for even weight distribution to existing curb



Existing Curb



GUIDE SPECIFICATIONS – 48TC04-14**

Note about this specification:

Carrier wrote this specification in the 2004 version of the “Masterformat” as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

Gas Heat/Electric Cooling Packaged Rooftop

HVAC Guide Specifications

Size Range: 3 to 12.5 Nominal Tons



Section Description

- 06 80 Schedules for Decentralized HVAC Equipment**
 - 23 06 80.13 Decentralized Unitary HVAC Equipment Schedule
 - 23 06 80.13.A. Rooftop unit schedule
 - 1. Schedule is per the project specification requirements.
- 23 07 16 HVAC Equipment Insulation**
 - 23 07 16.13 Decentralized, Rooftop Units:
 - 23 07 16.13.A. Evaporator fan compartment:
 - 1. Interior cabinet surfaces shall be insulated with a minimum 1/2-in. thick, minimum 1 1/2 lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side.
 - 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
 - 23 07 16.13.B. Gas heat compartment:
 - 1. Aluminum foil-faced fiberglass insulation shall be used.
 - 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- 23 09 13 Instrumentation and Control Devices for HVAC**
 - 23 09 13.23 Sensors and Transmitters
 - 23 09 13.23.A. Thermostats
 - 1. Thermostat must
 - a. energize both “W” and “G” when calling for heat.
 - b. have capability to energize 2 different stages of cooling, and 2 different stages of heating.
 - c. include capability for occupancy scheduling.
- 23 09 23 Direct-digital Control system for HVAC**
 - 23 09 23.13 Decentralized, Rooftop Units:
 - 23 09 23.13.A. PremierLink controller
 - 1. Shall be ASHRAE 62-2001 compliant.
 - 2. Shall accept 18-32 VAC input power.
 - 3. Shall have an operating temperature range from -40_F (-40_C) to 158_F (70_C), 10% - 95% RH (non-condensing).

Guide Specification for RTU-1-2-5

Project: ~Untitled32
Prepared By:

07/30/2010
01:07PM

4. Shall include an integrated economizer controller to support an economizer with 4 to 20 mA actuator input and no microprocessor controller.
 5. Controller shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, indoor relative humidity, compressor lock-out, fire shutdown, enthalpy, fan status, remote time clock/door switch.
 6. Shall accept a CO₂ sensor in the conditioned space, and be Demand Control Ventilation (DCV) ready.
 7. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve/ dehumidify/ occupied.
 8. Unit shall provide surge protection for the controller through a circuit breaker.
 9. Shall be Internet capable, and communicate at a Baud rate of 38.4K or faster
 10. Shall have an LED display independently showing the status of activity on the communication bus, and processor operation.
 11. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks plug-in communications card.
 12. Shall have built-in Carrier Comfort Network (CCN) protocol, and be compatible with other CCN devices, including ComfortLink and ComfortVIEW controllers.
 13. Shall have built-in support for Carrier technician tool.
 14. Software upgrades will be accomplished by local download. Software upgrades through chip replacements are not allowed.
 15. Shall be shock resistant in all planes to 5G peak, 11ms during operation, and 100G peak, 11ms during storage.
 16. Shall be vibration resistant in all planes to 1.5G @ 20-300 Hz.
 17. Shall support a bus length of 4000 ft (1219m) max, 60 devices per 1000 ft (305m) section, and 1 RS-485 repeater per 1000 ft (305m) sections.
- 23 09 23.13.B. RTU-MP - Open protocol, direct digital controller:
1. Shall be ASHRAE 62-2001 compliant.
 2. Shall accept 18-30VAC, 50-60Hz, and consumer 15VA or less power.
 3. Shall have an operating temperature range from -40_F (-40_C) to 130_F (54_C), 10% - 90% RH (non-condensing).
 4. Shall include built-in protocol for BACNET (MS/TP and PTP modes), Modbus (RTU and ASCII), Johnson N2 and LonWorks. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
 5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers
 6. Baud rate Controller shall be selectable using a dipswitch.
 7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
 8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/ humidity/ remote occupancy.
 9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve.
 10. Shall have built-in surge protection circuitry through solid state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the "trip" condition clears.
 11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
 12. Shall have built-in support for Carrier technician tool.
 13. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.
 14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

23 09 33 Electric and Electronic Control System for HVAC

23 09 33.13 Decentralized, Rooftop Units:

23 09 33.13.A. General:

1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.

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3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches.
 4. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor. See heat exchanger section of this specification.
 5. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.
- 23 09 33.23.B. Safeties:
1. Compressor over-temperature, over-current. High internal pressure differential.
 2. Low pressure switch.
 - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
 - b. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
 3. High pressure switch.
 - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
 - b. High pressure switch shall use different color wire than the low pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
 4. Automatic reset, motor thermal overload protector.
 5. Heating section shall be provided with the following minimum protections:
 - a. High temperature limit switches.
 - b. Induced draft motor speed sensor.
 - c. Flame rollout switch.
 - d. Flame proving controls.

09 93 Sequence of Operations for HVAC Controls

- 23 09 93.13 Decentralized, Rooftop Units:
23 09 93.13 INSERT SEQUENCE OF OPERATION

23 40 13 Panel Air Filters

- 23 40 13.13 Decentralized, Rooftop Units:
23 40 13.13.A. Standard filter section
1. Shall consist of factory installed, low velocity, disposable 2-in. thick fiberglass filters of commercially available sizes.
 2. Unit shall use only one filter size. Multiple sizes are not acceptable.
 3. Filters shall be accessible through an access panel with "no-tool" removal as described in the unit cabinet section of this specification (23 81 19.13.H).

23 81 19 Self-Contained Air Conditioners

- 23 81 19.13 Small-Capacity Self-Contained Air Conditioners (48TC**04-14)
23 81 19.13.A. General
1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.
 2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
 3. Unit shall use environmentally sound, Puron refrigerant.
 4. Unit shall be installed in accordance with the manufacturer's instructions.
 5. Unit must be selected and installed in compliance with local, state, and federal codes.
- 23 81 19.13.B. Quality Assurance
1. Unit meets ASHRAE 90.1 minimum efficiency requirements.
 2. 3 phase units are Energy Star certified.
 3. Unit shall be rated in accordance with AHRI Standards 210/240 and 340/360.
 4. Unit shall be designed to conform to ASHRAE 15, 2001.
 5. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian

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standards as a total package for safety requirements.

6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
 7. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
 8. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.
 9. Unit shall be designed in accordance with ISO 9001:2000, and shall be manufactured in a facility registered by ISO 9001:2000.
 10. Roof curb shall be designed to conform to NRCA Standards.
 11. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
 12. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
 13. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
 14. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.
- 23 81 19.13.C. Delivery, Storage, and Handling
1. Unit shall be stored and handled per manufacturer's recommendations.
 2. Lifted by crane requires either shipping top panel or spreader bars.
 3. Unit shall only be stored or positioned in the upright position.
- 23 81 19.13.E. Project Conditions
1. As specified in the contract.
- 23 81 19.13.F. Operating Characteristics
1. Unit shall be capable of starting and running at 115_F (46_C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at $\pm 10\%$ voltage.
 2. Compressor with standard controls shall be capable of operation down to 40_F (4_C), ambient outdoor temperatures. Accessory winter start kit is necessary if mechanically cooling at ambient temperatures down to 25_F (-4_C).
 3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
 4. Unit shall be factory configured for vertical supply & return configurations.
 5. Unit shall be field convertible from vertical to horizontal configuration without the use of special conversion kits.
 6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.
- 23 81 19.13.G. Electrical Requirements
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.
- 23 81 19.13.H. Unit Cabinet
1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a prepainted baked enamel finish on all externally exposed surfaces.
 2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60_F / 16_C): 60, Hardness: H-2H Pencil hardness.
 3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 or 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment.
 4. Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory installed or field installed), standard.
 5. Base Rail
 - a. Unit shall have base rails on a minimum of 2 sides.
 - b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
 - c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
 - d. Base rail shall be a minimum of 16 gauge thickness.
 6. Condensate pan and connections:
 - a. Shall be a sloped condensate drain pan made of a non-corrosive material.
 - b. Shall comply with ASHRAE Standard 62.
 - c. Shall use a 3/4" -14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer's recommendations.
 7. Top panel:

