

INVITATION TO BID
from
COMMUNITY COLLEGE OF ALLEGHENY COUNTY
PURCHASING DEPARTMENT
800 ALLEGHENY AVENUE, PITTSBURGH, PENNSYLVANIA 15233

BID PROPOSAL NO. 1015
HVAC VIBRATION REDUCTION AT SCIENCE BUILDING – ALLEGHENY CAMPUS

Sealed proposals will be received and publicly opened by a Purchasing Agent of the Community College of Allegheny County.

**Proposals must be received by the Purchasing Department, 800 Allegheny Avenue,
Pittsburgh, Pennsylvania 15233**

on or before 2:00 PM, on Friday, February 2, 2018

Proposals received after this deadline will be considered as a “late bid” and returned unopened to the offerer.

BID SCOPE

Provide all labor, material, equipment, permits and supervision required to reduce HVAC vibrations in the KLI Science Building - Allegheny Campus in accordance with specification, terms and conditions contained herein.

For technical questions or to view site call Ray Marks, Asst. Director of Facilities at 412.237.3072 (rmarks@ccac.edu)
For procedural questions, call Mike Cvetic, Director of Purchasing, at 412.237.3146 (mcvetic@ccac.edu)

BID REQUIREMENTS (where checked)

- Bid Bond. 10% of total base bid amount (Submit with Bid)
- Performance Bond. 100% of total contract amount (Awardee Only)
- Payment Bond. 100% of total contract amount (Awardee Only)
- Master Services Agreement (Awardee Only)
- No Lien Agreement (Awardee Only)
- Insurance Certificate (Awardee Only)

BID BOND: Bid must include the required bid bond or certified check, which will be returned to the unsuccessful bidder approximately 45 days after the bid due date.

PERFORMANCE BOND: The successful bidder will be required to enter into a written contract with the College and to furnish a contractor’s bond conditioned for the faithful and full performance of the contract with sufficient surety in the amount stated above. Any surety cosigning the contractor’s bond shall be an Incorporated surety company approved by the Court of Common Pleas of Allegheny County. Bond with surety must be furnished within 20 days after receipt of the contract. The Board of Trustees reserves the right to reject any bond furnished where it is in the best interest of the College to do so.

The College requires Power of Attorney attached to bonds to be dated concurrently, sealed, and executed by a proper **live** (not facsimile) **signature**.

PAYMENT BOND: The bidder to whom the contract is awarded shall furnish a bond to guarantee the payment of third-party subcontractors involved in fulfillment of services rendered against College contracts. Such bonds shall be with sufficient surety and in the amount stated above. Failure on the part of the contractor to furnish such bond shall be just cause for cancellation of award.

NO LIEN AGREEMENT AND/OR INSURANCE CERTIFICATES: As required by the College, the No Lien Agreement and/or Insurance Certificate may be requested of the successful bidder.

THE BOARD OF TRUSTEES RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS.

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

INDEX TO SPECIFICATIONS
FOR
BID PROPOSAL NO. 1015

HVAC VIBRATION REDUCTION AT SCIENCE BUILDING – ALLEGHENY CAMPUS

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RETURN BID PROPOSAL FORMS:

BIDDER SIGNATURE FORM	Return Form 1.0
PRICE FORM	Return Form 2.0
NON-COLLUSION AFFIDAVIT	Return Form 3.0
& INSTRUCTIONS	1 Page
MINORITY PARTICIPATION GOALS	Return Form 4.0
EXTENSION OF CONTRACT EXECUTION REQUIREMENTS	Return Form 5.0

DOCUMENTS REQUIRED BY AWARDEE ONLY:

PERFORMANCE BOND	Copy Attached
PAYMENT BOND	Copy Attached
MASTER SERVICES AGREEMENT	Copy Attached
NO-LIEN AGREEMENT	Copy Attached
INSURANCE REQUIREMENTS	Form B

DRAWINGS M0.1 and M1.1

ATTACHMENTS: Trane Custom Air Handling Unit Submittal (119 pages)
Cook (4 pages)

The CCAC Purchasing Department is now publishing all bids via the CCAC website at https://www.ccac.edu/Bid-RFP_Opportunities.aspx. It will be each vendor's responsibility to monitor the bid activity within the given website ("Bid and RFP Opportunities") and ensure compliance with all applicable bid documents inclusive of any issued addenda. Failure to incorporate any applicable addenda in the final submittal may result in the rejection of your bid.

NOTE: FAX OR ELECTRONIC RESPONSES TO BID PROPOSALS ARE NOT ACCEPTABLE.

In the event a sealed bid is hand carried, it is the sole responsibility of the bidder to assure the bid is in possession of the CCAC Purchasing Department prior to the time set for opening.

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

INSTRUCTIONS TO BIDDERS

1. All prices quoted shall be F.O.B. destination and include all freight and delivery charges to actual point of delivery.
2. **Bids that vary from specifications/addendum(s) may be rejected by the College.** Any and all changes to specifications will be issued by addenda via fax/mail. It is the responsibility of bidders to provide the College with company name, address, telephone, and fax numbers and contact names if applicable.
3. Bidders must be recognized dealers in specified materials and qualified to advise in the application and/or use of the materials. When requested, the bidder must satisfy the Community College of Allegheny County that they have the organization, capital, and stock availability and experience to fulfill their bid offer.
4. Bids may be rejected or award cancelled by the College if a bidder intends to sublet any/all of the required work.
5. Completely executed bid documents must be submitted in a **sealed envelope bearing the offering company's name and address; and, the bid number must appear on the sealed envelope.** No College representative will bear any responsibility for the premature opening of a bid which is not properly addressed and identified.
6. Whenever the words "Purchasing Agent" or a pronoun referring to a College Agent appears in either the specifications and/or Articles of Agreement, the Agent is acting only under the authority of and subject to the approval of the Board of Trustees of the Community College of Allegheny County.
7. The College reserves the right to award all or any items, separately or in a lump sum whichever is in the best interest of the College.
8. Bids for supplies shall be submitted to the College in accordance with the numbered item(s) on the price sheet. Unit prices(s) shall prevail where extension of prices is requested.
9. Contracts will not be awarded by the College to any corporation, firm, or individual that has failed in any former contract with the College to perform work or complete work or, in the College's sole judgment, to satisfactorily deliver or provide the quality of materials, fulfill a guarantee(s) or complete work in accordance with the schedule for such prior contract."
10. If the College Agent is of the opinion that the awarded work/products are unnecessarily delayed, the rate of progress of delivery is unsatisfactory, or that the corporation, firm, or individual contractor is willfully violating any of the contract requirements or conditions or is acting in bad faith, the College's Agent shall take whatever action necessary for the completion of the work and/or delivery of the products to the College. Resulting expenses to the College will be deducted from monies due the contractor and the bondsman will be held liable for any balance due at the completion of the contract.
11. Inspection of materials and workmanship of the contractor by a College Agent will not lessen the responsibility of the contractor from the obligation to perform and deliver satisfactory work/materials to the College. The contractor is expected to pay for the cost of tests for defective materials. This cost may be deducted from any monies due the contractor from the College.
12. The contractor will not receive instructions from a College Agent relative to the work or delivery until a contract has been duly signed and the bond, if required, is approved.
13. Companies may quote price(s) on work/material to any and all bidders and may also directly submit a bid to the College for the work/material.
14. When samples are requested by the College, the bidder must supply them free of charge. Samples will not be returned to the bidder.

15. The bidder is solely at risk when using unauthorized patented material.
16. Quantities requested by the College are for bidding purposes only. The College may purchase more or less than the estimated quantities.
17. The College reserves the right to reject any and all bids, and to waive minor discrepancies in the bids or specifications, when in the best interest of the College. The College may purchase any part, all, or none of the materials specified.
18. The College will reject materials that do not meet specifications, even if the bidder lists trade names, or names of such materials on the bid.
19. All prices quoted must be held firm for the contract period. Bids containing escalation or other clauses for price change may be rejected. Discounts or other uncalled for allowances quoted will not be considered in making the award and the bid may be rejected.
20. Unless otherwise specified, materials, supplies, and/or equipment must be delivered thirty (30) days from the date of the purchase order.
21. Unless otherwise specified, materials, supplies, and/or equipment must be new, current stock, and unused.

SIGNING OF AGREEMENT AND BOND

22. Successful bidders are required to sign Contract Articles of Agreement and bond forms as follows:

If trading as an Individual: All copies of Contract Articles of Agreement and bond(s) must be signed by the individual to whom the award is made and signature must be witnessed by the same witness.

If trading as a Partnership: All copies of Contract Articles of Agreement and bond(s) must be signed by **every partner** comprising the Partnership, regardless of number, and these signatures must be witnessed by the same witness.

If trading as a Corporation: All copies of Contract Articles of Agreement and bond(s) must be signed by the **President (or Vice President)** and attested by the Secretary or Assistant Secretary and Corporate seal must appear on all copies.

The County requires that Power of Attorney forms be attached to bonds, bear the same date as that appearing on the bonds and that the forms are sealed and executed by a proper **live signature**.

FICTITIOUS NAME REGISTRATION

23. To comply with a provision of the law regarding registration under the Fictitious Name Act of the Commonwealth of Pennsylvania, successful bidders trading as an **Individual or a Partnership** must submit a certified copy of their Fictitious Name Registration with their contract. Fictitious Name Registration forms are issued by the Office of the Prothonotary of Allegheny County, or the county in which the business is located.

PREVENTION OF DELAY

24. A contractor will be considered in **default** if the contractor has work performed or means employed in the carrying out of the contract that would in any way cause or result in a suspension or delay of, or strike upon the work to be performed of any of the trades working in or about the premises described, or in or about any other building of the Community College of Allegheny County.
25. When trade names or catalog numbers are used, bidders may quote on any equal (unless otherwise stated by the College) but such bids must show trade names and/or catalog numbers of the products.

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

GENERAL CONDITIONS

FOR

CONSTRUCTION AND RENOVATION CONTRACTS

1. PERMITS

It is the responsibility of the contractor to obtain all permits and/or licenses required by Federal, State, County, City, or other local Municipalities or Authorities for work done or services performed under this contract.

2. ROLE OF CONTRACTOR

In the performance of the work hereunder, the contractor shall act as an independent contractor, and all of his agents, employees, and subcontractors shall be subject solely to the control, supervision, and authority of the contractor.

3. EMPLOYEES OF THE CONTRACTOR

It is understood that the contractor in signing the contract will employ only competent and first-class workmen and mechanics; that no workmen shall be regarded as competent and first-class except those who are duly skilled in their respective branches of labor.

4. BONDS

The College will accept only bonds written by surety companies authorized to do business in the Commonwealth of Pennsylvania and the County of Allegheny and included on the United States Treasury Department Annual List of Surety Companies published July first of each year. Limits for those companies appearing on the United States Treasury Department's list cannot be exceeded. This list is available for inspection in the Purchasing Department, Community College of Allegheny County, Administration Building, 800 Allegheny Avenue, Pittsburgh, Pennsylvania 15233. It is also available from the Surety Bond Branch, Financial Management Services, Department of the Treasury, Washington, D.C. 20226. Phone: 1.202.634.2214.

5. EQUAL OPPORTUNITY

Contractor and all subcontractors shall not discriminate against any employee or applicant for employment because of race, color, creed, national origin, or sex. Contractor and all subcontractors shall also comply with all applicable Federal, State, and local Fair Employment Practice Acts, or similar Acts, Rules, and Regulations and whether or not applicable will comply with the Federal Civil Rights Act of 1964. The Terms and Provisions of Executive Order 11246 and any Executive Order modifying or superseding same, are incorporated herein with respect to any work subject thereto.

The contractor and all subcontractors shall, in all solicitations or advertisements for employees placed by them or their behalf state all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, or national origin.

6. MINORITY & DISADVANTAGED PARTICIPATION GOALS

The College's goal is to obtain **15%** combined MBE/WBE/DBE (Minority-owned Business enterprise/Woman-owned Business Enterprise/Disadvantaged Business Enterprise) participation in the work. This is to be based on the dollar value of employment, subcontracts, supplies, goods, and services as a percentage of the total contract amount. The bidder/contractor must demonstrate to the College prior to award of the contract, and periodically thereafter throughout the term of the contract, their compliance and continued ability to comply with these goals.

The contractor shall submit with their bid (on Return Form 4.0) a completed Minority & Disadvantaged Contractor Commitment Plan that will contain the details of how they plan to comply with this goal should they be awarded the contract.

If the plan is not submitted in the bid or is not acceptable, the College may deem the bid non-responsive and may award the work to the next lowest responsive bidder with an acceptable plan. Thus, it behooves all bidders to formulate their M/W/DBE plan before submitting a bid.

Finding Certified M/W/DBE's - All subcontractors and suppliers of goods and services used to comply with this goal must be **certified** minority or disadvantaged firms. They may be certified by any recognized and reputable organization such as the following: African American Chamber of Commerce, Allegheny County, Port Authority of Allegheny County, City of Pittsburgh, Pittsburgh Regional Minority Purchasing Council, Commonwealth of Pennsylvania, United States Federal Government.

If the firm is not certified and desires to be certified, it is suggested that they contact one of the following organizations. These organizations may also be used as references for sourcing M/W/DBE firms.

Allegheny County
M/W/DBE Department
County Office Building Rm 204
542 Forbes Avenue
Pittsburgh, Pennsylvania 15219
412.350.4309

EMSDC
Regional Enterprise Tower
425 Sixth Avenue
Suite 401
Pittsburgh, Pennsylvania 15219
412.391.4423

Diversity Business Resource Center
700 River Avenue Suite 231
Pittsburgh, PA 15212
412.322.3272

African American Chamber of Commerce
Koppers Building
436 Seventh Avenue, Suite 2220
Pittsburgh, PA 15219
412.391.0610

A list of PA certified M/W/DBE firms can be found on the Internet at <http://www.paucp.com>.

The College expects all firms to demonstrate a good faith effort to include M/W/DBE's when bidding on College contracts. A good faith effort as defined by the Code of Federal Regulations (49CFR26) means "*efforts to achieve a DBE goal or other requirement of this part which, by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the program requirement*".

If you are not successful in securing M/W/DBE participation after a good faith effort is made, provide the following in your waiver request:

- A detailed account of your efforts;
- Your normal business practice and/or inventory profile; and
- An active diversity plan/policy

Reporting During and After Project Completion - The contractor shall submit with their monthly application for payment a written M/W/DBE Contractor Report demonstrating their compliance with the goal. The report shall state the dollar amount spent on labor, materials, services, and subcontracts and shall list firm names and vendor names. At the completion of the project, with final application for payment, the contractor shall submit a recap of their compliance which shall state the dollar amount spent on labor, materials, subcontracts, and services as a percentage of the total contract amount. Projects with shorter timeframes shall require a one-time only report at the completion of the project. Reports are to be accompanied by back-up documentation evidencing the business relationship with the M/W/DBE for the particular project (e.g.: copies of invoices, purchase orders, or evidence of payments).

Failure to Comply With M/W/DBE Goals – If the contractor fails to make a good faith effort (as determined by the College) to comply with the College's 15% M/W/DBE goal or fails to meet their M/W/DBE commitment or to submit documentation as required by the College, the College may consider such non-compliance or breach of contract and any one or more of the following may occur:

- Rejection of the bid
- Forfeiture of bid guaranty
- Termination of the contract
- The imposing of sanctions as deemed appropriate by the College
- Contractor being barred from bidding on College contracts for up to three (3) years
- Or such other remedy as the College deems appropriate

7. FINANCIAL INTEREST

All bidders for construction must be established firms competent to perform the required scope of work. All bidders must satisfy the Community College of Allegheny County that they have the requisite organization, capital, plant, stock, ability, and experience to satisfactorily execute and contract in accordance with the provisions of the contract in which they are interested.

If the contractor's base bid is \$25,000.00 or more, the American Institute of Architects form, "Contractors Qualification Statement" form A305 - 1986 (or latest revision) may be requested by CCAC. This form is available from the American Institute of Architects, 1735 New York Avenue N.W., Washington, D.C. 20006. If requested by CCAC, a completed form A305 is to be submitted within 48 business hours and may be faxed to 412.237.3195.

8. EMPLOYMENT OF INDEPENDENT SUBCONTRACTORS

If you are a contractor to the College and the value of the base contract is \$25,000.00 or more, you must secure approval of all proposed subcontractors from the College prior to beginning work. Information on your proposed subcontractors is to be submitted on the form entitled Proposed Subcontractors.

Each proposed subcontractor to be employed must be an independent contractor "in fact" and must meet the following criteria:

- a. The subcontractor must have a Federal identification number.
- b. The subcontractor must perform these same services for others.
- c. The subcontractor must have an established place of business.
- d. The subcontractor must use their own tools and equipment.
- e. The subcontractor must pay all taxes and other items required by law to be paid by an employer with respect to compensation paid to their employees.
- f. The subcontractor must provide and maintain all insurance required by law and the College.

If the proposed subcontractor does not meet all of these criteria, they will not be approved.

9. VERBAL AUTHORIZATIONS

No verbal agreement or understanding with any officer, agent, or employee of the College either before or after the execution of the contract shall alter, amend, modify, or rescind any of the terms or provisions contained in any of the contract documents. This provision shall not limit or affect the right to make changes or variations in the work. Any changes must be authorized in writing.

10. APPLICABLE LAW, ACTS, AND ORDINANCES

The contractor(s) shall agree to abide by and be bound by all applicable provisions and regulations of all laws, acts, and ordinances relating to and regulating the hours and conditions of employment.

11. PENNSYLVANIA PREVAILING WAGE ACT

The Pennsylvania Prevailing Wage Act shall be incorporated into and made part of all College construction related contract(s) having an estimated value of \$25,000.00 or more.

It is the responsibility of the contractor to ensure that they have included the appropriate Pennsylvania prevailing wage rates in their proposal to the College. Failure to do this will not be a reason for the contractor to withdraw their bid or fail to perform the contract or to request additional payments from the College.

In accordance with the Prevailing Wage Determination Act, the contractor(s) shall:

- a. Pay no less than the wage rates including contributions for employee benefits as determined in the decision of the Secretary of Labor and Industry and shall comply with the conditions of the Pennsylvania Prevailing Wage Act approved August 15, 1961 (Act No. 442) as amended August 9, 1963 and/or subsequent amendments thereof (Act No. 342) and the regulations issued pursuant thereto.
- b. Apply all applicable provisions of the Acts and Laws to all work performed on the contract by the contractor(s) and subcontractor(s).
- c. Insert in each of his subcontracts all of the stipulations contained in these required provisions and such other stipulations as may be required.
- d. Assure that no workmen be employed on the public work except in accordance with the classifications set forth in the decisions of the Secretary. In the event that additional or different classifications are necessary, the procedure set forth in Section 7 of the above referenced Regulations shall be followed.
- e. Assure that all workmen employed or working on this contract shall be paid unconditionally regardless of whether any contractual relationship exists or the nature of any contractual relationship which may be alleged to exist between any contractor, subcontractor, and workmen not less than once a week without deduction or debate on any account either directly or indirectly except authorized deductions, the full amounts due at the time of payment computed at the rates applicable to the time worked on the appropriate classification. Nothing in this contract, the Act or these Regulations, prohibits the payment of more than the general prevailing minimum wage rates as determined by the Secretary to any workmen on public work.
- f. Each subcontractor shall post for the entire period of construction the wage determination decisions of the Secretary including the effective date of any charges thereof in a prominent and easily accessible place or places at the site of the work and at such place or places used by them to pay workmen their wages. The posted notice of wage rates must contain the following information:
 1. Name of project.
 2. Name of public body for which it is being constructed.
 3. The crafts and classifications of workmen listed in the Secretary's general prevailing minimum wage rate determination for the particular project.

4. The general prevailing minimum wage rates determined for each craft and classification and the effective date of any changes.
 5. A statement advising workmen that if they have been paid less than the general prevailing minimum wage rate for their job classification or that the contractor and/or subcontractor are not complying with the Act or these Regulations in any manner whatsoever they may file a protest with the Secretary of Labor and Industry. Any Workmen paid less than the rate specified in the contract shall have a civil right of action for the difference between the wage paid and the wages stipulated in the contract, which right of action must be exercised within six months from the occurrence of the event creating such right.
- g. All subcontractors shall keep an accurate record showing the name, craft, and/or classification, number of hours worked per day, and the actual hourly rate of wage paid (including employee benefits) to each workman employed by him in connection with the public work and such record must include any deductions from each workman. The record shall be preserved for two years from the date of payment and shall be open at all reasonable hours to the inspection of the public body awarding the contract and to the Secretary or his duly authorized representative.
 - h. Assure that apprentices shall be limited to such numbers as shall be in accordance with a bonafide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14, 1961 (Act No. 304) and the Rules and Regulations issued pursuant thereto shall be employed on the public work project. Any workman using the tools of a craft who does not qualify as an apprentice within the provisions of this subsection shall be paid at the rate predetermined for journeymen in that particular craft and/or classification.
 - i. Pay wages without any deductions except authorized deductions. Employers not parties to a contract requiring contributions for employee benefits which the Secretary has determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workmen.
 - j. Be advised that payment of compensation to workmen for work performed on public work on a lump sum basis, or a piece work system, or a price certain for the completion of a certain amount of work, or the production of a certain result shall be deemed a violation of the Act and these Regulations regardless of the average hourly earnings resulting therefrom.
 - k. Each subcontractor shall file a statement each week and a final statement at the conclusion of the work on the contract with the contracting agency under oath and in form satisfactory to the Secretary certifying that all workmen have been paid wages in strict conformity with the provisions of the contract as prescribed by Section 3 of these Regulations; or, if any wages remain unpaid, to set forth the amount of wages due and owing to each workman respectively. The College shall require the contractor and all subcontractors to file weekly wage certifications utilizing form WH-347. (Reference: Section 10(a) of Act and Section 10 of Regulations). Prior to making final payment the College will require final wage certifications from all contractors and subcontractors.

12. PAYMENT TO CONTRACTORS

The College maintains the right to withhold a percentage of monies requested by contractors for work done under this contract in accordance with the American Institute of Architects Application for Payment form G-702 as indicated in Section 01152--Applications for Payment of the technical specifications.

13. INSURANCE REQUIREMENT

A properly executed certificate of insurance must be submitted with the signed Contract Articles of Agreement. The certificate of insurance must show that the contractor and subcontractors comply with the College's insurance requirements. The certificate of insurance must state that in the event any coverage shown is to be cancelled the College will be given a thirty day advance notice of the cancellation.

14. MINORITY BIDDERS

The Community College of Allegheny County hereby notifies all bidders that it will affirmatively ensure that minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

15. MODIFICATION AND WITHDRAWAL OF BIDS

- a. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.
- b. Bidders may withdraw their bid within two (2) business days of the bid opening only within accordance of Commonwealth of Pennsylvania public bidding law.

16. TAXES

CCAC is a governmental entity and is generally exempt from sales and use tax with respect to purchases of building machinery and equipment. A tax exemption certificate will be provided upon request. It is the bidder's responsibility to pay any/all applicable taxes on non-exempt equipment, supplies and services in accordance with applicable law.

17. PENNSYLVANIA STEEL PRODUCTS PROCUREMENT ACT

Contractor acknowledges that CCAC is a public agency subject to the requirements of the Pennsylvania Steel Products Procurement Act, 73 P.S. Section 1881 et. seq (the "SPPA"). Contractor therefore represents and warrants that any and all steel products purchased, used or supplied by it in the performance of the Contract will be melted and manufactured in the United States, and that its performance hereunder will otherwise comply with requirements of the SPPA at all times. Contractor further agrees to provide CCAC with documentation and/or certification of its compliance with the foregoing requirements, as required under the SPPA, and acknowledges that it shall not be entitled to receive payment hereunder until such documentation and/or certification has been provided.

18. MARKUPS ON CHANGE ORDERS

Markups on change order requests shall not exceed 15%. This would apply to overhead and profit, labor, materials, equipment, etc.

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project Name:	HVAC Vibration Reduction at Science Building
Awarding Agency:	Community College of Allegheny County
Contract Award Date:	2/15/2018
Serial Number:	18-00398
Project Classification:	Building
Determination Date:	1/17/2018
Assigned Field Office:	Pittsburgh
Field Office Phone Number:	(412)565-5300
Toll Free Phone Number:	(877)504-8354
Project County:	Allegheny County

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 18-00398 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	8/1/2016		\$36.18	\$23.73	\$59.91
Boilermakers	6/1/2016		\$40.90	\$27.61	\$68.51
Bricklayer	12/1/2017		\$31.69	\$22.15	\$53.84
Bricklayer	12/1/2016		\$31.44	\$21.10	\$52.54
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2017		\$33.01	\$16.63	\$49.64
Cement Masons	6/1/2017		\$29.52	\$18.39	\$47.91
Cement Masons	6/1/2019		\$31.27	\$19.39	\$50.66
Cement Masons	6/1/2018		\$30.27	\$18.99	\$49.26
Cement Masons	6/1/2020		\$32.77	\$19.39	\$52.16
Cement Masons	6/1/2021		\$34.27	\$19.39	\$53.66
Dockbuilder, Pile Drivers	1/1/2016		\$32.03	\$17.53	\$49.56
Drywall Finisher	6/1/2018		\$28.10	\$19.99	\$48.09
Drywall Finisher	6/1/2017		\$27.80	\$19.14	\$46.94
Electric Lineman	5/30/2016		\$44.78	\$22.82	\$67.60
Electricians & Telecommunications Installation Technician	12/22/2018		\$41.74	\$26.44	\$68.18
Electricians & Telecommunications Installation Technician	12/22/2019		\$44.46	\$26.44	\$70.90
Electricians & Telecommunications Installation Technician	12/23/2017		\$39.76	\$26.44	\$66.20
Electricians & Telecommunications Installation Technician	12/23/2016		\$40.61	\$23.98	\$64.59
Elevator Constructor	1/1/2016		\$44.80	\$30.29	\$75.09
Glazier	9/1/2017		\$28.00	\$22.60	\$50.60
Glazier	9/1/2018		\$28.62	\$23.23	\$51.85
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	6/1/2017		\$33.54	\$30.24	\$63.78
Laborers (Class 01 - See notes)	1/1/2017		\$22.32	\$15.62	\$37.94
Laborers (Class 01 - See notes)	1/1/2019		\$25.37	\$14.67	\$40.04
Laborers (Class 01 - See notes)	1/1/2018		\$22.32	\$16.67	\$38.99
Laborers (Class 01 - See notes)	1/1/2021		\$27.47	\$14.67	\$42.14
Laborers (Class 01 - See notes)	1/1/2020		\$26.42	\$14.67	\$41.09
Laborers (Class 02 - See notes)	1/1/2021		\$27.62	\$14.67	\$42.29
Laborers (Class 02 - See notes)	1/1/2019		\$25.52	\$14.67	\$40.19
Laborers (Class 02 - See notes)	1/1/2018		\$22.47	\$16.67	\$39.14
Laborers (Class 02 - See notes)	1/1/2020		\$26.57	\$14.67	\$41.24
Laborers (Class 02 - See notes)	1/1/2017		\$22.47	\$15.62	\$38.09
Laborers (Class 03 - See notes)	1/1/2020		\$26.70	\$14.67	\$41.37
Laborers (Class 03 - See notes)	1/1/2021		\$27.75	\$14.67	\$42.42
Laborers (Class 03 - See notes)	1/1/2019		\$25.65	\$14.67	\$40.32
Laborers (Class 03 - See notes)	1/1/2017		\$22.60	\$15.62	\$38.22
Laborers (Class 03 - See notes)	1/1/2018		\$22.60	\$16.67	\$39.27
Laborers (Class 04 - See notes)	1/1/2017		\$23.07	\$15.62	\$38.69
Laborers (Class 04 - See notes)	1/1/2018		\$23.07	\$16.67	\$39.74
Laborers (Class 04 - See notes)	1/1/2021		\$28.22	\$14.67	\$42.89

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 18-00398 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 04 - See notes)	1/1/2020		\$27.17	\$14.67	\$41.84
Laborers (Class 04 - See notes)	1/1/2019		\$26.12	\$14.67	\$40.79
Landscape Laborer	1/1/2018		\$20.59	\$15.31	\$35.90
Landscape Laborer	1/1/2017		\$20.59	\$14.36	\$34.95
Landscape Laborer (Skilled)	1/1/2018		\$21.01	\$15.31	\$36.32
Landscape Laborer (Skilled)	1/1/2017		\$21.01	\$14.36	\$35.37
Landscape Laborer (Tractor Operator)	1/1/2017		\$21.31	\$14.36	\$35.67
Landscape Laborer (Tractor Operator)	1/1/2018		\$21.31	\$15.31	\$36.62
Millwright	6/1/2016		\$38.91	\$18.14	\$57.05
Millwright	6/1/2017		\$39.83	\$18.57	\$58.40
Operators (Class 01 - see notes)	6/1/2021		\$37.09	\$23.35	\$60.44
Operators (Class 01 - see notes)	6/1/2020		\$36.39	\$22.55	\$58.94
Operators (Class 01 - see notes)	6/1/2019		\$35.69	\$21.75	\$57.44
Operators (Class 01 - see notes)	6/1/2018		\$35.09	\$20.95	\$56.04
Operators (Class 01 - see notes)	6/12/2017		\$34.49	\$20.15	\$54.64
Operators (Class 02 -see notes)	6/1/2021		\$31.02	\$23.35	\$54.37
Operators (Class 02 -see notes)	6/1/2019		\$30.22	\$21.75	\$51.97
Operators (Class 02 -see notes)	6/1/2018		\$29.90	\$20.95	\$50.85
Operators (Class 02 -see notes)	6/12/2017		\$29.58	\$20.15	\$49.73
Operators (Class 02 -see notes)	6/1/2020		\$30.62	\$22.55	\$53.17
Operators (Class 03 - See notes)	6/1/2018		\$28.46	\$20.95	\$49.41
Operators (Class 03 - See notes)	6/1/2020		\$28.95	\$22.55	\$51.50
Operators (Class 03 - See notes)	6/1/2021		\$29.23	\$23.35	\$52.58
Operators (Class 03 - See notes)	6/12/2017		\$28.25	\$20.15	\$48.40
Operators (Class 03 - See notes)	6/1/2019		\$28.67	\$21.75	\$50.42
Painters Class 6 (see notes)	6/1/2017		\$27.50	\$18.66	\$46.16
Painters Class 6 (see notes)	6/1/2019		\$28.50	\$20.06	\$48.56
Painters Class 6 (see notes)	6/1/2018		\$28.00	\$19.36	\$47.36
Pile Driver Divers (Building, Heavy, Highway)	1/1/2017		\$49.13	\$17.95	\$67.08
Pile Driver Divers (Building, Heavy, Highway)	1/1/2018		\$50.33	\$18.55	\$68.88
Pile Driver Divers (Building, Heavy, Highway)	1/1/2019		\$51.45	\$19.30	\$70.75
Piledrivers	1/1/2018		\$33.55	\$18.55	\$52.10
Piledrivers	1/1/2019		\$34.30	\$19.30	\$53.60
Piledrivers	1/1/2017		\$32.75	\$17.95	\$50.70
Plasterers	6/1/2017		\$28.79	\$15.79	\$44.58
Plasterers	6/1/2017		\$28.79	\$15.79	\$44.58
Plasterers	6/1/2016		\$28.79	\$14.79	\$43.58
Plumbers	6/1/2017		\$39.20	\$21.27	\$60.47
Pointers, Caulkers, Cleaners	12/1/2016		\$29.27	\$18.34	\$47.61
Pointers, Caulkers, Cleaners	12/1/2017		\$29.88	\$18.73	\$48.61
Roofers	6/1/2020		\$36.08	\$13.84	\$49.92
Roofers	6/1/2018		\$33.58	\$13.84	\$47.42
Roofers	6/1/2017		\$31.00	\$15.17	\$46.17
Roofers	6/1/2019		\$34.83	\$13.84	\$48.67

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 18-00398 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Sheet Metal Workers	7/1/2018		\$34.72	\$27.83	\$62.55
Sheet Metal Workers	7/1/2017		\$33.70	\$27.74	\$61.44
Sprinklerfitters	7/1/2017		\$36.42	\$20.52	\$56.94
Sprinklerfitters	1/1/2017		\$35.42	\$20.52	\$55.94
Steamfitters	6/1/2017		\$41.71	\$19.01	\$60.72
Stone Masons	12/1/2016		\$32.24	\$20.53	\$52.77
Stone Masons	12/1/2017		\$32.66	\$21.41	\$54.07
Terrazzo Finisher	12/1/2017		\$31.08	\$15.85	\$46.93
Terrazzo Finisher	12/1/2016		\$30.53	\$15.40	\$45.93
Terrazzo Mechanics	12/1/2017		\$30.57	\$17.91	\$48.48
Terrazzo Mechanics	12/1/2016		\$30.18	\$17.30	\$47.48
Tile Finisher	12/1/2017		\$25.16	\$14.90	\$40.06
Tile Finisher	12/1/2016		\$24.59	\$14.38	\$38.97
Tile Setter	12/1/2016		\$30.27	\$18.51	\$48.78
Tile Setter	12/1/2017		\$30.75	\$19.05	\$49.80
Truckdriver class 1(see notes)	1/1/2016		\$27.62	\$16.60	\$44.22
Truckdriver class 2 (see notes)	1/1/2016		\$27.75	\$16.69	\$44.44
Truckdriver class 3 (see notes)	1/1/2016		\$28.23	\$16.98	\$45.21