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- a. Shall be a single piece top panel on 04 thru 12 sizes, two piece on 14 size.
 8. Gas Connections:
 - a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane).
 - b. Thru-the-base capability
 - (1.) Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan.
 - (2.) Optional, factory approved, water-tight connection method must be used for thru-the-base gas connections.
 - (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.
 9. Electrical Connections
 - a. All unit power wiring shall enter unit cabinet at a single, factory prepared, knockout location.
 - b. Thru-the-base capability.
 - (1.) Standard unit shall have a thru-the-base electrical location(s) using a raised, embossed portion of the unit basepan.
 - (2.) Optional, factory approved, water-tight connection method must be used for thru-the-base electrical connections.
 - (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.
 10. Component access panels (standard)
 - a. Cabinet panels shall be easily removable for servicing.
 - b. Unit shall have one factory installed, tool-less, removable, filter access panel.
 - c. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have molded composite handles.
 - d. Handles shall be UV modified, composite. They shall be permanently attached, and recessed into the panel.
 - e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.
 - f. Collars shall be removable and easily replaceable using manufacturer recommended parts.
- 23 81 19.13.I. Gas Heat
1. General
 - a. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.
 - b. Shall incorporate a direct-spark ignition system and redundant main gas valve.
 - c. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.
 2. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor.
 - a. IGC board shall notify users of fault using an LED (light-emitting diode).
 - b. The LED shall be visible without removing the control box access panel.
 - c. IGC board shall contain algorithms that modify evaporator fan operation to prevent future cycling on high temperature limit switch.
 - d. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication shall be made using an LED.
 3. Standard Heat Exchanger construction
 - a. Heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gauge steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
 - b. Burners shall be of the in-shot type constructed of aluminum-coated steel.
 - c. Burners shall incorporate orifices for rated heat output up to 2000 ft (610m) elevation. Additional accessory kits may be required for applications above 2000 ft (610m) elevation, depending on local gas supply conditions.
 - d. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.
 4. Optional Stainless Steel Heat Exchanger construction
 - a. Use energy saving, direct-spark ignition system.
 - b. Use a redundant main gas valve.
 - c. Burners shall be of the in-shot type constructed of aluminum-coated steel.
 - d. All gas piping shall enter the unit cabinet at a single location on side of unit (horizontal plane).
 - e. The optional stainless steel heat exchanger shall be of the tubular-section type, constructed of a minimum of 20-gauge type 409 stainless steel.
 - f. Type 409 stainless steel shall be used in heat exchanger tubes and vestibule plate.
 - g. Complete stainless steel heat exchanger allows for greater application flexibility.
 5. Optional Low NO_x Heat Exchanger construction
 - a. Low NO_x reduction shall be provided to reduce nitrous oxide emissions to meet California's Air Quality Management

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District (SCAQMD) low-NO_x emissions requirement of 40 nanograms per joule or less.

b. Primary tubes and vestibule plates on low NO_x units shall be 409 stainless steel. Other components shall be aluminized steel.

6. Induced draft combustion motor and blower

a. Shall be a direct-drive, single inlet, forward-curved centrifugal type.

b. Shall be made from steel with a corrosion-resistant finish.

c. Shall have permanently lubricated sealed bearings.

d. Shall have inherent thermal overload protection.

e. Shall have an automatic reset feature.

23 81 19.13.J. Coils

1. Standard Aluminum Fin - Copper Tube Coils:

a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.

b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.

c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.

2. Optional Pre-coated aluminum-fin condenser coils:

a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.

b. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.

c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

3. Optional Copper-fin evaporator and condenser coils:

a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.

b. Galvanized steel tube sheets shall not be acceptable.

c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.

4. Optional E-coated aluminum-fin evaporator and condenser coils:

a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.

b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.

c. Color shall be high gloss black with gloss per ASTM D523-89.

d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.

e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.

f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).

g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).

h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.

5. Standard All Aluminum Novation Coils:

a. Standard condenser coils shall have all aluminum NOVATION Heat Exchanger Technology design consisting of aluminum multi port flat tube design and aluminum fin. Coils shall be a furnace brazed design and contain epoxy lined shrink wrap on all aluminum to copper connections.

b. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.

6. Optional E-coated aluminum-fin, aluminum tube condenser coils:

a. Shall have a flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers.

b. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.

c. E-coat thickness of 0.8 to 1.2 mil with top coat having a uniform dry film thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.

d. Shall have superior hardness characteristics of 2H per ASTM D3363-00 and cross-hatch adhesion of 4B-5B per ASTM D3359-02.

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e. Shall have superior impact resistance with no cracking, chipping or peeling per NSF/ANSI 51-2002 Method 10.2.

23 81 19.13.K. Refrigerant Components

1. Refrigerant circuit shall include the following control, safety, and maintenance features:
 - a. Fixed orifice metering system shall prevent mal-distribution of two-phase refrigerant by including multiple fixed orifice devices in each refrigeration circuit. Each orifice is to be optimized to the coil circuit it serves.
 - b. Refrigerant filter drier - Solid core design.
 - c. Service gauge connections on suction and discharge lines.
 - d. Pressure gauge access through a specially designed access port in the top panel of the unit.
2. There shall be gauge line access port in the skin of the rooftop, covered by a black, removable plug.
 - a. The plug shall be easy to remove and replace.
 - b. When the plug is removed, the gauge access port shall enable maintenance personnel to route their pressure gauge lines.
 - c. This gauge access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on.
 - d. The plug shall be made of a leak proof, UV-resistant, composite material.
3. Compressors
 - a. Unit shall use fully hermetic, scroll compressor for each independent refrigeration circuit.
 - b. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
 - c. Compressors shall be internally protected from high discharge temperature conditions.
 - d. Compressors shall be protected from an over-temperature and over-ampereage conditions by an internal, motor overload device.
 - e. Compressor shall be factory mounted on rubber grommets.
 - f. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
 - g. Crankcase heaters shall not be required for normal operating range, unless required by compressor manufacturer due to refrigerant charge limits.

23 81 19.13.L. Filter Section

1. Filters access is specified in the unit cabinet section of this specification.
2. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.
3. Shall consist of factory installed, low velocity, throw-away 2-in. thick fiberglass filters.
4. Filters shall be standard, commercially available sizes.
5. Only one size filter per unit is allowed.

23 81 19.13.M. Evaporator Fan and Motor

1. Evaporator fan motor:
 - a. Shall have permanently lubricated bearings.
 - b. Shall have inherent automatic-reset thermal overload protection or circuit breaker.
 - c. Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating shall be required.
2. Belt-driven Evaporator Fan:
 - a. Belt drive shall include an adjustable pitch motor pulley.
 - b. Shall use sealed, permanently lubricated ball-bearing type.
 - c. Blower fan shall be double-inlet type with forward-curved blades.
 - d. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.

23 81 19.13.N. Condenser Fans and Motors

1. Condenser fan motors:
 - a. Shall be a totally enclosed motor.
 - b. Shall use permanently lubricated bearings.
 - c. Shall have inherent thermal overload protection with an automatic reset feature.
 - d. Shall use a shaft-down design on 04 to 12 models and shaft-up on 14 size with rain shield.
2. Condenser Fans:
 - a. Shall be a direct-driven propeller type fan.
 - b. Shall have aluminum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.

23 81 19.13.O. Special Features Options and Accessories

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1. Integrated Economizers:

- a. Integrated, gear-driven parallel modulating blade design type capable of simultaneous economizer and compressor operation.
- b. Independent modules for vertical or horizontal return configurations shall be available. Vertical return modules shall be available as a factory installed option.
- c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
- d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
- e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
- f. Shall be equipped with low-leakage dampers, not to exceed 2% leakage at 1 in. wg pressure differential.
- g. Shall be capable of introducing up to 100% outdoor air.
- h. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.
- i. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
- j. Dry bulb outdoor air temperature sensor shall be provided as standard. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100_F / 4 to 38_C. Additional sensor options shall be available as accessories.
- k. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
- l. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy. A remote potentiometer may be used to override the damper setpoint.
- m. Dampers shall be completely closed when the unit is in the unoccupied mode.
- n. Economizer controller shall accept a 2-10 Vdc CO₂ sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
- o. Compressor lockout sensor shall open at 35_F (2_C) and close closes at 50_F (10_C).
- p. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
- q. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

2. Two-Position Damper

- a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.
- b. Damper shall include adjustable damper travel from 25% to 100% (full open).
- c. Damper shall include single or dual blade, gear driven dampers and actuator motor.
- d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.
- e. Damper will admit up to 100% outdoor air for applicable rooftop units.
- f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
- g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
- h. Outside air hood shall include aluminum water entrainment filter.

3. Manual damper

- a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25 or 50% outdoor air for year round ventilation.

4. Humidi-MiZer Adaptive Dehumidification System:

- a. The Humidi-MiZer Adaptive Dehumidification System shall be factory installed in single stage 48TC04-07 and two stage 48TC08-14 models with RTPF (round tube plate tin) condenser coils, and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode:
 - (1.) Subcooling mode further sub cools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.
 - (2.) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving air temperature when only humidity in the space is not satisfied.
 - (3.) Includes head pressure controller mentioned below

5. Head Pressure Control Package

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- a. Controller shall control coil head pressure by condenser fan speed modulation or condenser fan cycling and wind baffles.
 - b. Shall consist of solid-state control and condenser coil temperature sensor to maintain condensing temperature between 90_F (32_C) and 110_F (43_C) at outdoor ambient temperatures down to -20_F (-29_C).
6. Propane Conversion Kit
- a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane, up to 2000 ft (610m) elevation.
 - b. Additional accessory kits may be required for applications above 2000 ft (610m) elevation.
7. Flue Shield
- a. Flue shield shall provide protection from the hot sides of the gas flue hood.
8. Condenser Coil Hail Guard Assembly
- a. Shall protect against damage from hail.
 - b. Shall be either hood style or louvered.
9. Unit-Mounted, Non-Fused Disconnect Switch:
- a. Switch shall be factory installed, internally mounted.
 - b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
 - c. Shall be accessible from outside the unit.
 - d. Shall provide local shutdown and lockout capability.
10. Convenience Outlet:
- a. Powered convenience outlet.
 - (1.) Outlet shall be powered from main line power to the rooftop unit.
 - (2.) Outlet shall be powered from line side or load side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be UL certified and rated for additional outlet amperage.
 - (3.) Outlet shall be factory installed and internally mounted with easily accessible 115-v female receptacle.
 - (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - (5.) Voltage required to operate convenience outlet shall be provided by a factory installed step-down transformer.
 - (6.) Outlet shall be accessible from outside the unit.
 - (7.) Outlet shall include a field installed "Wet in Use" cover.
 - b. Non-Powered convenience outlet.
 - (1.) Outlet shall be powered from a separate 115/120v power source.
 - (2.) A transformer shall not be included.
 - (3.) Outlet shall be factory installed and internally mounted with easily accessible 115-v female receptacle.
 - (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - (5.) Outlet shall be accessible from outside the unit.
 - (6.) Outlet shall include a field installed "Wet in Use" cover.
11. Flue Discharge Deflector:
- a. Flue discharge deflector shall direct unit exhaust vertically instead of horizontally.
 - b. Deflector shall be defined as a "natural draft" device by the National Fuel and Gas (NFG) code.
12. Thru-the-Base Connectors:
- a. Kits shall provide connectors to permit gas and electrical connections to be brought to the unit through the unit basepan.
 - b. Minimum of four connection locations per unit.
13. Propeller Power Exhaust:
- a. Power exhaust shall be used in conjunction with an integrated economizer.
 - b. Independent modules for vertical or horizontal return configurations shall be available.
 - c. Horizontal power exhaust is shall be mounted in return ductwork.
 - d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control.
14. Roof Curbs (Vertical):
- a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
 - b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.