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 18-00398 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter Welder	1/1/2019		\$34.97	\$18.42	\$53.39
Carpenter Welder	1/1/2017		\$33.35	\$17.14	\$50.49
Carpenter Welder	1/1/2018		\$34.12	\$17.77	\$51.89
Carpenters	1/1/2019		\$34.02	\$18.42	\$52.44
Carpenters	1/1/2017		\$32.40	\$17.14	\$49.54
Carpenters	1/1/2018		\$33.17	\$17.77	\$50.94
Cement Finishers	1/1/2017		\$30.14	\$19.40	\$49.54
Cement Finishers	1/1/2019		\$31.94	\$20.50	\$52.44
Cement Finishers	1/1/2018		\$31.04	\$19.90	\$50.94
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	6/1/2017		\$33.54	\$30.24	\$63.78
Laborers (Class 01 - See notes)	1/1/2017		\$24.85	\$20.95	\$45.80
Laborers (Class 01 - See notes)	1/1/2019		\$24.85	\$23.85	\$48.70
Laborers (Class 01 - See notes)	1/1/2018		\$24.85	\$22.35	\$47.20
Laborers (Class 02 - See notes)	1/1/2018		\$25.01	\$22.35	\$47.36
Laborers (Class 02 - See notes)	1/1/2019		\$25.01	\$23.85	\$48.86
Laborers (Class 02 - See notes)	1/1/2017		\$25.01	\$20.95	\$45.96
Laborers (Class 03 - See notes)	1/1/2017		\$25.40	\$20.95	\$46.35
Laborers (Class 03 - See notes)	1/1/2019		\$25.40	\$23.85	\$49.25
Laborers (Class 03 - See notes)	1/1/2018		\$25.40	\$22.35	\$47.75
Laborers (Class 04 - See notes)	1/1/2017		\$25.85	\$20.95	\$46.80
Laborers (Class 04 - See notes)	1/1/2018		\$25.85	\$22.35	\$48.20
Laborers (Class 04 - See notes)	1/1/2019		\$25.85	\$23.85	\$49.70
Laborers (Class 05 - See notes)	1/1/2019		\$26.26	\$23.85	\$50.11
Laborers (Class 05 - See notes)	1/1/2018		\$26.26	\$22.35	\$48.61
Laborers (Class 05 - See notes)	1/1/2017		\$26.26	\$20.95	\$47.21
Laborers (Class 06 - See notes)	1/1/2019		\$23.10	\$23.85	\$46.95
Laborers (Class 06 - See notes)	1/1/2018		\$23.10	\$22.35	\$45.45
Laborers (Class 06 - See notes)	1/1/2017		\$23.10	\$20.95	\$44.05
Laborers (Class 07 - See notes)	1/1/2019		\$25.85	\$23.85	\$49.70
Laborers (Class 07 - See notes)	1/1/2018		\$25.85	\$22.35	\$48.20
Laborers (Class 07 - See notes)	1/1/2017		\$25.85	\$20.95	\$46.80
Laborers (Class 08 - See notes)	1/1/2018		\$27.35	\$22.35	\$49.70
Laborers (Class 08 - See notes)	1/1/2017		\$27.35	\$20.95	\$48.30
Laborers (Class 08 - See notes)	1/1/2019		\$27.35	\$23.85	\$51.20
Operators (Class 01 - see notes)	1/1/2019		\$31.89	\$21.68	\$53.57
Operators (Class 01 - see notes)	1/1/2018		\$31.29	\$20.78	\$52.07
Operators (Class 01 - see notes)	1/1/2017		\$30.69	\$19.98	\$50.67
Operators (Class 02 -see notes)	1/1/2017		\$30.43	\$19.98	\$50.41
Operators (Class 02 -see notes)	1/1/2019		\$31.63	\$21.68	\$53.31
Operators (Class 02 -see notes)	1/1/2018		\$31.03	\$20.78	\$51.81
Operators (Class 03 - See notes)	1/1/2019		\$27.98	\$21.68	\$49.66
Operators (Class 03 - See notes)	1/1/2018		\$27.38	\$20.78	\$48.16
Operators (Class 03 - See notes)	1/1/2017		\$26.78	\$19.98	\$46.76
Operators (Class 04 - See notes)	1/1/2019		\$27.52	\$21.68	\$49.20

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 18-00398 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Class 04 - See notes)	1/1/2017		\$26.32	\$19.98	\$46.30
Operators (Class 04 - See notes)	1/1/2018		\$26.92	\$20.78	\$47.70
Operators (Class 05 - See notes)	1/1/2019		\$27.27	\$21.68	\$48.95
Operators (Class 05 - See notes)	1/1/2018		\$26.67	\$20.78	\$47.45
Operators (Class 05 - See notes)	1/1/2017		\$26.07	\$19.98	\$46.05
Painters Class 1 (see notes)	6/1/2018		\$32.50	\$19.36	\$51.86
Painters Class 1 (see notes)	6/1/2019		\$33.15	\$20.06	\$53.21
Painters Class 1 (see notes)	6/1/2017		\$31.85	\$18.66	\$50.51
Painters Class 1 (see notes)	6/1/2016		\$31.58	\$17.58	\$49.16
Painters Class 1 (see notes)	6/1/2017		\$31.98	\$18.43	\$50.41
Painters Class 2 (see notes)	6/1/2019		\$35.25	\$20.06	\$55.31
Painters Class 2 (see notes)	6/1/2018		\$34.60	\$19.36	\$53.96
Painters Class 2 (see notes)	6/1/2017		\$33.95	\$18.66	\$52.61
Painters Class 3 (see notes)	6/1/2018		\$34.60	\$19.36	\$53.96
Painters Class 3 (see notes)	6/1/2017		\$33.95	\$18.66	\$52.61
Painters Class 3 (see notes)	6/1/2017		\$27.58	\$18.48	\$46.06
Painters Class 3 (see notes)	6/1/2019		\$35.25	\$20.06	\$55.31
Painters Class 3 (see notes)	6/1/2016		\$33.68	\$17.58	\$51.26
Painters Class 4 (see notes)	6/1/2019		\$28.20	\$20.06	\$48.26
Painters Class 4 (see notes)	6/1/2018		\$27.68	\$19.36	\$47.04
Painters Class 4 (see notes)	6/1/2017		\$27.16	\$18.66	\$45.82
Painters Class 5 (see notes)	6/1/2016		\$21.90	\$17.58	\$39.48
Painters Class 5 (see notes)	6/1/2019		\$22.91	\$20.06	\$42.97
Painters Class 5 (see notes)	6/1/2018		\$22.49	\$19.36	\$41.85
Painters Class 5 (see notes)	6/1/2017		\$22.07	\$18.66	\$40.73
Pile Driver Divers (Building, Heavy, Highway)	1/1/2017		\$49.13	\$17.95	\$67.08
Pile Driver Divers (Building, Heavy, Highway)	1/1/2019		\$51.45	\$19.30	\$70.75
Pile Driver Divers (Building, Heavy, Highway)	1/1/2018		\$50.33	\$18.55	\$68.88
Piledrivers	1/1/2018		\$33.55	\$18.55	\$52.10
Piledrivers	1/1/2017		\$32.75	\$17.95	\$50.70
Piledrivers	1/1/2019		\$34.30	\$19.30	\$53.60
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2017		\$40.98	\$32.53	\$73.51
Truckdriver class 1(see notes)	1/1/2019		\$28.99	\$19.43	\$48.42
Truckdriver class 1(see notes)	1/1/2017		\$28.10	\$17.42	\$45.52
Truckdriver class 1(see notes)	1/1/2018		\$28.52	\$18.40	\$46.92
Truckdriver class 2 (see notes)	1/1/2019		\$29.13	\$19.51	\$48.64
Truckdriver class 2 (see notes)	1/1/2017		\$28.24	\$17.50	\$45.74
Truckdriver class 2 (see notes)	1/1/2018		\$28.66	\$18.48	\$47.14
Truckdriver class 3 (see notes)	1/1/2019		\$29.59	\$19.82	\$49.41
Truckdriver class 3 (see notes)	1/1/2018		\$29.13	\$18.78	\$47.91
Truckdriver class 3 (see notes)	1/1/2017		\$28.71	\$17.80	\$46.51

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

RETURN BID PROPOSAL FORM

FOR

BID PROPOSAL NO. 1015

HVAC VIBRATION REDUCTION AT SCIENCE BUILDING – ALLEGHENY CAMPUS

Complete this form and submit with your bid.

- **The undersigned agrees to comply with the Instructions to Bidders and Specifications for the price(s) quoted on the Return Price Form. Price(s) quoted include all allowable cash and/or credit discounts.**
- **The College may reject bids quoting unspecified discounts and/or allowances.**

Submitted by:

Company Name Bidding
(Please print)

Contact Person at Company
(Please print)

Signature

Title

(Handwritten signature must appear here in ink.)

Address

Telephone Number (Include Area Code.)

Fax Number (Include Area Code.)

Trading as: (Check one.) Please print.

_____ Individual

Owner _____

_____ Partnership

Partner _____

Partner _____

_____ Corporation

Exact Name _____

State Incorporated _____

THE BOARD OF TRUSTEES OF THE COLLEGE RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS.

Rev: 1/01

RETURN FORM 1.0

**BID PROPOSAL FORM BID NO. 1015
HVAC VIBRATION REDUCTION AT SCIENCE BUILDING – ALLEGHENY CAMPUS
ALLEGHENY CAMPUS**

Provide all labor, material, equipment, and supervision required to replace items to alleviate vibration in accordance with the specifications contained herein (see attached two pages/drawings M1.0 and M1.1):

\$ _____

See accompanying Air Handling Unit submittal: CCAC K. Leroy Irvis Science & Tech Ctr -- CUSTOM AIR HANDLING UNIT SUBMITTAL dated Nov 29, 2010. Unit section weights begin on page 9. Fan schedule is on page 24. Fan motor data begins on page 39. This submittal is provided "as-is" for the convenience of the bidding contractors. Any marks within the submittal were from the original submission. Neither BDA nor CCAC warrant or guarantee the accuracy of the data contained within.

See accompanying Exhaust Fan submittal: ROOF FAN ADD#4 for project CCAC K LERY IRVIS dated 7/6/2011. This submittal is provided "as-is" for the convenience of the bidding contractors. Any marks within the submittal were from the original submission. Neither BDA nor CCAC warrant or guarantee the accuracy of the data contained within.

CLARIFICATIONS:

1. All fans included in this project shall be dynamically balanced to ensure minimal vibration.
2. Working hours: Normal working hours can start between 6:00 am and 7:00 am. All Contractors shall check in and out each day at the Allegheny Campus Security Office, which is open 24/7 and located inside of the Legacy Way Entrance of the PE Building (above the Starbucks).
3. System shut downs shall be scheduled for Spring Break (March 24, 2018 - April 1, 2018). Work outside of this timeframe shall be scheduled and coordinated with CCAC. Of particular concern is the continued operation of laboratory ventilation systems, which are often required to operate continuously during academic sessions.
4. EF-4 CAN be hard wired instead of connected to the Siemens' system.

WORKING DRAWINGS:

5. M0.1, EXISTING FAN SCHEDULE: The tag "AHU-3" should be changed to "AHU-2".

BIDDER'S NAME (please print): _____

COMPANY NAME: _____

RETURN FORM 2.0

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

NON-COLLUSION AFFIDAVIT

Contract/Bid No. 1015

State of _____ : :s.s.

County of _____ :

I state that I am _____ of _____

(title)

(name of my firm)

and that I am authorized to make this affidavit on behalf of my firm, and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

- (1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any bidder or potential bidder.
- (2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.
- (3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
- (4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
- (5) _____, its affiliates,

(name of my firm)

subsidiaries, officers, directors and employees are not currently under investigation by any governmental agency and have not in the last four years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

I state that _____ understands and

(name of my firm)

acknowledges that the above representations are material and important, and will be relied on by the Community College of Allegheny County in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the Community College of Allegheny County of the true facts relating to the submission of bids for this contract.

Signature _____ Title _____

(MUST BE SIGNED HERE IN HANDWRITING, IN INK.)

Sworn to and subscribed before me this _____ day of _____, 20_____

Notary Public _____ My Commission Expires: _____

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

1. This Non-collusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Antibid-Rigging Act, 73 P.S. § 1611 et seq., governmental agencies may require Non-collusion Affidavits to be submitted together with bids.
2. This Non-collusion Affidavit must be executed by the member, officer or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.
3. Bid rigging and other efforts to restrain competition and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval or submission of the bid.
4. In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.
5. The term “complementary bid” as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.
6. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

MBE/WBE PARTICIPATION: CCAC encourages the participation of minority and women-owned businesses in all of its contracts and is committed to providing maximum opportunities for qualified minority and/or women-owned business enterprises ("MBE/WBEs") to participate in its work. Bidder agrees (1) if qualified, to take reasonable and timely steps to obtain appropriate certification as an MBE and/or WBE, (2) to ensure that MBE and/or WBEs are appropriately considered as subcontractors and/or suppliers under this Agreement; and (3) to report moneys spent for MBE and/or WBE subcontractors and/or suppliers for work as CCAC may from time to time reasonably request. CCAC's goal for MBE/WBE participation is 15%. Please provide documentation as to your firm's good faith effort to reach this goal by describing all applicable details of MBE/WBE participation that may be included in the resulting agreement.

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

MINORITY PARTICIPATION GOALS – BID PROPOSAL NO. 1015

The following must be included with your bid.

Reference: General Conditions for Construction and Renovation Contracts - Item 6, Page 2 – Minority & Disadvantaged Participation Goals

A **15%** M/W/DBE work participation is established. Document your firm’s good faith effort to obtain the **15%** Goal:

M/W/DBE Company	Contact Person	Phone Number	\$Amount or Objective %
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

_____ I am an M/W/DBE. (ATTACH CERTIFICATION)

Total: _____

Bidder acknowledges that CCAC may communicate with listed firms to verify the extent of the contact.

Bidding Company’s Name: _____

Signature: _____

Title: _____

Date: _____

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

BID PROPOSAL NO. 1015

**COMMONWEALTH OF PENNSYLVANIA
BID AWARD & RETENTION LAW
ACT NO. 1978-317, SENATE BILL 68, NOVEMBER 26, 1978**

EXTENSION OF CONTRACT EXECUTION REQUIREMENTS

In the event the contract(s)/purchase order(s) resulting from the above specified bid proposal is/are in excess of \$50,000.00, the above specified Act will apply.

This Act requires the awarding of a contract to the lowest responsible bidder within sixty (60) days of the date of bid opening and the execution of a contract within thirty (30) days after award by the College Board of Trustees. Thirty (30) day extensions of the date for award and for execution are permitted by the mutual written consent of the College and the successful bidder.

Due to the extent of the approval actions required prior to award and execution of any contract, it may not be possible for the College to complete contract award and execution within the sixty (60) day and thirty (30) day periods. Accordingly, each bidder is requested to indicate their agreement with a thirty (30) day extension of the sixty (60) day award date and thirty (30) day execution date by signing this form and returning it with their bid.

Name of Company

Authorized Company Representative

Signature

Title

MUST BE SIGNED HERE IN HANDWRITING, IN INK

RETURN FORM 5.0

COMMUNITY COLLEGE OF ALLEGHENY COUNTY
800 ALLEGHENY AVENUE, PITTSBURGH PA 15233

LABOR AND MATERIAL

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

That we _____ "TO BE COMPLETED ONLY BY AWARDEE"
_____ as Principal
hereinafter called Principal, and _____
_____ as Surety, hereinafter called Surety, are held and firmly bound unto the
COMMUNITY COLLEGE OF ALLEGHENY COUNTY, through its Board of Trustees as Oblige, hereinafter called Owner, for the use and benefit of claimants
as hereinbelow defined, in the amount of _____
_____ Dollars (\$ _____),
for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these
presents.

WHEREAS, Principal has by written agreement, dated _____ 20 _____, entered into a contract with Owner
for _____
in accordance with drawings and specifications prepared by _____
(Here insert full name, title and address)
_____ which contract is by reference made a part hereof, and is
hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal shall promptly make payment to all claimants as
hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it
shall remain in full force and effect, subject, however, to the following conditions:

- (1) A claimant is defined as one having a direct contract with the Principal or with a sub-contractor of the Principal for labor, material, or both used or
reasonably required for use in the performance of the contract, labor and material being construed to include that part of water, gas, power, light, heat, oil,
gasoline, telephone service or rental of equipment directly applicable to the Contract.
- (2) The above-named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in
full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or
materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums
as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.
- (3) No suit or action shall be commenced hereunder by any claimant.
 - (a) Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: The
Principal, the Owner, or the Surety above-named, within ninety (90) days after such claimant did or performed the last of the work or labor, or
furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party
to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same
by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety, at any place where an office is
regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the
aforesaid project is located, save that such service need not be made by a public officer.
 - (b) After the expiration of one (1) year following the date on which Principal ceased work on said Contract, it being understood, however, that if
any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended
so as to be equal to the minimum period of limitation permitted by such law.
 - (c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any
part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not
elsewhere.
- (4) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by
Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under
and against this bond.