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c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.

15. High Altitude Gas Conversion Kit:

a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit to operate from 2000-7000 ft (610 to 2134m) elevation with natural gas or from 0-7000 ft (90-2134m) elevation with liquefied propane.

16. Outdoor Air Enthalpy Sensor:

a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.

17. Return Air Enthalpy Sensor:

a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.

18. Indoor Air Quality (CO₂) Sensor:

a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.

b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.

19. Smoke detectors (factory installed only):

a. Shall be a Four-Wire Controller and Detector.

b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.

c. Shall use magnet-activated test/reset sensor switches.

d. Shall have tool-less connection terminal access.

e. Shall have a recessed momentary switch for testing and resetting the detector.

f. Controller shall include:

(1.) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.

(2.) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.

(3.) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.

(4.) Capable of direct connection to two individual detector modules.

(5.) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications

20. Winter start kit

a. Shall contain a bypass device around the low pressure switch.

b. Shall be required when mechanical cooling is required down to 25_F (-4_C).

c. Shall not be required to operate on an economizer when below an outdoor ambient of 40_F (4_C).

21. Time Guard

a. Shall prevent compressor short-cycling by providing a 5-minute delay (± 2 minutes) before restarting a compressor after shutdown for any reason.

b. One device shall be required per compressor.

Unit Feature Sheet for RTU-4

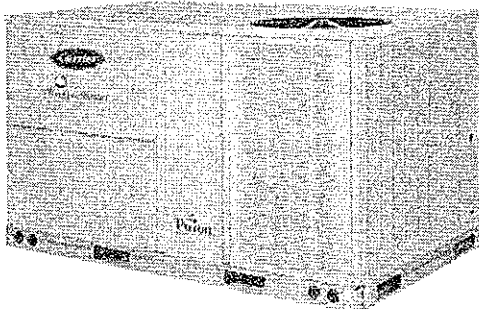
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WeatherMaker - 48TC

PACKAGED ROOFTOP GAS HEATING/ELECTRIC COOLING UNITS
3, 4, 6, 6, 7.5, 8.5, 10, 12.5 TONS



Optional Lowered Hail Guard Shown



WEATHERMAKER SERIES

WeatherMaker (48TC) units are one-piece gas heating, electric cooling units that are pre-wired and charged with Puron (R-410A) refrigerant. They are factory tested in both heating and cooling modes, and rated in accordance with ARI Standards 210 (04-06 sizes) and 360 (07-14 sizes). WeatherMaker units are designed in accordance with UL Standard 199S, and listed by the Underwriters' Laboratories.

Approved and certified by:



Sizes 04-06



Sizes 07-14

Certified to ISO 9001:2000

STANDARD FEATURES INCLUDE:

- Puron (R-410A) HFC refrigerant
- ASHRAE 90.1 compliant and Energy Star qualified
- Scroll compressors with internal line break and overload protection
- Single-stage cooling capacity control on 04-12 models
- Two-stage cooling capacity control on 09-14 models
- SEER's up to 13.0, EER's up to 11.1 and IEER's up to 11.8
- AccuLink™ refrigerant metering system
- Exclusive non-corrosive composite condensate pan in accordance with ASHRAE Standard 62, sloping design, side or center drain
- Standard cooling operation up to 115°F (46°C) and down to 40°F (4°C) - down to 25° F (-4° C) with winter start kit.
- Pre-painted exterior panels and primer-coated interior panels tested to 500 hours salt spray protection
- Fully insulated cabinet
- Exclusive IGC solid-state control for on-board diagnostics with LED error code designation burner control logic and energy saving indoor fan motor delay
- Low NOx models that meet California Air Quality Management
- Insulated draft gas heat combustion design
- Redundant gas valves with up to two stages of heating
- Low pressure and high pressure switch protected.

MAINTENANCE FEATURES:

- Access panels with easy grip handles
- Innovative easy starting, no-strip screws on unit access panels
- Two-inch disposable return air filters and Tool-less filter access door
- Belt drive evaporator-fan motor and pulley combinations
- New terminal board facilitating simple safety circuit troubleshooting and simplified control box arrangement
- Exclusive IGC solid-state control for on-board diagnostics with LED error code designation, burner control logic and energy saving indoor fan motor delay.

INSTALLATION FEATURES:

- Thru-the-bottom power entry capability
- Single point gas and electric connections
- Full perimeter base rail with built-in rigging adapters and fork slots
- Convertible from vertical to horizontal airflow for slab mounting

STANDARD WARRANTY:

- 10-year heat exchanger - 15-year stainless steel option
- 5-year compressor
- 1-year parts
- 3-year parts on Novation Condenser coils - where available
- Many optional upgrades also available

OPTIONS INCLUDE BUT ARE NOT LIMITED TO:

- PremierLink™ and Multi-Protocol Direct Digital Controls (DDC)
- Supply and Return Air Smoke Detectors, high static motors
- Louvered condenser coil guards
- Economizer, disconnect and convenience outlet options
- Stainless Steel heat exchanger option
- Corrosion resistant coil coating
- Exclusive Humid-MiZe™ adaptive dehumidification system available on all sizes - Motor Master I controller included

For a complete list of options and accessories refer to the Product Data Catalog for this unit.

Unit Report For RTU-4

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Unit Parameters

Unit Model: 48TCEA06A2A5-0A0A0
Unit Size: 06 (5 Tons)
Volts-Phase-Hertz: 208-3-60
Heating Type: Gas
Duct Cfg: Vertical Supply / Vertical Return
Heating Capacity:
Medium Heat

Dimensions (ft. in.) & Weight (lb.) ***

Unit Length: 6' 2.375"
Unit Width: 3' 8"
Unit Height: 2' 9.375"
Base Unit Weight: 569 lb

*** Weights and Dimensions are approximate. Weight does not include roof curbs, unit packaging, field installed accessories or factory installed options. Approximate dimensions are provided primarily for shipping purposes. For exact dimensions and weights, refer to appropriate product data catalog.

Unit Configuration

Medium Static Option
Al/Cu - Al/Cu
Electro-mechanical controls
Standard Packaging

Warranty Information

No standard warranties.

No optional warranties were selected.

NOTE: Please see Warranty Catalog 500-089 for explanation of policies and ordering methods.

Ordering Information

Part Number	Description	Quantity
48TCEA06A2A5-0A0A0	Rooftop Unit	1
	Base Unit	
	Medium Static Option	
	Al/Cu - Al/Cu	
	Electro-mechanical controls	
	Standard Packaging	
	Accessories	
CRMANDPR001A03	Outdoor Air Damper Package	1
33CS400-01	Debonair 400 Slimline - Non-Programmable Thermostat	1

Performance Summary For RTU-4

Project: ~Untitled32
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Part Number: 48TCEA06A2A5-0A0A0

ARI SEER: 13.00

Base Unit Weight: 569 lb

Base Unit Dimensions

Unit Length: 74.4 in

Unit Width: 44.0 in

Unit Height: 33.4 in

Unit Voltage-Phase-Hertz: 208-3-60

Air Discharge: Vertical

Fan Drive Type: Belt

Actual Airflow: 1750 CFM

Site Altitude: 0 ft

Cooling Performance

Condenser Entering Air DB: 95.0 F

Evaporator Entering Air DB: 80.0 F

Evaporator Entering Air WB: 67.0 F

Entering Air Enthalpy: 31.44 BTU/lb

Evaporator Leaving Air DB: 56.4 F

Evaporator Leaving Air WB: 56.0 F

Evaporator Leaving Air Enthalpy: 23.75 BTU/lb

Gross Cooling Capacity: 60.54 MBH

Gross Sensible Capacity: 44.53 MBH

Compressor Power Input: 4.41 kW

Coil Bypass Factor: 0.045

Heating Performance

Heating Airflow: 1750 CFM

Entering Air Temp: 70.0 F

Leaving Air Temp: 119.2 F

Gas Input Capacity: 115.0 MBH

Gas Heating Capacity: 93.00 MBH

Temperature Rise: 49.2 F

Supply Fan

External Static Pressure: 0.50 in wg

Fan RPM: 1108

Fan Power: 0.83 BHP

NOTE: Standard Static Fan Option

Electrical Data

Minimum Voltage: 187

Maximum Voltage: 253

Compressor RLA: 15.6

Compressor LRA: 110

Outdoor Fan Motor Qty: 1

Outdoor Fan FLA (ea): 1.5

Indoor Fan Motor Type: MED

Indoor Fan Motor FLA: 5.2

Combustion Fan Motor FLA (ea): 0.24

Power Supply MCA: 26.2

Power Supply MOCP (Fuse or HACR): 40

Min. Unit Disconnect FLA: 26

Min. Unit Disconnect LRA: 144

Electrical Convenience Outlet: None

Performance Summary For RTU-4

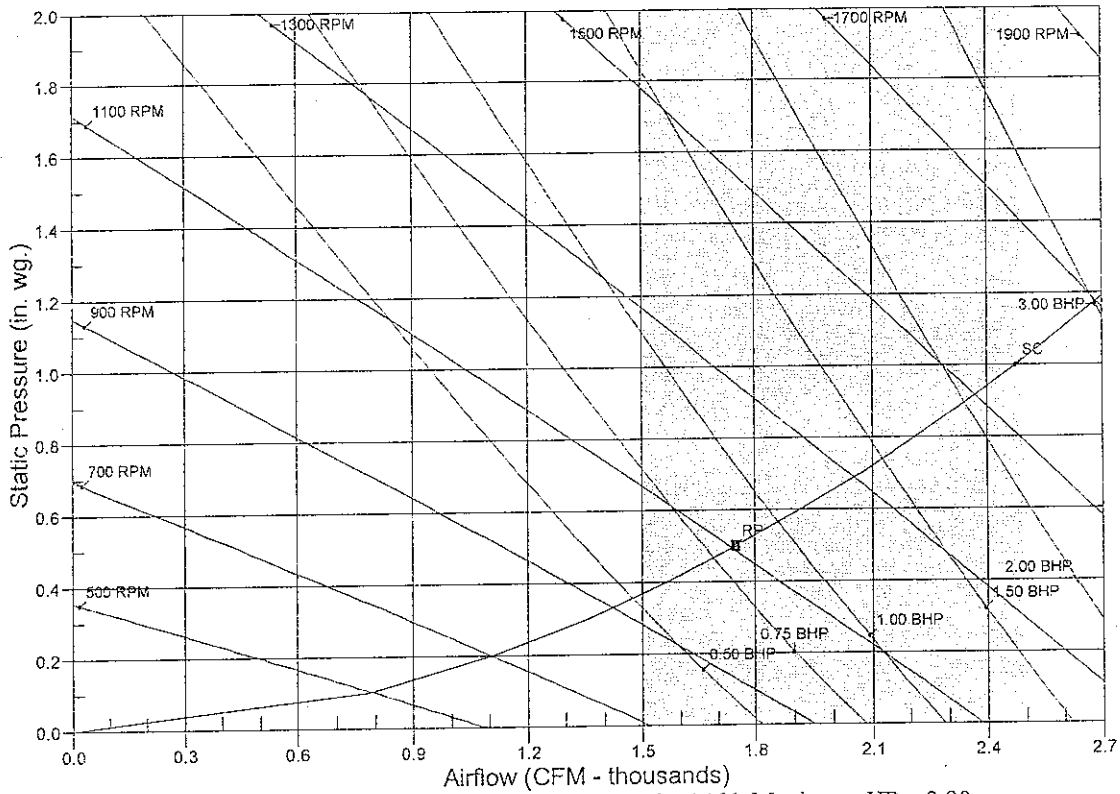
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Sound Power Levels, db re 10E-12 Watts

	Discharge	Inlet	Outdoor
63 Hz	85.8	86.4	84.0
125 Hz	80.2	77.1	82.2
250 Hz	72.1	63.6	76.3
500 Hz	68.2	61.8	74.8
1000 Hz	64.9	61.2	72.5
2000 Hz	59.0	55.2	68.8
4000 Hz	60.6	50.6	65.6
8000 Hz	55.7	43.0	61.8
A-Weighted	71.7	67.2	78.0

Fan Curve

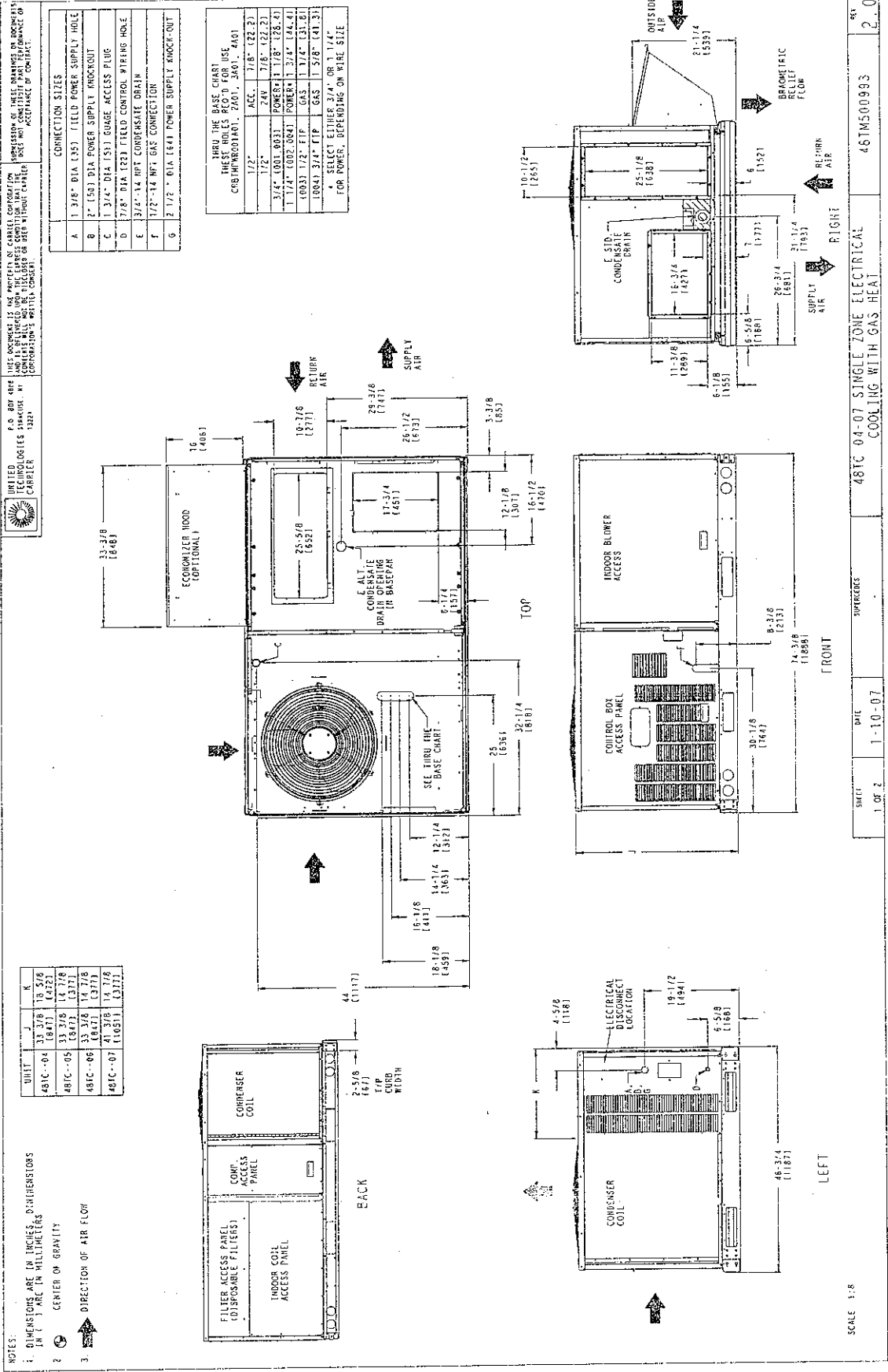


RPM = 1108 BHP = 0.83 Maximum RPM = 1466 Maximum HP = 2.90
 Note: Please contact application engineering for selections outside the shaded region.
 SC - System Curve RP - Rated Point

Certified Drawing for RTU-4

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Certified Drawing for RTU-4

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 Prepared By:

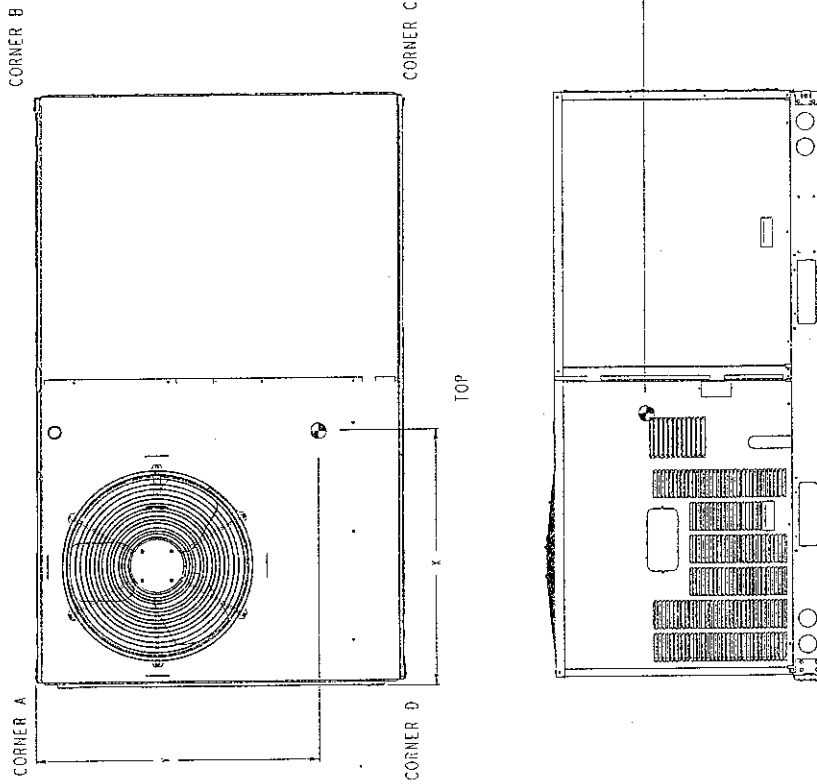
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UNITED STATES OF AMERICA
 FEDERAL BUREAU OF INVESTIGATION
 LABORATORY
 P.O. BOX 400
 WASHINGTON, D.C. 20535