Signed and sealed this _____ day of _____ 20 _____

_____ By _____
Witness (Seal) Principal

_____ By _____
Witness (Seal) Surety

This bond is issued simultaneously with performance bond in favor of the Owner conditioned on the full and faithful performance of the Contract.

MASTER SERVICES AGREEMENT
“Awardee Only”
Bid 1015

THIS MASTER SERVICES AGREEMENT ("Agreement") is made and entered into as of this ____ day of _____, 2017, by and between **Community College of Allegheny County**, with a business office located at 800 Allegheny Avenue, Pittsburgh, PA 15233 (hereinafter referred to as the “College”), and _____ (hereinafter referred to as “Contractor”).

RECITALS

WHEREAS, the College has issued a Request for Quotation, Bid Solicitation, Request for Proposal, and/or a Purchase Order (hereinafter individually and collectively referred to as the “Order”), pursuant to

Bid Proposal No.	Awardee Only
-------------------------	---------------------

which College seeks to procure certain work and services, as more fully described on the Order; and

WHEREAS, Contractor has submitted a proposal to the College to provide the services described in the Order, a copy of which is attached hereto as Exhibit A (hereinafter the “Proposal”) and incorporated by reference;

WHEREAS, the College desires to engage Contractor to provide the services, pursuant to and in accordance with the terms and conditions that this Agreement set forth herein.

NOW, THEREFORE, in consideration of the premises and covenants that this Agreement contains, the receipt and adequacy of which are hereby acknowledged, the parties, intending to be legally bound, agree as follows:

1. Term. The term of this Agreement shall be as specified in the Order unless otherwise stated in the section below. If no date is specified, this Agreement shall begin with the date first stated above and terminate upon satisfactory completion of the services described herein.

AWARDEE ONLY

2. Services. Contractor shall fully and faithfully perform the work and services described in the Order and the Proposal and any specifications, scope of work or other documentation attached thereto. Contractor warrants that all work and services performed by or on behalf of it under this Agreement will conform to all terms and specifications set forth in the Order and in the Proposal.

3. Price/Fees: The College shall pay Contractor for the services and work performed by Contractor in accordance with the fees and/or prices set forth in the Proposal.

4. Terms and Conditions: This Agreement, and the services to be performed by Contractor hereunder, will be subject to and governed by College’s Standard Terms and Conditions for the Purchase of Goods and Services (“Master Terms”), which are incorporated herein by reference. The Master Terms can be viewed and downloaded at https://www.ccac.edu/Terms_and_Conditions.aspx By signing below, Contractor acknowledges its receipt and acceptance of the Master Terms.

5. Insurance Requirements: In addition to the Master Terms, Contractor shall comply with the insurance and indemnification requirements set forth on Exhibit B, which are incorporated herein by reference. Prior to commencing performance of the Services, Contractor shall furnish to the College a properly executed certificate(s) of insurance which evidence all insurance required by Exhibit B. Said certificate(s) of insurance shall be attached herein as Exhibit C.

6. Assignment. Contractor may not assign or subcontract this Agreement or its performance thereof, in whole or in part, without the College’s prior written consent.

7. Entire Agreement; Modification. This Agreement, together with the Exhibits and other documents referenced and incorporated herein, sets forth the entire agreement of the parties on the subject matter hereof and supersedes all previous or concurrent agreements between them, whether oral or written. Any proposal, quotation, acknowledgment, confirmation or other writing submitted by Contractor to the College shall not be deemed to amend or modify this Agreement, and will be of no legal effect except to the extent that it serves to identify the work and services to be performed by the Contractor. This Agreement, and the terms set forth in the Master Terms, will control over any conflicting terms or provisions contained in any proposal, invoice or other documentation submitted by Contractor to College. The terms of this Agreement may not be modified or changed except by a writing that both parties sign. This Agreement shall inure to the benefit of the College and Contractor and the College’s successors and assigns.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first above written.

AWARDEE ONLY – COMPANY NAME

**COMMUNITY COLLEGE
OF ALLEGHENY COUNTY**

By: _____

By: Joyce Breckenridge

Signature: _____

Signature: _____

Title: _____

Title: Vice President for Finance

Date: _____

Date: _____

Revised 3/3/15

EXHIBITS - The following Exhibits are attached hereto and made a part of this Agreement for all purposes:

- Exhibit A - Contractor’s Proposal Response**
- Exhibit B - Insurance Requirements**
- Exhibit C - Contractor’s Certificate(s) of Insurance.**
- Exhibit D – Performance and Payment Bonds**
- Exhibit E – No-Lien Agreement**

COMMUNITY COLLEGE OF ALLEGHENY COUNTY
800 ALLEGHENY AVENUE, PITTSBURGH, PA 15233

NO-LIEN AGREEMENT

“TO BE COMPLETED ONLY BY AWARDEE”

Bid 1015

Made the _____ day of _____, 20____ between _____
_____ Pittsburgh, Pennsylvania Contractor and Community College of Allegheny County,
Pittsburgh, Pennsylvania, Owner.

Whereas, by separate written contract dated and executed the day and year first above written. The Owner and Contractor have entered into a No-Lien Contract (herein described for convenience as the Contract) to furnish all labor, materials, supplies, tools, and equipment necessary to complete the Contract in accordance with the specifications prepared by the Owner, and the provisions on the Contract between the Owner and Contractor, as more particularly recited therein.

NOW, THEREFORE, in consideration of the execution of said Contract for the purchases of and delivery on the premises of the owner and terms and conditions thereof, the Contractor covenants and agrees as follows:

1. The contractor covenants and agrees that no mechanics' claims or liens shall be entered or filed by the Contractor or by any subcontractor or materialsman or by an other person against the building or property of the Owner described more particularly hereinafter, for or on account of any work or labor done, materials, supplies, tools and equipment furnished in, upon, or about the building and property of the Owner described more particularly hereinafter.
2. Any and all right of lien is hereby waived and the Contractor, all subcontractors, all materialsmen, all persons supplying labor, and/or materials and all other persons shall look exclusively to and hold the Contractor and not the property liable for any sums due, however arising.
3. The property as to which this No-Lien Agreement is filed is located at Community College of Allegheny County, _____.

Block/Lot _____

IN WITNESS WHEREOF, the parties hereto, with the intent to be bound legally thereby have duly executed this No-Lien Agreement the day and year first above written.

COMMUNITY COLLEGE OF ALLEGHENY COUNTY (OWNER)

CCAC - VICE PRESIDENT FOR FINANCE (revised 3/16/15)

(CONTRACTOR)

WITNESS

COMMUNITY COLLEGE OF ALLEGHENY COUNTY
800 ALLEGHENY AVENUE PITTSBURGH, PA 15233

INSURANCE REQUIREMENTS

FORM B

Indemnification. To the fullest extent permitted by law, Contractor shall defend, indemnify and hold harmless the Community College of Allegheny County (CCAC), its agents, officers, employees, and volunteers from and against all claims, damages, losses, and expenses (including but not limited to attorney fees and court costs) arising from the acts, errors, mistakes, omissions, work or service of Contractor, its agents, employees, or any tier of its subcontractors in the performance of this Contract. The amount and type of insurance coverage requirements of this Contract will in no way be construed as limiting the scope of indemnification in this Paragraph.

Insurance. Contractor shall maintain during the term of this Contract insurance policies described below issued by companies licensed in Pennsylvania with a current A.M. Best rating of A- or better. At the signing of this Contract, and prior to the commencement of any work, Contractor shall furnish the CCAC Purchasing Department with a **Certificate of Insurance** evidencing the required coverages, conditions, and limits required by this Contract at the following address: Community College of Allegheny County, Purchasing Department, 800 Allegheny Avenue, Pittsburgh, PA 15233.

The insurance policies, except Workers' Compensation and Professional Liability, shall be endorsed to name Community College of Allegheny County, its agents, officers, employees, and volunteers as Additional Insureds with the following language or its equivalent:

Community College of Allegheny County, its agents, officers, employees, and volunteers are hereby named as additional insureds as their interest may appear.

All such Certificates shall provide a 30-day notice of cancellation. Renewal Certificates must be provided for any policies that expire during the term of this Contract. Certificate must specify whether coverage is written on an Occurrence or a Claims Made Policy form.

Insurance coverage required under this Contract is:

- 1) **Commercial General Liability** insurance with a limit of not less than \$1,000,000 per occurrence for bodily injury, property damage, personal injury, products and completed operations, and blanket contractual coverage, including but not limited to the liability assumed under the indemnification provisions of this Contract.
- 2) **Automobile Liability** insurance with a combined single limit for bodily injury and property damage of not less than \$1,000,000 each occurrence with respect to Contractor's owned, hired, and non-owned vehicles.
- 3) **Workers' Compensation** insurance with limits statutorily required by any Federal or State law and **Employer's Liability** insurance of not less than \$100,000 for each accident, \$100,000 disease for each employee, and \$500,000 disease policy limit.
- 4) **Professional Liability** insurance (where applicable) covering acts, errors, mistakes, and omissions arising out of the work or services performed by the Contractor, or any person employed by the Contractor, with a limit of not less than \$1,000,000 each claim.



CUSTOM AIR HANDLING UNIT SUBMITTAL

Project: CCAC - K. Leroy Irvis Science & Tech Ctr

Date of Original Submittal: Nov 29, 2010

Location: Pittsburgh, PA

Prepared By: MBP

Consultant:

Revision:

Sales Office: Trane - Orlando

Salesperson: Randy Proudfit

Internal Review By:

Date of Review:

Tagging:

Approval Stamps:

If above space is filled, please stamp on reverse side.

Submittal approval dates are the basis for determining manufacturing lead times. Manufacturing will not begin and shipping dates will not be issued, until we receive approved, stamped submittal drawings. Performance, openings and dimensions may vary from contract documents. Return of approved drawings constitutes acceptance of these variances.



CCAC - K. Leroy Irvis Science & Tech Ctr

- **Title Sheet**
- **Clarifications and Exceptions**
- **Air Handling Unit Data**
 - Unit Construction**
 - Air Unit Drawings**
 - Construction Details**
- **Fan and Motor**
 - Fan Schedule**
 - Fan Selection Data and Curves**
 - Motor Data**
 - Isolator Data**
- **Cooling Coil Data**
 - Cooling Coil Schedule**
 - Coil Selections and Drawings**
- **Heating Coil Data**
 - Heating Coil Schedule**
 - Coil Selections and Drawings**
- **IFB Coil Data**
 - IFB Coil Schedule**
 - Coil Selections and Drawings**
- **Humidifiers**
 - Humidifier Schedule**
 - Manufacturer's Data**
- **Evaporative Cooler**
 - Manufacturer's Data**



- **Dampers**
 - Damper Schedule**
 - Manufacturer's Data**
- **Blenders**
 - Blender Schedule**
 - Manufacturer's Data**
- **U-V Lights**
 - Manufacturer's Data**
- **Filters**
 - Filter Schedule**
 - Gauge Information**
 - Manufacturer's Data**



CUSTOM AIR HANDLING UNIT REVISION LOG

Project: CCAC - K. Leroy Irvis Science & Tech Ctr **Date:** Nov 29, 2010

Location: Pittsburgh, PA **Prepared By:** MBP

Consultant: **Revision:** 1

Sales Office: Orlando **Salesman:** Randy Proudfit

Date	Description
11/12/2010	ERU1access & handing revised
11/12/2010	ERU-1 EF air discharge rev 180 deg
11/12/2010	AH-1 ERC rev to (2) 54x109 right hand
11/12/2010	AHU-1 Wing coil rev to (1) VE-10T
11/12/2010	AHU-1 Humidifier rev to (1) 120w x 72h
11/12/2010	AHU-1 CC rev to (2) 55.5x109 right hand
11/12/2010	AHU-1 supply air opening moved to side wall
11/12/2010	AHU-1 fan access door moved to side wall
11/12/2010	AHU-2 access doors moved to AHU right wall
11/12/2010	AHU-2 humidifier grid added



CUSTOM AIR HANDLING UNIT CLARIFICATIONS AND EXCEPTIONS

Project: CCAC - K. Leroy Irvis Science & Tech Ctr **Date:** Nov 29, 2010

Location: Pittsburgh, PA **Prepared By:** MBP

Consultant: **Revision:** 1

Sales Office: Trane - Orlando **Salesman:** Randy Proudfit

Clarifications and Exceptions:

- Please confirm handing of doors, handing of coil connections and drains, and sizes and locations of all openings, or advise of any changes required.
- Steam heating coils provided for AHU-2 in lieu of VIFB coil – discrepancy in schedule and drawing.
- Modular framing system not included – Knock down thermal break construction provided in lieu of this.
- Removable plug panels provided where required for ease of maintenance in lieu of all panels being removable.
- Piezometric rings provided in lieu of volu probe in inlet of fans.
- Unit(s) are knockdown type construction - electrical components ship loose.
- Circulating water temp for energy recovery coils not scheduled.
- Base drain pans extend past the CC & ERC discharge face as indicated on drawing.
- All cooling coil drain pans & racks are 16 ga, 304 stainless steel.
- Access doors are 0.050 embossed aluminum exterior & smooth 0.063 interior. 0.063 embossed door panels are not available.
- AHU-1 & -2 fans are SWSI plenum fans
- ERU-1 & -2 fans are SWSI scrolled housed fans
- ERU-1 & 2 ERC coated with Phenolic protective coating.
- CC & ERC casing is 304 stainless steel, min 16 ga.
- AHU-1 ERC is 6 rows, 9 fins, no Turbs.
- ERU-1-2 ERC is 8 rows 10 fins, no Turbs.
- AHU-2 CC 8 rows, 9 fins, no Turbs.

Due to variability of local codes, it is the responsibility of the customer to verify compliance and identify specific requirements. Any correction necessary after shipment to satisfy local authorities shall be at the expense of the customer.



- AHU-1 ERC circulating fluid is 40% propylene glycol as scheduled on M-PP1.
- AHU-1 CC 8 rows, 9 fins, no Turbs.
- Air blender is constructed of 0.080" 5052 H34 aluminum.
- AHU & ERU base splits as indicated on drawings.
- Fan impeller balanced to G6.3 level or better.
- Fans are bump started at factory.

Not Included

- Condensate drain "P" traps (drain will be stubbed through unit for exterior traps).
- Field assembly, field testing, pressure testing, balancing or start-up, field instruction.
- Damper operators, controls, sensors, control transformers or control wiring.
- Rigging or hoisting.
- Piping, valves, control valves or accessories. All necessary pipe insulation is furnished and installed by others in the field.
- Sales tax, special permits or duties.
- Storage or protection of equipment while in storage.
- Roof curbs.
- Starters, VFD's or motor wiring.
- Field electrical connections at section joints.

Due to variability of local codes, it is the responsibility of the customer to verify compliance and identify specific requirements. Any correction necessary after shipment to satisfy local authorities shall be at the expense of the customer.



UNIT CONSTRUCTION

BASE FRAME		<ul style="list-style-type: none"> - Aluminum beam perimeter with removable lifting lugs. - Aluminum structural intermediate supports installed a minimum 24" centers.
CABINET	FLOOR	<ul style="list-style-type: none"> - Surface consists of continuous welded 3/16 Al tread plate. - .050 aluminum floor under liner. - 1 1/2" stainless steel floor drains as indicated on the drawings. Drains are stubbed through the perimeter channel. All trapping is by others.
	WALLS	<ul style="list-style-type: none"> - 2" Custom Panel Knockdown type construction. - 0.063 Embossed aluminum solid exterior. - 0.050" aluminum solid inner liner. - Internal tunnel walls (i.e. fan/damper/blender walls) are 3" un-insulated, 16ga. aluminum single wall C-panels.
	ROOF	<ul style="list-style-type: none"> - 2" Custom Panel Knockdown type construction. - 0.063" Embossed aluminum solid exterior. - 0.050" aluminum solid inner liner. - Indoor construction, roof is flat.
	SAFING	<ul style="list-style-type: none"> - All safing will be aluminum safing unless otherwise stated. - Cooling coil safing will be stainless steel - Filter rack safing will be aluminum
INSULATION		<ul style="list-style-type: none"> - 2" x 3 lbs. - cft., fiberglass insulation installed in walls and roof. - 3" Injected foam installed in walls and roof. Foam is polyurethane foam isocyanate - Insulation in compliance with NFPA90A
EXTERIOR PAINT		<ul style="list-style-type: none"> - Non painted embossed aluminum exterior finish
DRAIN PANS		<ul style="list-style-type: none"> - 16 ga. 304 stainless steel, double-sloped insulated drain pans with 1-1/2in stainless steel MPT drain. All traps furnished and installed in field by others. - 16 ga. 304 stainless steel intermediate drain pans on units with multiple stacked coils - Intermediate pans drain to the bottom pan via dual 1" copper downspouts
ACCESS DOORS	<ul style="list-style-type: none"> • Door thickness • Exterior material • Interior material • Insulation • Handles • Hinge • Windows 	<ul style="list-style-type: none"> - 2" - 0.050" Embossed aluminum - 0.063 " smooth aluminum - 2.25#/ft3 polyurethane foam insulation - Ventlok 260 latches - Multi-piece stainless steel piano hinge - 8"x12" Thermal pane - All doors are thermal break

UNIT SUPPORT
REQUIREMENTS

- AHU & ERU bases shipped in sections. Sections to be assembled at the job site. Assembly documentation provided.
- Base requires full perimeter support & at each of the shipping split locations.
- Installation co-ordination and AHU mounting details need to be made available to AHU manufacturer for review to ensure no interference issues occur at the jobsite. Installation contractor is responsible for providing these details to the AHU manufacturer. Contractor to work with local Trane office and AHU manufacturer.

COIL RACKS

- Cooling coil racks are 304 stainless steel
- Heating coil racks are galvanized steel
- Coils are removed through removable access plugs.

PIPE CONNECTIONS

- Heating and cooling coil supply and return connections, plus the vent and drain, will be extended to the outside of the unit for connection by others.
- All humidifier piping is by others.
- Humidifier traps, valves, strainers, all shipped loose for field installation by others.
- Pipe penetration are sealed with Rubber grommets & sheet metal collars rings.
- Pipe extension material is Sch. 40 blk pipe
- Vent and drain material is Sch. 40 blk pipe
- All pipe insulation is by other.

ELECTRICAL

- Units are ETL labeled
- Reference electrical diagram for detail
- EMT Conduit, Zinc Die-cast Compression Connector, and Flexible metal Conduit (FMC) are standard conduits.
- Standard Lighting is Standard Single Pole 15A Switch, Marine Glass Globe with Wire Guard, 100W Incandescent, and Standard 20A GFIC Receptacles.

CONTROLS

- Controls provided by others in the field.

TESTING

- Fans will be factory bump start.

EQUIPMENT LIST

12/01/2010

- A Outside Air Opening
- B FILTER SECTION - (25 @)
Prefilter 24 x 24 - 2" 30%
Final filter 24 x 24 - 12" 80-85%
- C ER COIL SECTION - (2)
54"FH x 109"FL Water Coils
- D VFB Coil- WING-5 PSIG Steam
(1) 80"H x 111"L
- E Humidifier- 10 PSIG Steam
- F Cooling Coil (2)
55.5"FH x 109"FL - Water Coils
- G Fan Isolation Filters (2) 48 x 48
- H Supply Fan (2) EPPN 365
- J Supply Air Opening
- K U-V Lights

#	Revision	Date	By:
1	Rev ERC to 2 Rt hand	/	
1	Rev Wing Coil rt hand	/	
1	Rev humidifier Rt hand	/	
1	Rev CC to 2 Rt hand	/	
1	Rev fan access & SA	/	

UNIT CONSTRUCTION

TYPE: Indoor MOUNTING: Pad

BASE: C6 x 3.0 aluminum

FLOOR: 3/16" Alum. Tead Plate

INSUL/LINER: 18 ga Aluminum

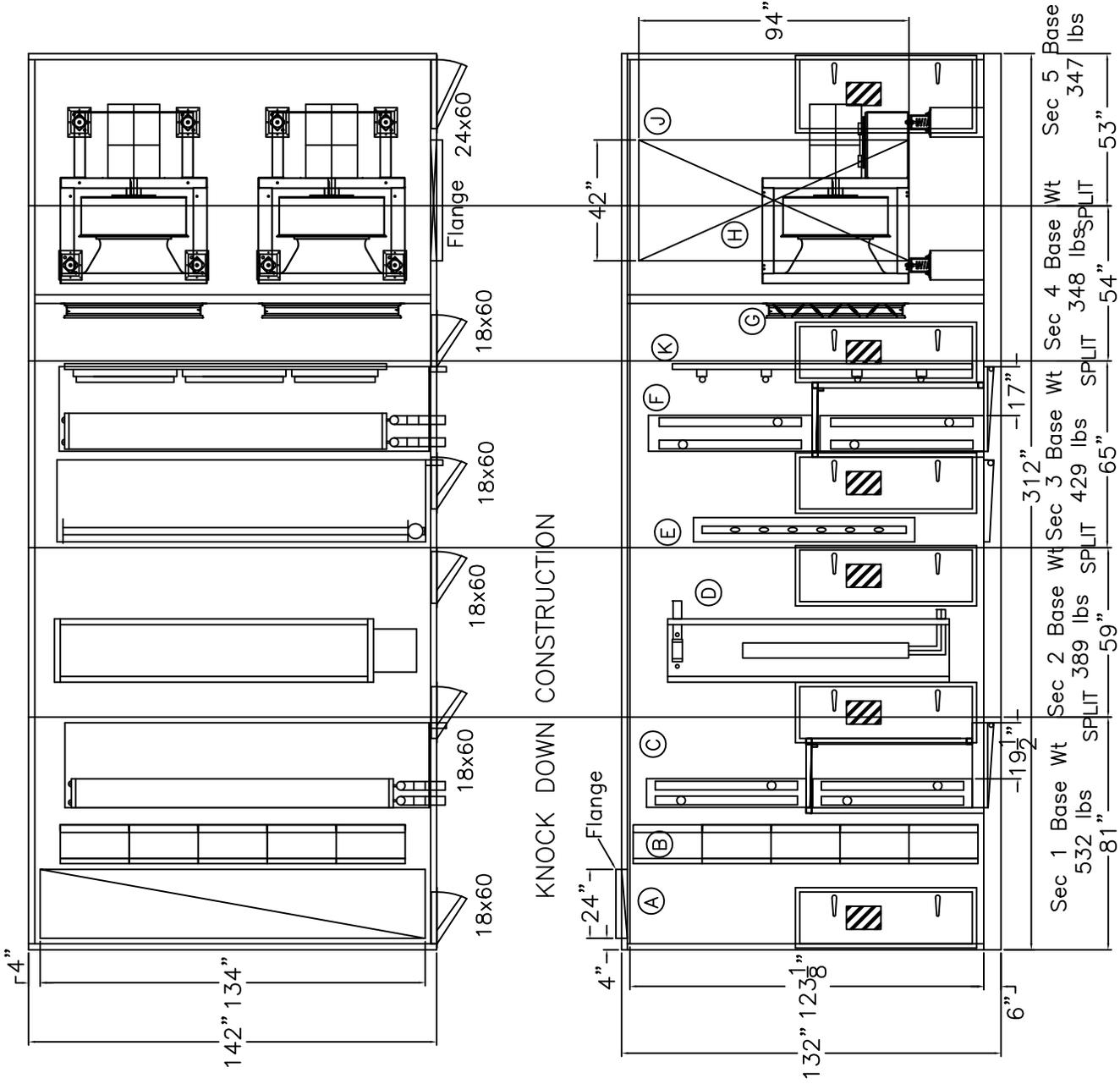
CASING: 0.063" Embossed Al

INSUL/LINER: 2" - 0.050 Aluminum

DOORS: (see drawing) Mech. 9

LIGHTING: (see drawing)

ISOLATION: (see drawing)



Openings and Dimensions may vary from Contract Documents. Return of approved drawings constitutes acceptance of these variances	
Sales Order#:	CCAC-K. Leroy Irvis Science & Tech Ctr
Drawn by: MBP	PROJECT:
Approved by:	Description: 42,500 CFM Unit
Unit Tag: AHU-1	JOB Number
Ship WT: 19,517 lbs.	EQ#15044
Scale: None	Date: 11-01-2010
Sales Office	Base Wt
Orlando, FL CSO	Sec 1 532 lbs
	Sec 2 389 lbs
	Sec 3 429 lbs
	Sec 4 348 lbs
	Sec 5 347 lbs
	SPLIT
	81" 59" 65" 54" 53"

EQUIPMENT LIST

12/01/2010

- A Return Air Opening
89"W x 32"H
- B Exhaust Air Damper
89"W x 32"H
- C EPPN 365 Return Fan
- D Return Air Damper
89"W x 32"H
- E Outside Air Damper
89"W x 32"H
- F Air Static Mixer - AB60
- G FILTER SECTION - (12 @)
Prefilter 24 x 24 - 2" 30%
Final filter 24 x 24 - 12" 80-85%
- H Heating Coil (2)
42"FH x 72"FL - Steam Coils
- I Cooling Coil (2)
43.5"FH x 85"FL - Water oil
- J Supply Fan EPPN 365
- K Supply Air Opening
- L U-Y Lights
- M Humidifier-10 psig Steam

#	Revision	Date	By:
1	Dr to side opposite	/	
1	Add humidifier grid	/	
		/	
		/	
		/	

UNIT CONSTRUCTION

TYPE: Indoor
MOUNTING: Pad

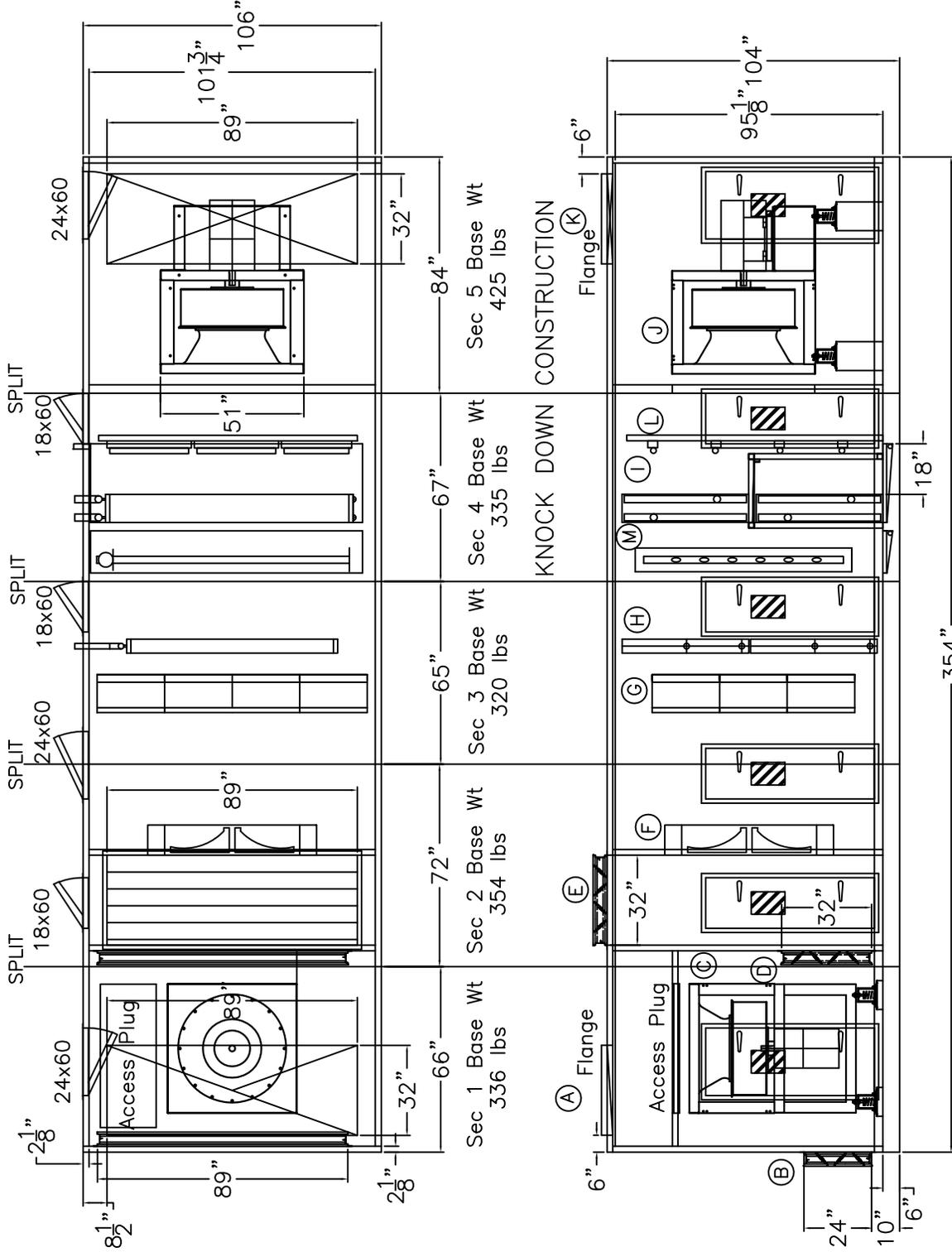
BASE: C6 x 3.0 aluminum
FLOOR: 3/16" Alum. Tead Plate

INSUL/LINER: 18 ga Aluminum
CASING: 0.063" Embossed Al

INSUL/LINER: 2" - 0.050 Aluminum

DOORS: (see drawing)
LIGHTING: (see drawing)
ISOLATION: (see drawing)

Tech. 10



Sales Order#:		Openings and Dimensions may vary from Contract Documents. Return of approved drawings constitutes acceptance of these variances	
Drawn by: MBP	DWG #: 15044-AHU-2	Sales Office: Orlando, FL CSO	PROJECT: CCAC-K. Leroy Irvis Science & Tech Ctr
Approved by:	Unit Tag: AHU-2	Scale: None	JOB Number: EQ#15044
	Ship Wt: 11,132 lbs.	Date: 11-02-2010	Description: 23,500 CFM Unit

EQUIPMENT LIST

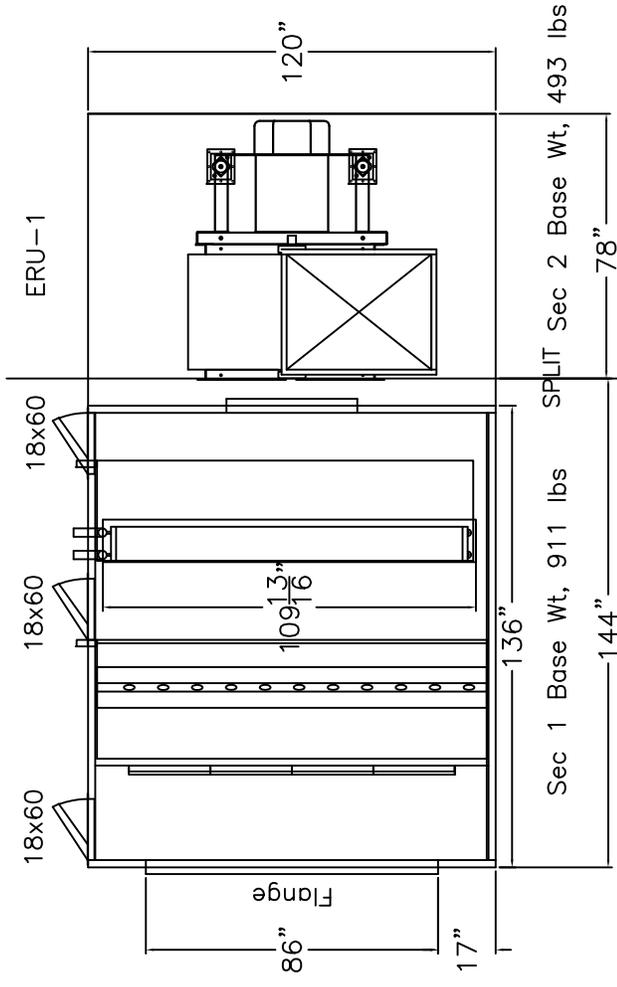
- A Return Air Opening
- B FILTER SECTION - (12 @)
Prefilter 24 x 24 - 2" 30%
- C Evaporative Cooling
XX"FH x XX"FL
- D ER Col (2) 37.5"FH x 102"FL
- E Exhaust Fan BAE 403 Arr 4

12/01/2010

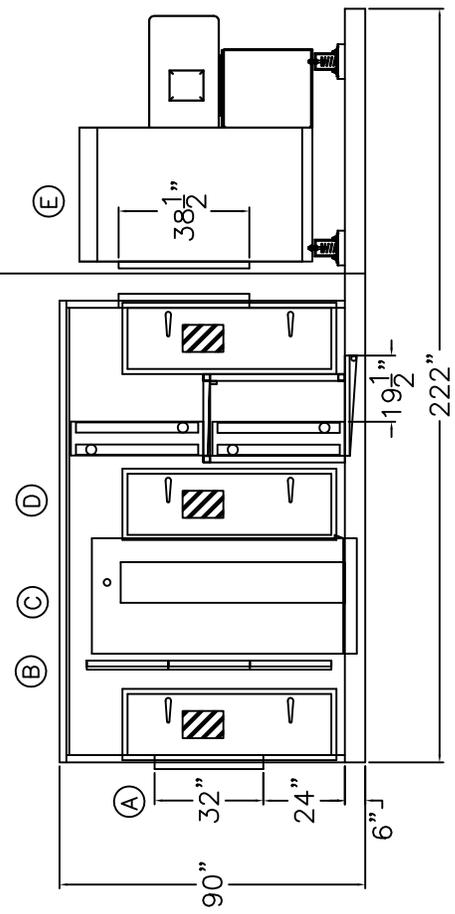
#	Revision	Date	By:
1	Doors to Rt side ERU	/	
1	ERC Rt hand	/	
1	DP drain pipe Rt hand	/	
1	EF discharge rev 180	/	