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UNIT	CORNER A		CORNER B		CORNER C		CORNER D		C.G.		HEIGHT	
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z	Z
48TC-04	483	219	111	50	125	57	131	59	116	53	10	(991) 23 (584) 16 3/8 (416)
48TC-05	337	153	124	56	139	63	145	66	129	59	10	(991) 23 (584) 17 (432)
48TC-06	346	158	131	59	147	67	154	70	137	62	10	(991) 23 (584) 17 1/4 (428)
48TC-07	353	159	138	63	149	68	157	71	141	64	10	(991) 23 (584) 18 1/8 (513)



SCALE 5:32

SHEET 2 OF 2	DATE 1-10-07	SUPPRESSED	48TC 04-07 SINGLE ZONE ELECTRICAL COOLING WITH GAS HEAT	48IM500993	REV 2.0
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NEW UNITS

CARRIER:
 48/50 GJ, HJ, TE, TJ 004-007

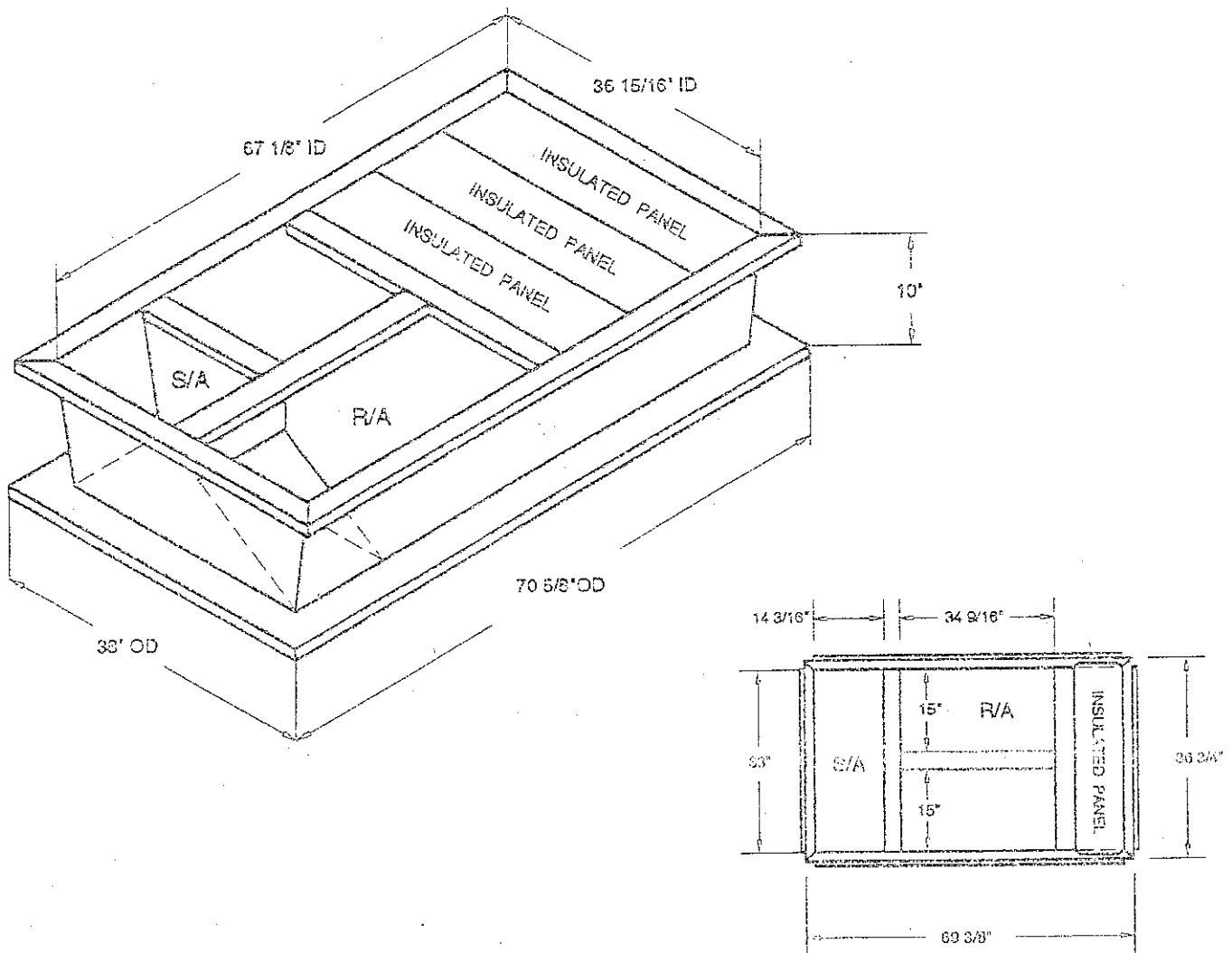
BRYANT:
 548C, 551A, B 558C, D, F
 580C, D, F 581A, B 036-072

EXISTING UNITS

BRYANT: 579D 036-060
CARRIER: 48HD 007;
 48HDT 005, 006;
 48 LDT 004-006

FEATURES

- ▶ One-piece welded construction
- ▶ Curb adapter body fabricated of heavy gauge galvanized steel
- ▶ All welds sprayed with galvanizing compound
- ▶ Factory installed supply transition
- ▶ Gasketing provided for unit to adapter sealing
- ▶ Fully insulated with 1" - 1½ Lb. density insulation
- ▶ Sloped design for even weight distribution to existing curb



Existing Curb



GUIDE SPECIFICATIONS – 48TC04-14**

Note about this specification:

Carrier wrote this specification in the 2004 version of the “Masterformat” as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

Gas Heat/Electric Cooling Packaged Rooftop

HVAC Guide Specifications

Size Range: 3 to 12.5 Nominal Tons



Section Description

06 80 Schedules for Decentralized HVAC Equipment

23 06 80.13 Decentralized Unitary HVAC Equipment Schedule

23 06 80.13.A Rooftop unit schedule

- 1. Schedule is per the project specification requirements.

23 07 16 HVAC Equipment Insulation

23 07 16.13 Decentralized, Rooftop Units:

23 07 16.13.A Evaporator fan compartment:

- 1. Interior cabinet surfaces shall be insulated with a minimum 1/2-in. thick, minimum 1 1/2 lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side.
- 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

23 07 16.13.B. Gas heat compartment:

- 1. Aluminum foil-faced fiberglass insulation shall be used.
- 2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

23 09 13 Instrumentation and Control Devices for HVAC

23 09 13.23 Sensors and Transmitters

23 09 13.23.A Thermostats

- 1. Thermostat must
 - a. energize both “W” and “G” when calling for heat.
 - b. have capability to energize 2 different stages of cooling, and 2 different stages of heating.
 - c. include capability for occupancy scheduling.

23 09 23 Direct-digital Control system for HVAC

23 09 23.13 Decentralized, Rooftop Units:

23 09 23.13.A PremierLink controller

- 1. Shall be ASHRAE 62-2001 compliant.
- 2. Shall accept 18-32 VAC input power.
- 3. Shall have an operating temperature range from -40_F (-40_C) to 158_F (70_C), 10% - 95% RH (non-condensing).

Guide Specification for RTU-4

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4. Shall include an integrated economizer controller to support an economizer with 4 to 20 mA actuator input and no microprocessor controller.
 5. Controller shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, indoor relative humidity, compressor lock-out, fire shutdown, enthalpy, fan status, remote time clock/door switch.
 6. Shall accept a CO₂ sensor in the conditioned space, and be Demand Control Ventilation (DCV) ready.
 7. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve/ dehumidify/ occupied.
 8. Unit shall provide surge protection for the controller through a circuit breaker.
 9. Shall be Internet capable, and communicate at a Baud rate of 38.4K or faster
 10. Shall have an LED display independently showing the status of activity on the communication bus, and processor operation.
 11. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks plug-in communications card.
 12. Shall have built-in Carrier Comfort Network (CCN) protocol, and be compatible with other CCN devices, including ComfortLink and ComfortVIEW controllers.
 13. Shall have built-in support for Carrier technician tool.
 14. Software upgrades will be accomplished by local download. Software upgrades through chip replacements are not allowed.
 15. Shall be shock resistant in all planes to 5G peak, 11ms during operation, and 100G peak, 11ms during storage.
 16. Shall be vibration resistant in all planes to 1.5G @ 20-300 Hz.
 17. Shall support a bus length of 4000 ft (1219m) max, 60 devices per 1000 ft (305m) section, and 1 RS-485 repeater per 1000 ft (305m) sections.
- 23 09 23.13.B. RTU-MP - Open protocol, direct digital controller:
1. Shall be ASHRAE 62-2001 compliant.
 2. Shall accept 18-30VAC, 50-60Hz, and consumer 15VA or less power.
 3. Shall have an operating temperature range from -40_F (-40_C) to 130_F (54_C), 10% - 90% RH (non-condensing).
 4. Shall include built-in protocol for BACNET (MS/TP and PTP modes), Modbus (RTU and ASCII), Johnson N2 and LonWorks. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
 5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers
 6. Baud rate Controller shall be selectable using a dipswitch.
 7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
 8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/ humidity/ remote occupancy.
 9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve.
 10. Shall have built-in surge protection circuitry through solid state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the "trip" condition clears.
 11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
 12. Shall have built-in support for Carrier technician tool.
 13. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.
 14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

23 09 33 Electric and Electronic Control System for HVAC

23 09 33.13 Decentralized, Rooftop Units:

23 09 33.13.A. General:

1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.