UNIT CONSTRUCTION

TYPE: Indoor
 MOUNTING: Pad
 BASE: C6 x 3.0 aluminum
 FLOOR: 3/16" Alum. Tead Plate
 INSUL/LINER: 18 ga Aluminum
 CASING: 0.063" Embossed Al
 INSUL/LINER: 2" - 0.050 Aluminum
 DOORS: (see drawing) Mech.11
 LIGHTING: (see drawing)
 ISOLATION: (see drawing)



KNOCK DOWN CONSTRUCTION



Openings and Dimensions may vary from Contract Documents. Return of approved drawings constitutes acceptance of these variances	
Sales Order#:	CCAC-K. Leroy Irvis Science & Tech Ctr
Drawn by: MBP	PROJECT:
Approved by:	Description: 25,250 CFM Unit
DWG #: 15044-ERU-1	JOB Number
Unit Tag: ERU-1	EQ#15044
Ship WT: 9,255 lbs.	
Sales Office	Scale: None
Orlando, FL CSO	Date: 11-02-2010

EQUIPMENT LIST

- A Return Air Opening
- B FILTER SECTION - (12 @)
- Pre-filter 24 x 24 - 2" 30%
- C Evaporative Cooling
- XXFH x XXFL
- D ER Col (2) 37.5"FH x 102"FL
- E Exhaust Fan BAE 403 Arr 4

12/01/2010

#	Revision	Date	By:
		/ /	
		/ /	
		/ /	
		/ /	
		/ /	

UNIT CONSTRUCTION

TYPE: Indoor MOUNTING: Pad

BASE: C6 x 3.0 aluminum

FLOOR: 3/16" Alum. Tead Plate

INSUL/LINER: 18 ga Aluminum

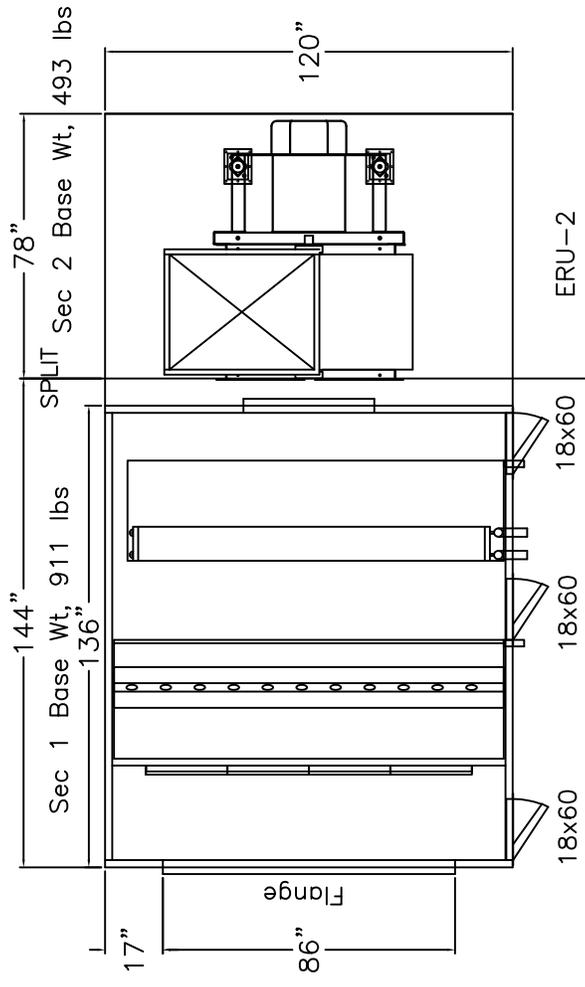
CASING: 0.063" Embossed Al

INSUL/LINER: 2" - 0.050 Aluminum

DOORS: (see drawing) Mech. 12

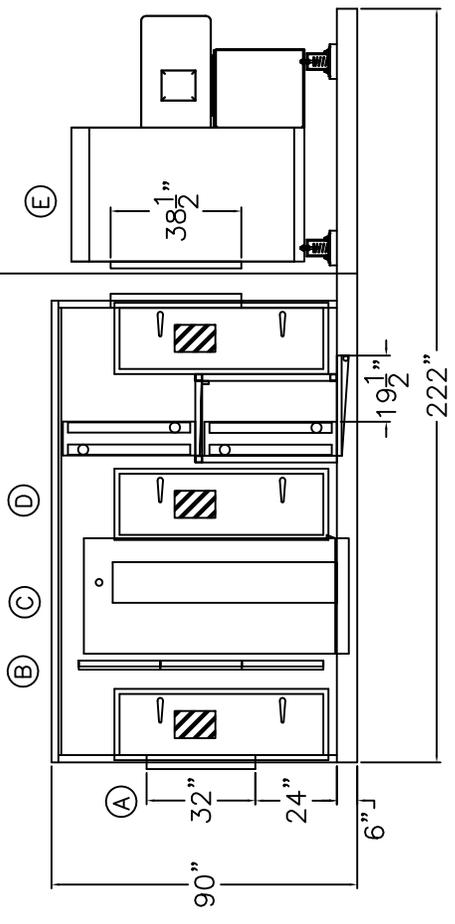
LIGHTING: (see drawing)

ISOLATION: (see drawing)



ERU-2

KNOCK DOWN CONSTRUCTION

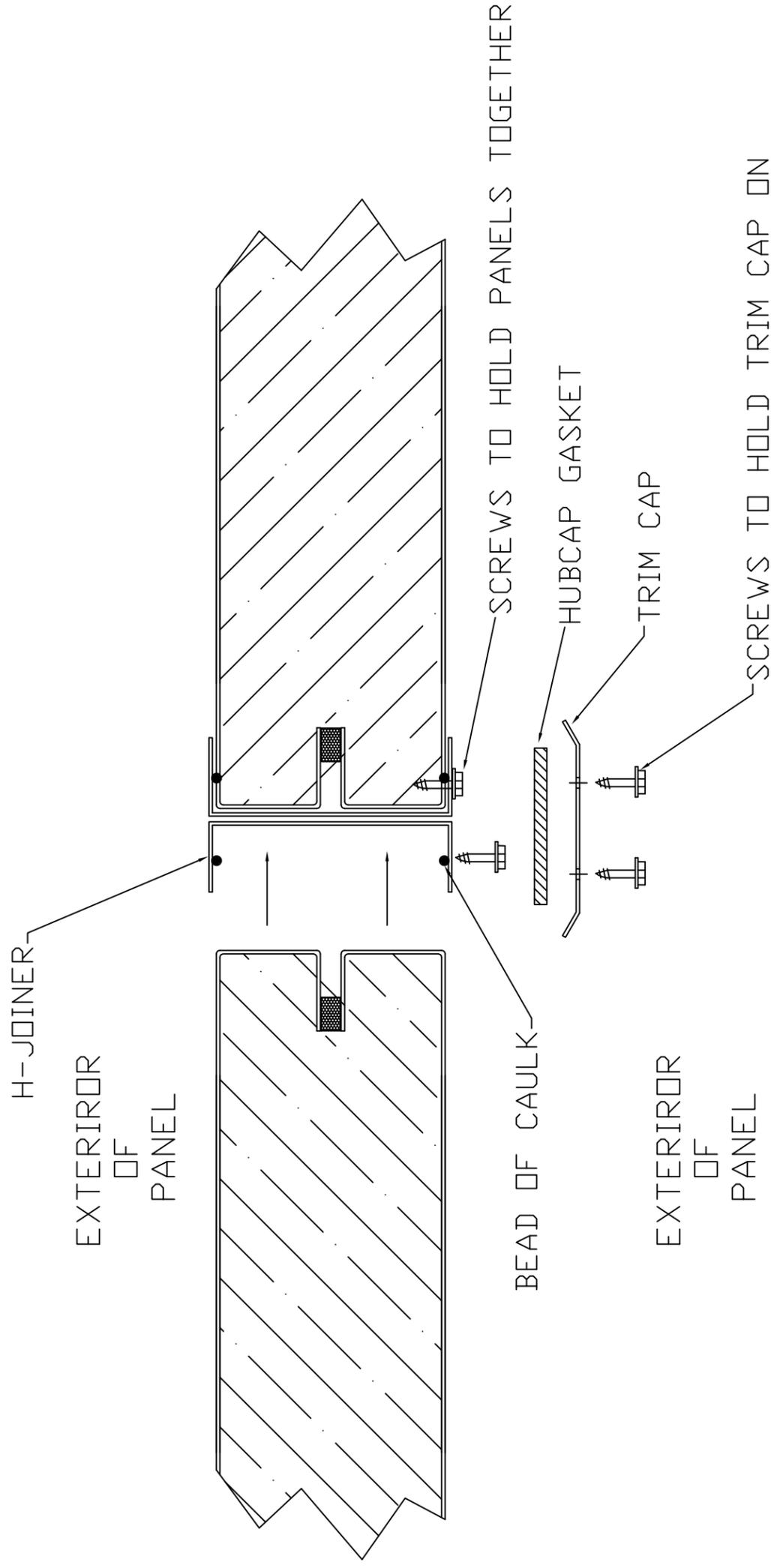


Openings and Dimensions may vary from Contract Documents. Return of approved drawings constitutes acceptance of these variances	
Sales Order#:	CCAC-K. Leroy Irvis Science & Tech Ctr
Drawn by: MBP	PROJECT:
Approved by:	Description: 25,250 CFM Unit
DWG #: 15044-ERU-2	JOB Number
Unit Tag: ERU-2	EQ#15044
Ship WT: 9,255 lbs.	Date: 11-02-2010
Scale: None	Scale Office
Date: 11-02-2010	Orlando, FL CSO

EQUIPMENT LIST

#	Revision:	Date:	Rev.By:

DRAWN BY:
DATE:
SCALE: nts
APPROVED BY:



WALL OR ROOF PANELS

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES

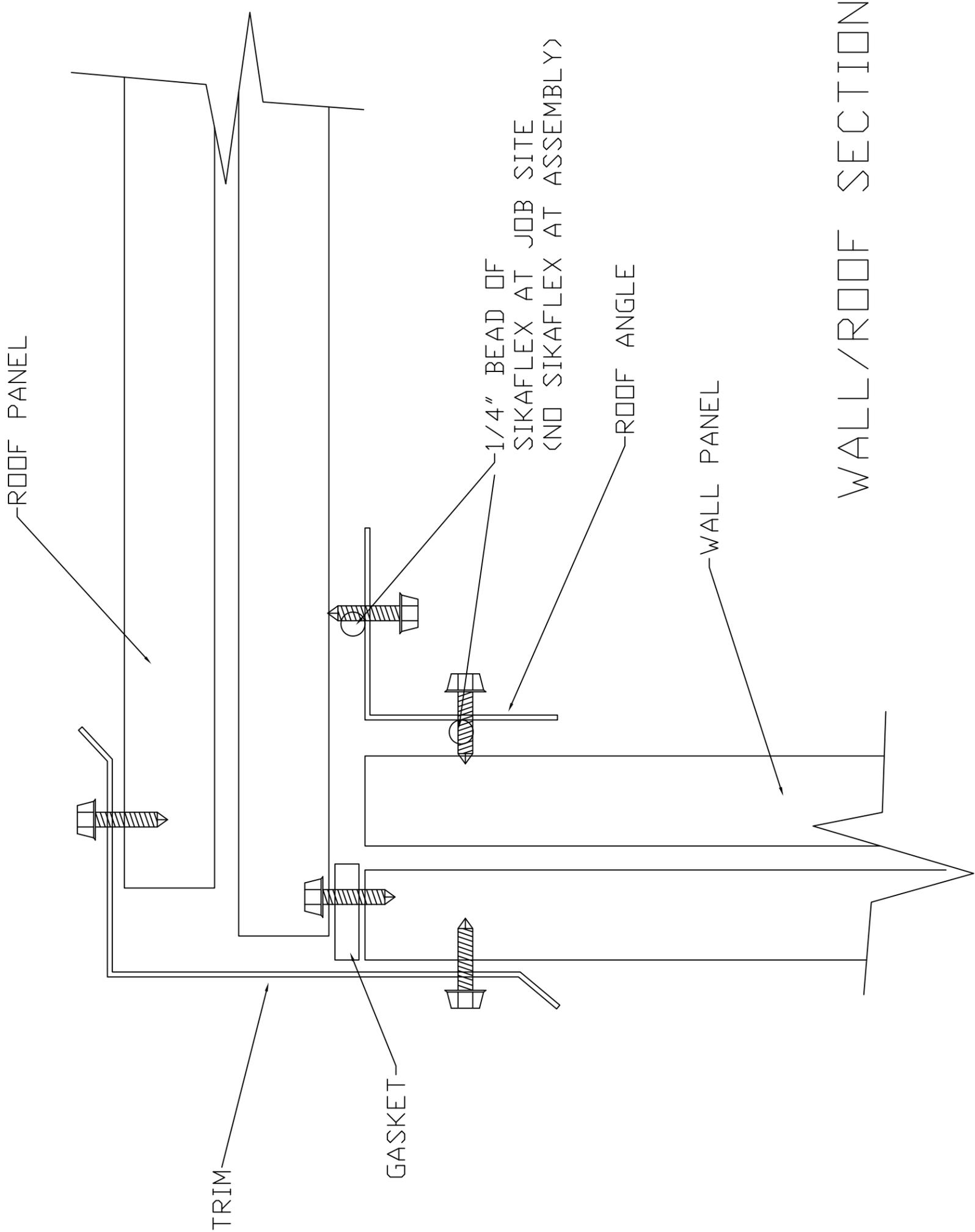
TYPE: Indoor	UNIT CASING:	PROJECT:	JOB NUMBER:
MOUNTING:	INSUL./LINER:	DESCRIPTION:	SALES ORDER#:
BASE:	DOORS:	SALES OFFICE:	DWG #:
FLOOR:	LIGHTING:		UNIT TAG:
INSUL./LINER:	ISOLATION:		SHIP WT:



EQUIPMENT LIST

#	Revision:	Date:	Rev.By:

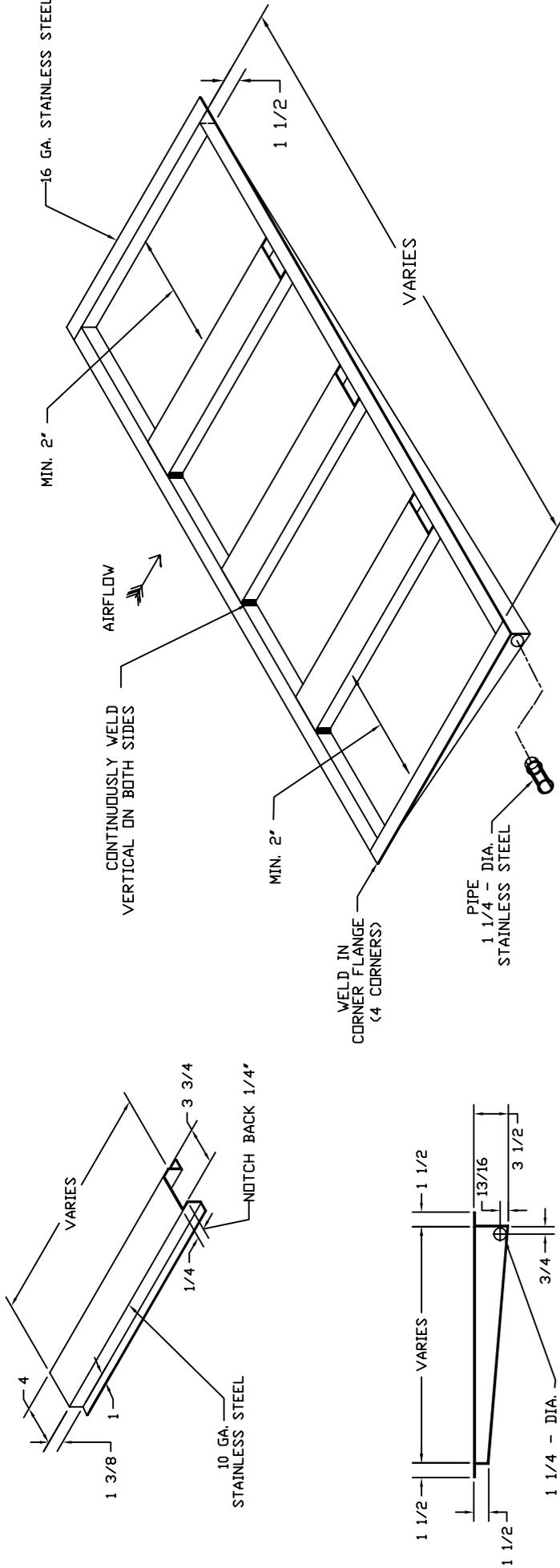
DRAWN BY:
DATE:
SCALE: nts
APPROVED BY:



OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES

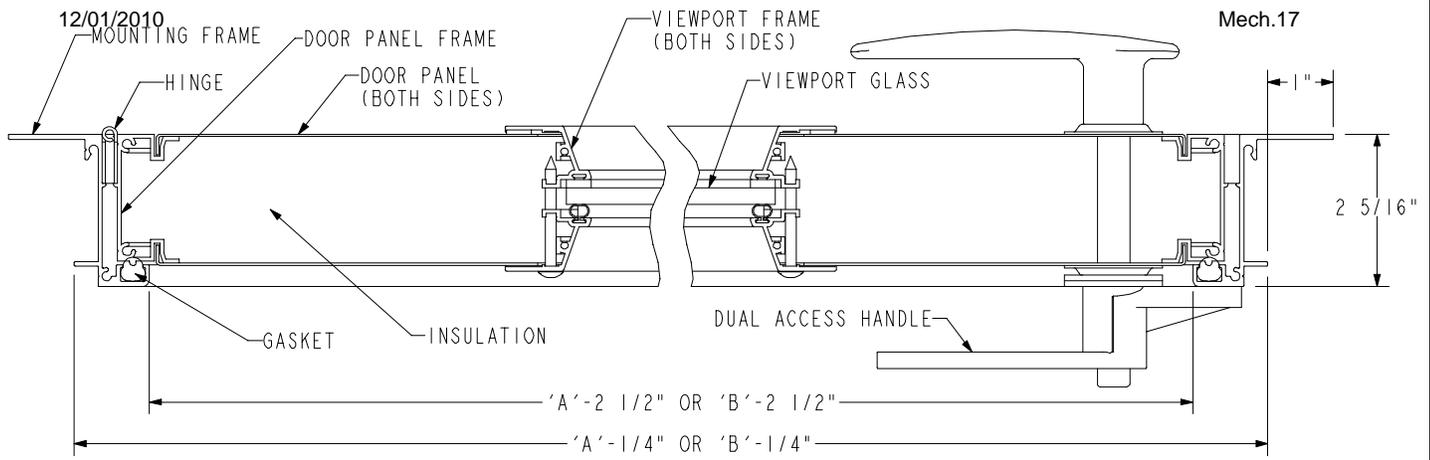
TYPE: Indoor	PROJECT:	JOB NUMBER:
MOUNTING:	DESCRIPTION:	SALES ORDER#:
BASE:	SALES OFFICE:	DWG #:
FLOOR:		UNIT TAG:
INSUL./LINER:		SHIP WT:





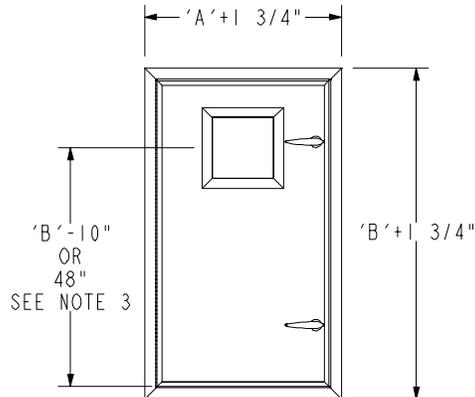
Drain Pan Construction

		Custom Air Handlers SHOP DRAWINGS		All dimensions are in inches unless otherwise noted.		Revision Number	Revision Description	Revision Date
TITLE: RECESSED DRAIN PAN DETAILS	Job Number: N/A	Job Name: N/A	Date: 08/08/08	Drawn By: E.C.	TAGGING: N/A	16	16	16
Draw Name: DRAIN PAN DETAILS	Date: 08/08/08	Drawn By: E.C.	FILENAME: MS004	16	16	16	16	16



ALL MODEL DOORS ARE IN COMPLIANCE WITH UL 1995, 2nd EDITION, STANDARD FOR SAFETY HEATING AND COOLING EQUIPMENT, AND NFPA 90.

MODEL PA2VN (L/H) SHOWN



MODELS PA2N AND PA2VN ARE OUTWARD SWING DOORS DESIGNED FOR "DRAW THROUGH", NEGATIVE PRESSURE APPLICATIONS

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SCHEDULE

ITEM	QTY	MODEL			OPENING SIZE		IDENTIFICATION
		PA2	V	N	*'A' WIDTH	*'B' HEIGHT	
		PA2	L/H	R/H	N		
		PA2			N		
		PA2			N		
		PA2			N		
		PA2			N		

NOTES

- UNLESS OTHERWISE SPECIFIED, DOOR WILL BE FABRICATED 1/4" UNDER LISTED WALL OPENING SIZE, ±1/16".
- MIN. DOOR SIZE 12" WIDE X 12" HIGH, MAX. DOOR SIZE 48" WIDE X 96" HIGH. (WIDTH CANNOT EXCEED 3 X HEIGHT)
- VIEWPORT LOCATION, AS DIM. ABOVE, IS 'B'-10" (±1") ON DOORS UP TO 60" HIGH, AND 48" (±1") ON DOORS OVER 60" HIGH.
- (V) DESIGNATES MODEL DOOR WITH VIEWPORT, SPECIFY (L/H) LEFT HAND OR (R/H) RIGHT HAND, HINGE LOCATION WHEN VIEWING EXTERIOR SIDE OF DOOR.
- HINGE ALWAYS FURNISHED ALONG 'B' DIMENSION, HEIGHT OF DOOR.
- VIEWPORT IS NOT AVAILABLE ON DOORS UNDER 14" WIDE x 20" HIGH.
- OPTIONAL MATERIALS AVAILABLE:
 DOOR PANELS-16 GA. BONDERIZED, STAINLESS AND GALVANIZED STEEL
 -20 GA. BONDERIZED AND STAINLESS STEEL
 -.063 SMOOTH ALUMINUM AND .050 EMBOSSED ALUMINUM
 VIEWPORT GLASS-SINGLE PANE, 1/4" TEMPER CLEAR OR PLEXIGLASS
 -DOUBLE THERMAL PANE, 1/4" TEMPERED WIRE AND CLEAR
 HANDLE-CHROME PLATED
- REFER TO INSTALLATION INSTRUCTION FOR MOUNTING OF HANDLES AND DOOR.

SPECIFICATIONS

MOUNTING FRAME
.080 6063-T5 EXTRUDED ALUMINUM

INSULATION
2-1/4# DENSITY, R13 POLYURETHANE FOAM

HINGE
.050 STAINLESS STEEL CONTINUOUS TYPE

DOOR PANEL FRAME
.060 6063-T5 EXTRUDED ALUMINUM

HANDLES
DUAL ACCESS ZINC DIE CAST

VIEWPORT FRAME
.062 6063-T5 EXTRUDED ALUMINUM

DOOR PANELS

GASKET
ONE PIECE SANTOPRENE

FINISH
MILL

ITM4 Innovative Technology Marketing 4...

P.O. Box 5, 1713 Southgate Drive, Buffalo, MN 55313
Phone/Fax (763) 497-0842

PROJECT/LOCATION		ARCHITECT/ENGINEER
CONTRACTOR		SALES ENGINEER
DRAWN BY	DATE	DRAWING NO.
RCN	3-3-02	40630302

ACCESS DOOR - MODEL PA2(V)N



MODEL PA2N AND PA2VN PERFORMANCE CHARACTERISTICS

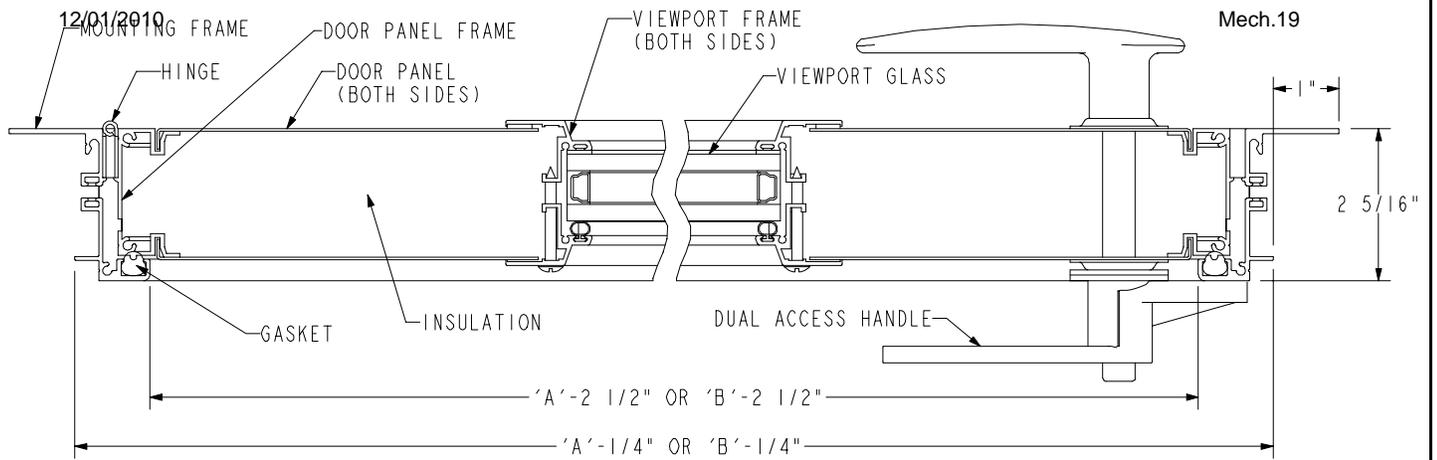
All model doors are in compliance with UL 1995
2nd Edition Standard for Safety Heating and Cooling Equipment

STATIC PRESSURE (IN. WG)	MODELS PA2N AND PA2VN AIR LEAKAGE PERFORMANCE		
	TOTAL SCFM	SCFM/PERIM. FT.	SCFM/SQ. FT.
1	0.10	0.01	0.01
2	0.10	0.01	0.01
3	0.10	0.01	0.01
4	0.10	0.01	0.01
5	0.10	0.01	0.01
6	0.20	0.01	0.02
7	0.20	0.01	0.02
8	0.20	0.01	0.02
9	0.20	0.01	0.02
10	0.30	0.02	0.03
11	0.30	0.02	0.03
12	0.30	0.02	0.03
13	0.30	0.02	0.03
14	0.40	0.03	0.04
15	0.40	0.03	0.04

Air Leakage table is based upon independent air leakage tests conducted by Intertek Testing Services. Both the PA2N and PA2VN models of 24"x60" were tested. Testing was in accordance with ASTM E 283-91 "Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen". ITM4 recommends using PA2N and PA2VN models for "draw through", negative pressure applications.

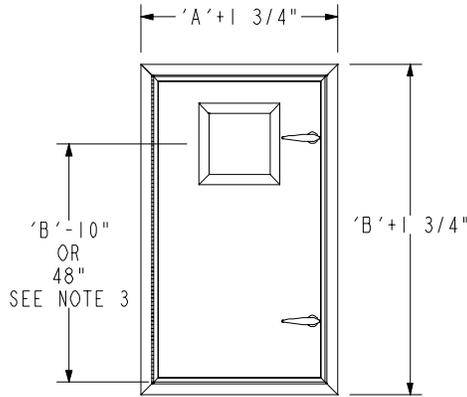
Water Leakage Performance

Water Leakage results are based upon testing per ASTM E 331-93 "Water Penetration of Exterior Windows, Curtain Walls and Doors by a Uniform Static Air Pressure Difference". The tests consisted of mounting doors Under a pressure difference of 2" WG and subjected them to a uniform water spray for 15 minutes. The spray was equivalent to a torrential rainfall rate of 8 inches/hour. Over the 15 minute period, Models PA2N and PA2VN (24"x60") doors allowed approximately 0.8 ounces of water penetration.

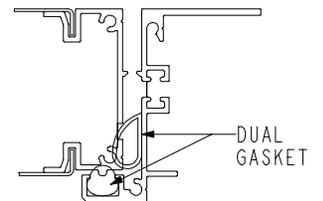


ALL MODEL DOORS ARE IN COMPLIANCE WITH UL 1995, 2nd EDITION, STANDARD FOR SAFETY HEATING AND COOLING EQUIPMENT, AND NFPA 90.

MODEL PA2VNTB (L/H) SHOWN



MODELS PA2NTB AND PA2VNTB ARE OUTWARD SWING DOORS DESIGNED FOR "DRAW THROUGH", NEGATIVE PRESSURE APPLICATIONS



MODEL PA2(V)NTBS

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SCHEDULE

ITEM	QTY	MODEL					OPENING SIZE		IDENTIFICATION
		PA2	V		NTB	S	*'A' WIDTH	*'B' HEIGHT	
		PA2	L/H	R/H	NTB	S			
		PA2			NTB				
		PA2			NTB				
		PA2			NTB				
		PA2			NTB				

NOTES

- SS OTHERWISE SPECIFIED, DOOR WILL BE FABRICATED 1/4" UNDER LISTED WALL OPENING SIZE, ±1/16".
- MIN. DOOR SIZE 12" WIDE X 12" HIGH, MAX. DOOR SIZE 48" WIDE X 96" HIGH. (WIDTH CANNOT EXCEED 3 X HEIGHT)
- VIEWPORT LOCATION, AS DIM. ABOVE, IS 'B'-10" (±1") ON DOORS UP TO 60" HIGH, AND 48" (±1") ON DOORS OVER 60" HIGH.
- (V) DESIGNATES MODEL DOOR WITH VIEWPORT, SPECIFY (L/H) LEFT HAND OR (R/H) RIGHT HAND, HINGE LOCATION WHEN VIEWING EXTERIOR SIDE OF DOOR.
- HINGE ALWAYS FURNISHED ALONG 'B' DIMENSION, HEIGHT OF DOOR.
- VIEWPORT IS NOT AVAILABLE ON DOORS UNDER 14" WIDE x 20" HIGH.
- OPTIONAL MATERIALS AVAILABLE:
DOOR PANELS-16 GA. BONDERIZED, STAINLESS AND GALVANIZED STEEL
-20 GA. BONDERIZED AND STAINLESS STEEL
-.063 SMOOTH ALUMINUM AND .050 EMBOSSED ALUMINUM
VIEWPORT GLASS-DOUBLE THERMAL PANE, 1/4" TEMPER CLEAR
HANDLE-CHROME PLATED
- REFER TO INSTALLATION INSTRUCTION FOR MOUNTING OF HANDLES AND DOOR.

SPECIFICATIONS

MOUNTING FRAME .080 6063-T5 EXTRUDED ALUMINUM NON-THROUGH METAL THERMAL BREAK	INSULATION 2-1/4# DENSITY, R13 POLYURETHANE FOAM	HINGE .050 STAINLESS STEEL CONTINUOUS TYPE
DOOR PANEL FRAME .060 6063-T5 EXTRUDED ALUMINUM NON-THROUGH METAL THERMAL BREAK	HANDLES DUAL ACCESS ZINC DIE CAST	VIEWPORT FRAME .062 6063-T5 EXTRUDED ALJ
DOOR PANELS -----	GASKET ONE PIECE SANTOPRENE	FINISH MILL

ITM4 Innovative Technology Marketing 4...