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3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches.
 4. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor. See heat exchanger section of this specification.
 5. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.
- 23 09 33.23.B. Safeties:
1. Compressor over-temperature, over-current. High internal pressure differential.
 2. Low pressure switch.
 - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
 - b. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
 3. High pressure switch.
 - a. Units with 2 compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
 - b. High pressure switch shall use different color wire than the low pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
 4. Automatic reset, motor thermal overload protector.
 5. Heating section shall be provided with the following minimum protections:
 - a. High temperature limit switches.
 - b. Induced draft motor speed sensor.
 - c. Flame rollout switch.
 - d. Flame proving controls.
- 09 93 Sequence of Operations for HVAC Controls
- 23 09 93.13 Decentralized, Rooftop Units:
- 23 09 93.13 INSERT SEQUENCE OF OPERATION
- 23 40 13 Panel Air Filters
- 23 40 13.13 Decentralized, Rooftop Units:
- 23 40 13.13.A. Standard filter section
1. Shall consist of factory installed, low velocity, disposable 2-in. thick fiberglass filters of commercially available sizes.
 2. Unit shall use only one filter size. Multiple sizes are not acceptable.
 3. Filters shall be accessible through an access panel with "no-tool" removal as described in the unit cabinet section of this specification (23 81 19.13.H).
- 23 81 19 Self-Contained Air Conditioners
- 23 81 19.13 Small-Capacity Self-Contained Air Conditioners (48TC**04-14)
- 23 81 19.13.A. General
1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.
 2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
 3. Unit shall use environmentally sound, Puron refrigerant.
 4. Unit shall be installed in accordance with the manufacturer's instructions.
 5. Unit must be selected and installed in compliance with local, state, and federal codes.
- 23 81 19.13.B. Quality Assurance
1. Unit meets ASHRAE 90.1 minimum efficiency requirements.
 2. 3 phase units are Energy Star certified.
 3. Unit shall be rated in accordance with AHRI Standards 210/240 and 340/360.
 4. Unit shall be designed to conform to ASHRAE 15, 2001.
 5. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian

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standards as a total package for safety requirements.

6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
 7. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
 8. Unit casing shall be capable of withstanding Federal Test Method Standard No. 141 (Method 6061) 5000-hour salt spray.
 9. Unit shall be designed in accordance with ISO 9001:2000, and shall be manufactured in a facility registered by ISO 9001:2000.
 10. Roof curb shall be designed to conform to NRCA Standards.
 11. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
 12. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
 13. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
 14. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.
- 23 81 19.13.C. Delivery, Storage, and Handling
1. Unit shall be stored and handled per manufacturer's recommendations.
 2. Lifted by crane requires either shipping top panel or spreader bars.
 3. Unit shall only be stored or positioned in the upright position.
- 23 81 19.13.E. Project Conditions
1. As specified in the contract.
- 23 81 19.13.F. Operating Characteristics
1. Unit shall be capable of starting and running at 115_F (46_C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at $\pm 10\%$ voltage.
 2. Compressor with standard controls shall be capable of operation down to 40_F (4_C), ambient outdoor temperatures. Accessory winter start kit is necessary if mechanically cooling at ambient temperatures down to 25_F (-4_C).
 3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
 4. Unit shall be factory configured for vertical supply & return configurations.
 5. Unit shall be field convertible from vertical to horizontal configuration without the use of special conversion kits.
 6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.
- 23 81 19.13.G. Electrical Requirements
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.
- 23 81 19.13.H. Unit Cabinet
1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a prepainted baked enamel finish on all externally exposed surfaces.
 2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60_F / 15_C): 60, Hardness: H-2H Pencil hardness.
 3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 or 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment.
 4. Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory installed or field installed), standard.
 5. Base Rail
 - a. Unit shall have base rails on a minimum of 2 sides.
 - b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
 - c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
 - d. Base rail shall be a minimum of 16 gauge thickness.
 6. Condensate pan and connections:
 - a. Shall be a sloped condensate drain pan made of a non-corrosive material.
 - b. Shall comply with ASHRAE Standard 62.
 - c. Shall use a 3/4" -14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer's recommendations.
 7. Top panel:

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a. Shall be a single piece top panel on 04 thru 12 sizes, two piece on 14 size.

8. Gas Connections:

a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane).

b. Thru-the-base capability

- (1.) Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan.
- (2.) Optional, factory approved, water-tight connection method must be used for thru-the-base gas connections.
- (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.

9. Electrical Connections

a. All unit power wiring shall enter unit cabinet at a single, factory prepared, knockout location.

b. Thru-the-base capability.

- (1.) Standard unit shall have a thru-the-base electrical location(s) using a raised, embossed portion of the unit basepan.
- (2.) Optional, factory approved, water-tight connection method must be used for thru-the-base electrical connections.
- (3.) No basepan penetration, other than those authorized by the manufacturer, is permitted.

10. Component access panels (standard)

a. Cabinet panels shall be easily removable for servicing.

b. Unit shall have one factory installed, tool-less, removable, filter access panel.

c. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have molded composite handles.

d. Handles shall be UV modified, composite. They shall be permanently attached, and recessed into the panel.

e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.

f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

23 81 19.13.L Gas Heat

1. General

a. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.

b. Shall incorporate a direct-spark ignition system and redundant main gas valve.

c. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.

2. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor.

a. IGC board shall notify users of fault using an LED (light-emitting diode).

b. The LED shall be visible without removing the control box access panel.

c. IGC board shall contain algorithms that modify evaporator fan operation to prevent future cycling on high temperature limit switch.

d. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication shall be made using an LED.

3. Standard Heat Exchanger construction

a. Heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gauge steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.

b. Burners shall be of the in-shot type constructed of aluminum-coated steel.

c. Burners shall incorporate orifices for rated heat output up to 2000 ft (610m) elevation. Additional accessory kits may be required for applications above 2000 ft (610m) elevation, depending on local gas supply conditions.

d. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.

4. Optional Stainless Steel Heat Exchanger construction

a. Use energy saving, direct-spark ignition system.

b. Use a redundant main gas valve.

c. Burners shall be of the in-shot type constructed of aluminum-coated steel.

d. All gas piping shall enter the unit cabinet at a single location on side of unit (horizontal plane).

e. The optional stainless steel heat exchanger shall be of the tubular-section type, constructed of a minimum of 20-gauge type 409 stainless steel.

f. Type 409 stainless steel shall be used in heat exchanger tubes and vestibule plate.

g. Complete stainless steel heat exchanger allows for greater application flexibility.

5. Optional Low NO_x Heat Exchanger construction

a. Low NO_x reduction shall be provided to reduce nitrous oxide emissions to meet California's Air Quality Management

Guide Specification for RTU-4

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District (SCAQMD) low-NO_x emissions requirement of 40 nanograms per joule or less.

b. Primary tubes and vestibule plates on low NO_x units shall be 409 stainless steel. Other components shall be aluminized steel.

6. Induced draft combustion motor and blower

a. Shall be a direct-drive, single inlet, forward-curved centrifugal type.

b. Shall be made from steel with a corrosion-resistant finish.

c. Shall have permanently lubricated sealed bearings.

d. Shall have inherent thermal overload protection.

e. Shall have an automatic reset feature.

23 81 19.13.J. Coils

1. Standard Aluminum Fin - Copper Tube Coils:

a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.

b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.

c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.

2. Optional Pre-coated aluminum-fin condenser coils:

a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.

b. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.

c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

3. Optional Copper-fin evaporator and condenser coils:

a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.

b. Galvanized steel tube sheets shall not be acceptable.

c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.

4. Optional E-coated aluminum-fin evaporator and condenser coils:

a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.

b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.

c. Color shall be high gloss black with gloss per ASTM D523-89.

d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.

e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.

f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).

g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).

h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.

5. Standard All Aluminum Novation Coils:

a. Standard condenser coils shall have all aluminum NOVATION Heat Exchanger Technology design consisting of aluminum multi port flat tube design and aluminum fin. Coils shall be a furnace brazed design and contain epoxy lined shrink wrap on all aluminum to copper connections.

b. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.

6. Optional E-coated aluminum-fin, aluminum tube condenser coils:

a. Shall have a flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers.

b. Coating process shall ensure complete coil encapsulation, including all exposed fin edges.

c. E-coat thickness of 0.8 to 1.2 mil with top coat having a uniform dry film thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided.

d. Shall have superior hardness characteristics of 2H per ASTM D3363-00 and cross-hatch adhesion of 4B-5B per ASTM D3359-02.

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e. Shall have superior impact resistance with no cracking, chipping or peeling per NSF/ANSI 51-2002 Method 10.2.

23 81 19.13.K. Refrigerant Components

1. Refrigerant circuit shall include the following control, safety, and maintenance features:

a. Fixed orifice metering system shall prevent mal-distribution of two-phase refrigerant by including multiple fixed orifice devices in each refrigeration circuit. Each orifice is to be optimized to the coil circuit it serves.

b. Refrigerant filter drier - Solid core design.

c. Service gauge connections on suction and discharge lines.

d. Pressure gauge access through a specially designed access port in the top panel of the unit.

2. There shall be gauge line access port in the skin of the rooftop, covered by a black, removable plug.

a. The plug shall be easy to remove and replace.

b. When the plug is removed, the gauge access port shall enable maintenance personnel to route their pressure gauge lines.

c. This gauge access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on.

d. The plug shall be made of a leak proof, UV-resistant, composite material.

3. Compressors

a. Unit shall use fully hermetic, scroll compressor for each independent refrigeration circuit.

b. Compressor motors shall be cooled by refrigerant gas passing through motor windings.

c. Compressors shall be internally protected from high discharge temperature conditions.

d. Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.

e. Compressor shall be factory mounted on rubber grommets.

f. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.

g. Crankcase heaters shall not be required for normal operating range, unless required by compressor manufacturer due to refrigerant charge limits.

23 81 19.13.L. Filter Section

1. Filters access is specified in the unit cabinet section of this specification.

2. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.

3. Shall consist of factory installed, low velocity, throw-away 2-in. thick fiberglass filters.

4. Filters shall be standard, commercially available sizes.

5. Only one size filter per unit is allowed.

23 81 19.13.M. Evaporator Fan and Motor

1. Evaporator fan motor:

a. Shall have permanently lubricated bearings.

b. Shall have inherent automatic-reset thermal overload protection or circuit breaker.

c. Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating shall be required.

2. Belt-driven Evaporator Fan:

a. Belt drive shall include an adjustable pitch motor pulley.

b. Shall use sealed, permanently lubricated ball-bearing type.

c. Blower fan shall be double-inlet type with forward-curved blades.

d. Shall be constructed from steel with a corrosion resistant finish and dynamically balanced.

23 81 19.13.N. Condenser Fans and Motors

1. Condenser fan motors:

a. Shall be a totally enclosed motor.

b. Shall use permanently lubricated bearings.

c. Shall have inherent thermal overload protection with an automatic reset feature.

d. Shall use a shaft-down design on 04 to 12 models and shaft-up on 14 size with rain shield.

2. Condenser Fans:

a. Shall be a direct-driven propeller type fan.

b. Shall have aluminum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.

23 81 19.13.O. Special Features Options and Accessories

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1. Integrated Economizers:
 - a. Integrated, gear-driven parallel modulating blade design type capable of simultaneous economizer and compressor operation.
 - b. Independent modules for vertical or horizontal return configurations shall be available. Vertical return modules shall be available as a factory installed option.
 - c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
 - d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
 - e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
 - f. Shall be equipped with low-leakage dampers, not to exceed 2% leakage at 1 in. wg pressure differential.
 - g. Shall be capable of introducing up to 100% outdoor air.
 - h. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air.
 - i. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
 - j. Dry bulb outdoor air temperature sensor shall be provided as standard. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100_F / 4 to 38_C. Additional sensor options shall be available as accessories.
 - k. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
 1. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy. A remote potentiometer may be used to override the damper setpoint.
 - m. Dampers shall be completely closed when the unit is in the unoccupied mode.
 - n. Economizer controller shall accept a 2-10 Vdc CO₂ sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
 - o. Compressor lockout sensor shall open at 35_F (2_C) and close closes at 50_F (10_C).
 - p. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
 - q. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
2. Two-Position Damper
 - a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.
 - b. Damper shall include adjustable damper travel from 25% to 100% (full open).
 - c. Damper shall include single or dual blade, gear driven dampers and actuator motor.
 - d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.
 - e. Damper will admit up to 100% outdoor air for applicable rooftop units.
 - f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
 - g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
 - h. Outside air hood shall include aluminum water entrainment filter.
3. Manual damper
 - a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25 or 50% outdoor air for year round ventilation.
4. Humidi-MiZer Adaptive Dehumidification System:
 - a. The Humidi-MiZer Adaptive Dehumidification System shall be factory installed in single stage 48TC04-07 and two stage 48TC08-14 models with RTPF (round tube plate tin) condenser coils, and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode:
 - (1.) Subcooling mode further sub cools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.
 - (2.) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving air temperature when only humidity in the space is not satisfied.
 - (3.) Includes head pressure controller mentioned below
5. Head Pressure Control Package

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- a. Controller shall control coil head pressure by condenser fan speed modulation or condenser fan cycling and wind baffles.
 - b. Shall consist of solid-state control and condenser coil temperature sensor to maintain condensing temperature between 90_F (32_C) and 110_F (43_C) at outdoor ambient temperatures down to -20_F (-29_C).
6. Propane Conversion Kit
- a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane, up to 2000 ft (610m) elevation.
 - b. Additional accessory kits may be required for applications above 2000 ft (610m) elevation.
7. Flue Shield
- a. Flue shield shall provide protection from the hot sides of the gas flue hood.
8. Condenser Coil Hail Guard Assembly
- a. Shall protect against damage from hail.
 - b. Shall be either hood style or louvered.
9. Unit-Mounted, Non-Fused Disconnect Switch:
- a. Switch shall be factory installed, internally mounted.
 - b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
 - c. Shall be accessible from outside the unit.
 - d. Shall provide local shutdown and lockout capability.
10. Convenience Outlet:
- a. Powered convenience outlet.
 - (1.) Outlet shall be powered from main line power to the rooftop unit.
 - (2.) Outlet shall be powered from line side or load side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be UL certified and rated for additional outlet amperage.
 - (3.) Outlet shall be factory installed and internally mounted with easily accessible 115-v female receptacle.
 - (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - (5.) Voltage required to operate convenience outlet shall be provided by a factory installed step-down transformer.
 - (6.) Outlet shall be accessible from outside the unit.
 - (7.) Outlet shall include a field installed "Wet in Use" cover.
 - b. Non-Powered convenience outlet.
 - (1.) Outlet shall be powered from a separate 115/120v power source.
 - (2.) A transformer shall not be included.
 - (3.) Outlet shall be factory installed and internally mounted with easily accessible 115-v female receptacle.
 - (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
 - (5.) Outlet shall be accessible from outside the unit.
 - (6.) Outlet shall include a field installed "Wet in Use" cover.
11. Flue Discharge Deflector:
- a. Flue discharge deflector shall direct unit exhaust vertically instead of horizontally.
 - b. Deflector shall be defined as a "natural draft" device by the National Fuel and Gas (NFG) code.
12. Thru-the-Base Connectors:
- a. Kits shall provide connectors to permit gas and electrical connections to be brought to the unit through the unit basepan.
 - b. Minimum of four connection locations per unit.
13. Propeller Power Exhaust:
- a. Power exhaust shall be used in conjunction with an integrated economizer.
 - b. Independent modules for vertical or horizontal return configurations shall be available.
 - c. Horizontal power exhaust is shall be mounted in return ductwork.
 - d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control.
14. Roof Curbs (Vertical):
- a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
 - b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.

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c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.

15. High Altitude Gas Conversion Kit:

a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit to operate from 2000-7000 ft (610 to 2134m) elevation with natural gas or from 0-7000 ft (90-2134m) elevation with liquefied propane.

16. Outdoor Air Enthalpy Sensor:

a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.

17. Return Air Enthalpy Sensor:

a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.

18. Indoor Air Quality (CO₂) Sensor:

a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.

b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.

19. Smoke detectors (factory installed only):

a. Shall be a Four-Wire Controller and Detector.

b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.

c. Shall use magnet-activated test/reset sensor switches.

d. Shall have tool-less connection terminal access.

e. Shall have a recessed momentary switch for testing and resetting the detector.

f. Controller shall include:

(1.) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.

(2.) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.

(3.) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.

(4.) Capable of direct connection to two individual detector modules.

(5.) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications

20. Winter start kit

a. Shall contain a bypass device around the low pressure switch.

b. Shall be required when mechanical cooling is required down to 25_F (-4_C).

c. Shall not be required to operate on an economizer when below an outdoor ambient of 40_F (4_C).

21. Time Guard

a. Shall prevent compressor short-cycling by providing a 5-minute delay (± 2 minutes) before restarting a compressor after shutdown for any reason.

b. One device shall be required per compressor.

AIR QUALITY SYSTEMS, INC.

101 Hartz Blvd.
Broadway, VA 22815

(540) 896-7182
FAX (540) 896-7185

August 4, 2010

Proposal #AQS080410BHI

Department Of Administration
Purchasing Division Building 15
2019 Washington Street, East
Charleston, WV. 25305-0130

RE: the change out of four roof top units at the Martinsburg Correctional Center located at 38 Grapevine Road, Martinsburg, WV
Unit #s RTU-1 RTU-2 RTU-4 RTU-5

Air Quality Systems, Inc. proposes to furnish and install four new Carrier gas/ac package roof top units in place of the existing Carrier roof top units. Installation to include: removal of the existing units, install new Carrier units, reconnection of the primary electrical, gas pipe and duct work. The existing electrical disconnects will be reused.
A start-up and system check will be performed for completion.

Total this estimate: **\$37,950.00**

Thirty seven thousand, nine hundred and fifty dollars

Equipment

Model 48TCED09A2A5-0A0A0	Carrier roof top unit (x3)
Model 48TCEA06A2A5-0A0A0	Carrier roof top unit (x1)
Manual outside air damper (x4)	one per each unit (x4)
33CS400-01	digital non programmable thermostat (x4)

Warranty

10 year limited on the heat exchanger
5 year limited on Carrier compressor
1 year limited on Carrier parts
1 year limited on labor

Warranty work is performed during regular working hours Monday through Friday, 8:00 am – 4:30 pm.

Any alteration or deviation from above specifications involving extra costs will be executed only upon written orders, and will become an extra charge over and above the estimate. All agreements contingent upon strikes, accidents or delays beyond our control. Owner to carry fire, tornado, flood and other necessary insurance upon the above work. Workmen's compensation and public liability insurance on the above work to be taken out by **Air Quality Systems, Inc.**

Should **Air Quality Systems, Inc.** become involved in a legal action in order to recover any amount payable under this agreement or for additional services performed, the customer will be responsible for all court costs and attorney fees incurred by **Air Quality Systems, Inc.**

Respectfully submitted per **Air Quality Systems, Inc.**

NOTE: This proposal may be withdrawn by us if not accepted within 30 days.

ACCEPTANCE OF PROPOSAL #AQS080410BHI

Payment Schedule: 100% due upon completion.

Terms: 15 days-1.5% after 30 days-18% APR

The above prices, specifications and conditions are satisfactory and are hereby accepted. You are authorized to do the work as specified. Payments will be made as outlined above.

Signature _____ Date _____

Billing Address _____

Job Site Address _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, Air Quality Systems, Inc.
of Broadway, Virginia, as Principal, and Merchants Bonding
Company of Des Moines, Iowa, a corporation organized and existing under the laws of the State of Iowa
with its principal office in the City of Des Moines, as Surety, are held and firmly bound unto the State
of West Virginia, as Obligee, in the penal sum of Five Percent of Bid (\$ 5% of bid) for the payment of which,
well and truly to be made, we jointly and severally bind ourselves, our heirs, administrators, executors, successors and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the Purchasing Section of the
Department of Administration a certain bid or proposal, attached hereto and made a part hereof, to enter into a contract in writing for
COR61462 Buyer 21 Rooftop HVAC System Installation, Martinsburg
Correctional Center, Randolph County.

NOW THEREFORE,

- (a) If said bid shall be rejected, or
- (b) If said bid shall be accepted and the Principal shall enter into a contract in accordance with the bid or proposal attached
hereto and shall furnish any other bonds and insurance required by the bid or proposal, and shall in all other respects perform the
agreement created by the acceptance of said bid, then this obligation shall be null and void, otherwise this obligation shall remain in full
force and effect. It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event,
exceed the penal amount of this obligation as herein stated.

The Surety, for the value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no
way impaired or affected by any extension of the time within which the Obligee may accept such bid, and said Surety does hereby
waive notice of any such extension.

IN WITNESS WHEREOF, Principal and Surety have hereunto set their hands and seals, and such of them as are corporations
have caused their corporate seals to be affixed hereunto and these presents to be signed by their proper officers, this
5th day of August, 20 10.

Principal Corporate Seal

Air Quality Systems, Inc.
(Name of Principal)
By [Signature]
(Must be President or
Vice President)
Pres 8-5-10
(Title)

Surety Corporate Seal

Merchants Bonding Company
(Name of Surety)
[Signature]
Attorney-in-Fact

Beth A. Martin, Attorney In Fact

IMPORTANT - Surety executing bonds must be licensed in West Virginia to transact surety insurance. Raised corporate seals
must be affixed, a power of attorney must be attached.

MERCHANTS BONDING COMPANY POWER OF ATTORNEY

Know All Persons By These Presents, that the MERCHANTS BONDING COMPANY (MUTUAL), a corporation duly organized under the laws of the State of Iowa, and having its principal office in the City of Des Moines, County of Polk, State of Iowa, hath made, constituted and appointed, and does by these presents make, constitute and appoint

Jill P. Wright, Thomas L. Beierle, Beth A. Martin, Patrick C. Sweet

of Harrisonburg and State of Virginia its true and lawful Attorney-in-Fact, with full power and authority hereby conferred in its name, place and stead, to sign, execute, acknowledge and deliver in its behalf as surety any and all bonds, undertakings, recognizances or other written obligations in the nature thereof, subject to the limitation that any such instrument shall not exceed the amount of:

THREE MILLION (\$3,000,000.00) DOLLARS

and to bind the MERCHANTS BONDING COMPANY (MUTUAL) thereby as fully and to the same extent as if such bond or undertaking was signed by the duly authorized officers of the MERCHANTS BONDING COMPANY (MUTUAL), and all the acts of said Attorney-in-Fact, pursuant to the authority herein given, are hereby ratified and confirmed.

This Power-of-Attorney is made and executed pursuant to and by authority of the following Amended Substituted and Restated By-Laws adopted by the Board of Directors of the MERCHANTS BONDING COMPANY (MUTUAL) on November 16, 2002.

ARTICLE II, SECTION 8 - The Chairman of the Board or President or any Vice President or Secretary shall have power and authority to appoint Attorneys-in-Fact, and to authorize them to execute on behalf of the Company, and attach the Seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof.

ARTICLE II, SECTION 9 - The signature of any authorized officer and the Seal of the Company may be affixed by facsimile to any Power of Attorney or Certification thereof authorizing the execution and delivery of any bond, undertaking, recognizance, or other suretyship obligations of the Company, and such signature and seal when so used shall have the same force and effect as though manually fixed.

In Witness Whereof, MERCHANTS BONDING COMPANY (MUTUAL) has caused these presents to be signed by its President and its corporate seal to be hereto affixed, this 13th day of July, 2009.



MERCHANTS BONDING COMPANY (MUTUAL)

By

Larry Taylor
President

STATE OF IOWA
COUNTY OF POLK ss.

On this 13th day of July, 2009, before me appeared Larry Taylor, to me personally known, who being by me duly sworn did say that he is President of the MERCHANTS BONDING COMPANY (MUTUAL), the corporation described in the foregoing instrument, and that the Seal affixed to the said instrument is the Corporate Seal of the said Corporation and that the said instrument was signed and sealed in behalf of said Corporation by authority of its Board of Directors.

In Testimony Whereof, I have hereunto set my hand and affixed my Official Seal at the City of Des Moines, Iowa, the day and year first above written.

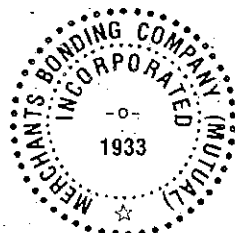


Cindy Smyth
Notary Public, Polk County, Iowa

STATE OF IOWA
COUNTY OF POLK ss.

I, William Warner, Jr., Secretary of the MERCHANTS BONDING COMPANY (MUTUAL), do hereby certify that the above and foregoing is a true and correct copy of the POWER-OF-ATTORNEY executed by said MERCHANTS BONDING COMPANY (MUTUAL), which is still in full force and effect and has not been amended or revoked.

In Witness Whereof, I have hereunto set my hand and affixed the seal of the Company on this 5th day of August, 2010.



William Warner Jr.
Secretary



State of West Virginia
DRUG FREE WORKPLACE CONFORMANCE AFFIDAVIT
West Virginia Code §21-1D-5

STATE OF Virginia

COUNTY OF Rockingham, TO-WIT:

I, Brian Hitt, after being first duly sworn, depose and state as follows:

- 1. I am an employee of Air Quality Systems Inc.; and,
(Company Name)
- 2. I do hereby attest that Air Quality Systems Inc.
(Company Name)

maintains a valid written drug free workplace policy and that such policy is in compliance with **West Virginia Code** §21-1D-5.

The above statements are sworn to under the penalty of perjury.

Air Quality Systems Inc.
(Company Name)

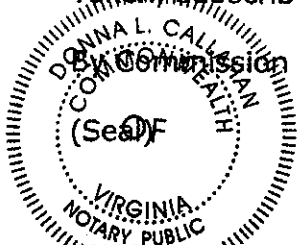
By: Brian Hitt

Title: Project Manager

Date: 8/4/10

Taken, subscribed and sworn to before me this 4th day of August.

My Commission expires October 31, 2010



Donna L. Man #167861
(Notary Public)

Commissioned as Donna L. Callahan

THIS AFFIDAVIT MUST BE SUBMITTED WITH THE BID IN ORDER TO COMPLY WITH WV CODE PROVISIONS. FAILURE TO INCLUDE THE AFFIDAVIT WITH THE BID SHALL RESULT IN DISQUALIFICATION OF THE BID.

RFQ No. COR61462

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code §61-5-3*), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: Air Quality Systems, Inc.

Authorized Signature: Brian Holt Date: 8/4/10

State of Virginia

County of Hockingham, to-wit:

Taken, subscribed, and sworn to before me this 4th day of August, 2010.

My Commission expires October 31, 2010.

NOTARY PUBLIC Donna L. May #1167861
Commissioned as Donna L. Callahan