P.O. Box 5, 1713 Southgate Drive, Buffalo, MN 55313
Phone/Fax (763) 497-0842

PROJECT/LOCATION		ARCHITECT/ENGINEER
CONTRACTOR		SALES ENGINEER
DRAWN BY RCN	DATE 3-3-02	DRAWING NO. 40730302

THERMAL BREAK DOOR - MODEL PA2(V)NTB(S)



MODEL PA2NTB AND PA2VNTB PERFORMANCE CHARACTERISTICS

All model doors are in compliance with UL 1995
2nd Edition Standard for Safety Heating and Cooling Equipment

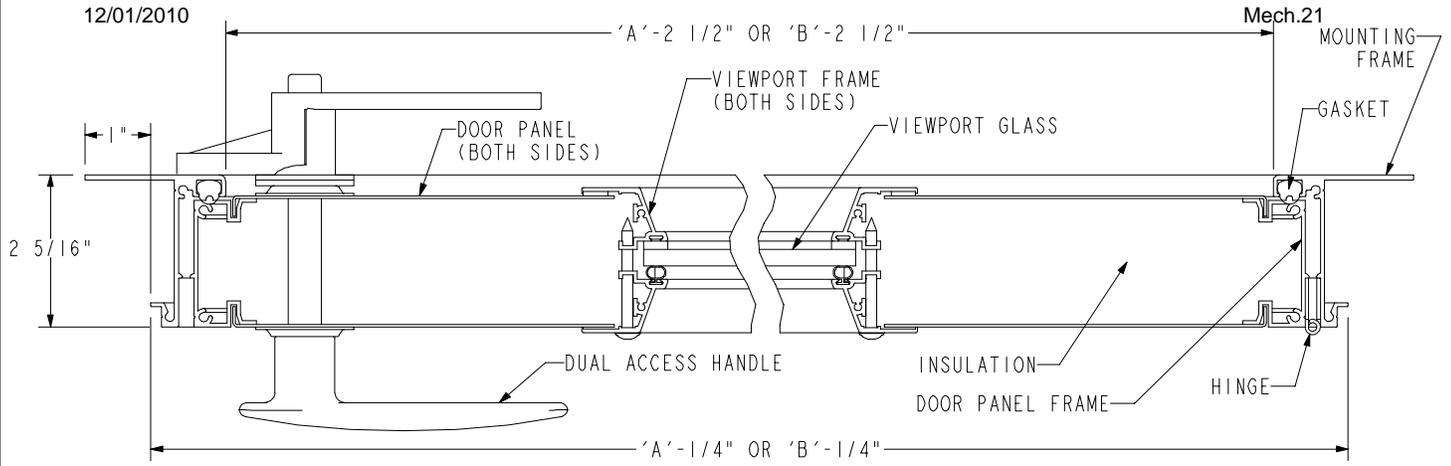
STATIC PRESSURE (IN. WG)	MODELS PA2N AND PA2VN AIR LEAKAGE PERFORMANCE		
	TOTAL SCFM	SCFM/PERIM. FT.	SCFM/SQ. FT.
1	0.10	0.01	0.01
2	0.10	0.01	0.01
3	0.10	0.01	0.01
4	0.10	0.01	0.01
5	0.10	0.01	0.01
6	0.20	0.01	0.02
7	0.20	0.01	0.02
8	0.20	0.01	0.02
9	0.20	0.01	0.02
10	0.30	0.02	0.03
11	0.30	0.02	0.03
12	0.30	0.02	0.03
13	0.30	0.02	0.03
14	0.40	0.03	0.04
15	0.40	0.03	0.04

Air Leakage table is based upon independent air leakage tests conducted by Intertek Testing Services. Both the PA2N and PA2VN models of 24"x60" were tested. Testing was in accordance with ASTM E 283-91 "Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen". ITM4 recommends using PA2N and PA2VN models for "draw through", negative pressure applications. Air leakage for Models PA2NTB and PA2VNTB will be comparable to Models PA2N and PA2VN.

Water Leakage Performance

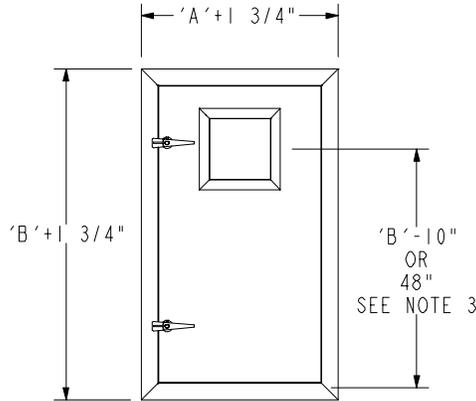
Water Leakage results are based upon testing per ASTM E 331-93 "Water Penetration of Exterior Windows, Curtain Walls and Doors by a Uniform Static Air Pressure Difference". The tests consisted of mounting doors under a pressure difference of 2" WG and subjected them to a uniform water spray for 15 minutes. The spray was equivalent to a torrential rainfall rate of 8 inches/hour. Over the 15 minute period, Models PA2N and PA2VN (24"x60") doors allowed approximately 0.8 ounces of water penetration. Water leakage for Models PA2NTB and PA2VNTB will be comparable to Models PA2N and PA2VN.

12/01/2010



ALL MODEL DOORS ARE IN COMPLIANCE WITH UL 1995, 2nd EDITION, STANDARD FOR SAFETY HEATING AND COOLING EQUIPMENT, AND NFPA 90.

MODEL PA2VP (R/H) SHOWN



MODELS PA2P AND PA2VP ARE INWARD SWING DOORS DESIGNED FOR "BLOW THROUGH", POSITIVE PRESSURE APPLICATIONS

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SCHEDULE

ITEM	QTY	MODEL			OPENING SIZE		IDENTIFICATION
		PA2	V L/H R/H	P	*'A' WIDTH	*'B' HEIGHT	
		PA2		P			
		PA2		P			
		PA2		P			
		PA2		P			
		PA2		P			

NOTES

- 1. UNLESS OTHERWISE SPECIFIED, DOOR WILL BE FABRICATED 1/4" UNDER LISTED WALL OPENING SIZE, ±1/16".
- 2. MIN. DOOR SIZE 12" WIDE X 12" HIGH, MAX. DOOR SIZE 48" WIDE X 96" HIGH. (WIDTH CANNOT EXCEED 3 X HEIGHT)
- 3. VIEWPORT LOCATION, AS DIM. ABOVE, IS 'B'-10" (±1") ON DOORS UP TO 60" HIGH, AND 48" (±1") ON DOORS OVER 60" HIGH.
- 4. (V) DESIGNATES MODEL DOOR WITH VIEWPORT, SPECIFY (L/H) LEFT HAND OR (R/H) RIGHT HAND, HINGE LOCATION WHEN VIEWING EXTERIOR SIDE OF DOOR.
- 5. HINGE ALWAYS FURNISHED ALONG 'B' DIMENSION, HEIGHT OF DOOR.
- 6. VIEWPORT IS NOT AVAILABLE ON DOORS UNDER 14" WIDE x 20" HIGH.
- 7. OPTIONAL MATERIALS AVAILABLE:
 DOOR PANELS-16 GA. BONDERIZED, STAINLESS AND GALVANIZED STEEL
 -20 GA. BONDERIZED AND STAINLESS STEEL
 -.063 SMOOTH ALUMINUM AND .050 EMBOSSED ALUMINUM
 VIEWPORT GLASS-SINGLE PANE, 1/4" TEMPER CLEAR OR PLEXIGLASS
 -DOUBLE THERMAL PANE, 1/4" TEMPERED WIRE AND CLEAR
 HANDLE-CHROME PLATED
- 8. REFER TO INSTALLATION INSTRUCTION FOR MOUNTING OF HANDLES AND DOOR.

SPECIFICATIONS

MOUNTING FRAME
.080 6063-T5 EXTRUDED ALUMINUM

INSULATION
2-1/4# DENSITY, R13 POLYURETHANE FOAM

HINGE
.050 STAINLESS STEEL CONTINUOUS TYPE

DOOR PANEL FRAME
.060 6063-T5 EXTRUDED ALUMINUM

HANDLES
DUAL ACCESS ZINC DIE CAST

VIEWPORT FRAME
.062 6063-T5 EXTRUDED ALUMINUM

DOOR PANELS

GASKET
ONE PIECE SANTOPRENE

**FINISH
MILL**

ITM4 Innovative Technology Marketing 4...

P.O. Box 5, 1713 Southgate Drive, Buffalo, MN 55313
Phone/Fax (763) 497-0842

PROJECT/LOCATION		ARCHITECT/ENGINEER
CONTRACTOR		SALES ENGINEER
DRAWN BY	DATE	DRAWING NO.
RCN	3-3-02	40680302

ACCESS DOOR - MODEL PA2(V)P



MODEL PA2P AND PA2VP PERFORMANCE CHARACTERISTICS

All model doors are in compliance with UL 1995
2nd Edition Standard for Safety Heating and Cooling Equipment

STATIC PRESSURE (IN. WG)	MODELS PA2P AND PA2VP AIR LEAKAGE PERFORMANCE		
	TOTAL SCFM	SCFM/PERIM. FT.	SCFM/SQ. FT.
1	0.10	0.01	0.01
2	0.20	0.01	0.02
3	0.20	0.01	0.02
4	0.30	0.02	0.03
5	0.30	0.02	0.03
6	0.30	0.02	0.03
7	0.40	0.03	0.04
8	0.40	0.03	0.04
9	0.40	0.03	0.04
10	0.60	0.04	0.06
11	0.70	0.05	0.07
12	0.70	0.05	0.07
13	0.80	0.06	0.08
14	0.80	0.06	0.08
15	0.90	0.06	0.09

Air Leakage table is based upon independent air leakage tests conducted by Intertek Testing Services. Both the PA2P and PA2VP models of 24"x60" were tested. Testing was in accordance with ASTM E 283-91 "Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen". ITM4 recommends using PA2P and PA2VP models for "blow through", positive pressure applications.

Water Leakage Performance

Models PA2P and PA2VP are designed for pressure assist sealing under a "blow through", positive pressure application. Therefore, no dynamic water performance tests were conducted since all water would blow away from the door. However, as part of the ETL listing in compliance to UL 1995 standard, the doors were subject to a static rain exposure test. The one-hour test resulted in zero water penetration through the door.

VENTLOK LATCHES

Mech.23

260 VENTLOK LATCH

This latch is designed for walk-in access doors and can be operated from both inside and outside the duct. The latch is installed by drilling a hole in the door and is held in place by sliding the adjustable spacer up against the door pan and tightening the set screw. In the case of flush-type doors, the spacer is discarded, and the combination striker and handle will both hold the latch in place and lock the door when turned.

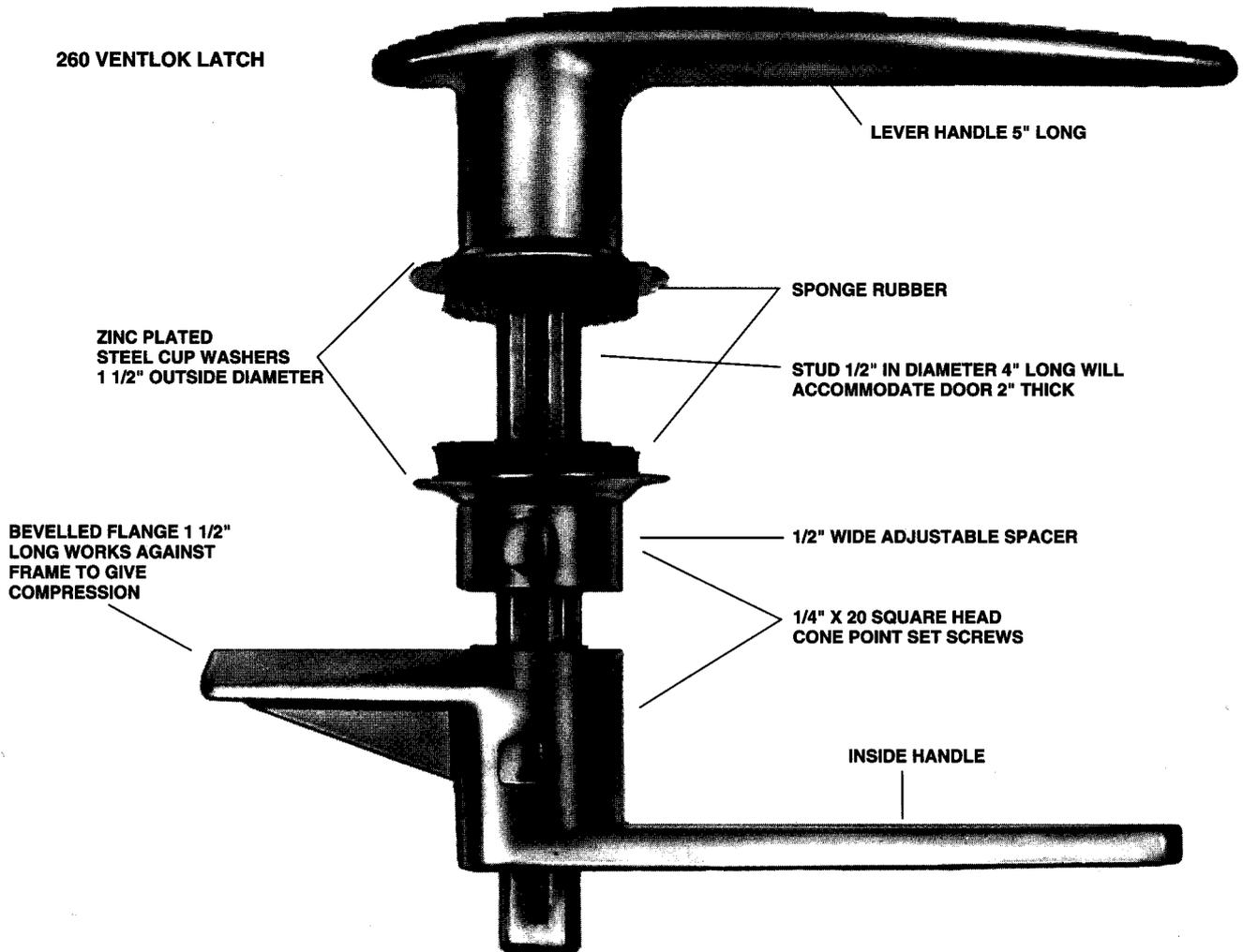
The stud on the 260 Latch is long enough to accommodate an insulated door up to 2" thick. It comes complete with steel and sponge rubber washers to ensure easy turning and prevent leakage.

All VENTLOK Latches are made of a rustproof alloy of zinc and aluminum. *Weight per 100: 100 lbs.* Available in plain finish or chrome plated

260 SOLID BRASS VENTLOK LATCH

This latch is identical, except it is cast from solid brass. It comes complete with brass cup washers and set screws. *Weight per 100: 140 lbs.*

260 VENTLOK LATCH



APPROXIMATELY
ACTUAL SIZE



Fan Schedule

Unit No.	Fan Tag	Service	Total CFM	Fan TSP	RPM	BHP	MHP	AMCA Class	Manufacturer & Model	Fan Type	Size
ERU-1	EF-1	EXHAUST	25,250	7.0	1302	33.6	40	II	Twin City BAE	SWSI	402
ERU-2	EF-2	EXHAUST	25,250	7.0	1302	33.6	40	II	Twin City BAE	SWSI	402
AHU-1	SF-2	SUPPLY	42,500	7.0	1137	30.6	40	II	Twin City EPFN	Plenum	365
AHU-2	SF-2	SUPPLY	23,500	5.5	1338	26.7	30	II	Twin City EPFN	Plenum	365
AHU-2	RF-2	RETURN	23,500	2.5	1234	15.5	20	II	Twin City EPFN	Plenum	330

Unit No.	Fan Tag	Motor Mfg.	Motor Model Number	Volts/PH/HZ	Motor Enclosure	NEMA Frame	Motor Efficiency	Bearings	Isolator Type	Feature Codes
ERU-1	EF-1	BALDOR	EM4308T	230 / 460 volt, 3 phase, 60 Hz. 460 volt wiring	TEFC	364T	Premium	200k	SWSR-2A	IS EL OG CP PZ BP Direct Drive
ERU-2	EF-2	BALDOR	EM4308T	230 / 460 volt, 3 phase, 60 Hz. 460 volt wiring	TEFC	364T	Premium	200k	SWSR-2A	IS EL OG CP PZ BP Direct Drive
AHU-1	SF-1	BALDOR	EM4308T	230 / 460 volt, 3 phase, 60 Hz. 460 volt wiring	TEFC	364T	Premium	200k	SWSR-2A	IS EL VP TR WC PZ STD Direct Drive 90 %Width
AHU-2	SF-2	BALDOR	EM4117T	230 / 460 volt, 3 phase, 60 Hz. 460 volt wiring	TEFC	326T	Premium	200k	SWSR-2A	IS UB EL VP TR WC PZ STD Direct Drive
AHU-2	RF-2	BALDOR	EM4102T	230 / 460 volt, 3 phase, 60 Hz. 460 volt wiring	TEFC	286T	Premium	200k	SWSR-2A	IS UB EL VP TR WC PZ STD Direct Drive

Feature Codes	
IS	Inlet Screen
EL	Extended Lube Fittings
ELX	Extended lube Fittings to Exterior
WC	Wheel Cage
TR	Thrust Restraints
PZ	Piezometer
STD	Standard Paint
BP	Baked Phenolic Paint



Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
 Phone (763) 551-7600 · Fax (763) 551-7601 · www.tcf.com



Customer: W/A
 Job Name:
 Job ID:

October 28, 2010
 Page 1

Fan Description		Fan Performance	
Tag	ERU-1-2 EF	CFM	25,250
Type	BAE-SW	Operating SP (in.wg)	7
Size	402	Standard SP (in.wg)	7
Width	SWSI	RPM	1137
Class	II	Tip Speed (fpm)	11,981
Wheel diameter (in.)	40.25	Oper. BHP	33.61
Percentage width	100%	Standard BHP	33.61
Percentage diameter	100%	Outlet area (sq. ft)	9.31
		Outlet Velocity (fpm)	2,712
		Temperature (°F)	70
		Altitude (ft)	0
		Density (lb/ft³)	0.075
		Max RPM for Class	1278
		Static Efficiency	82.65
		Mechanical Efficiency	88.06

Sound

Sound Power Levels in dB re. 10⁻¹² Watts:

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	94	98	94	86	85	82	78	73	92

Estimated sound pressure level in dBA (re: 0.0002 microbar) based on a single* ducted installation:

Distance in ft	1	3	5
dBA at Inlet	92	82	78

*To estimate dBA level for ducted inlet and ducted outlet (into and out of the room) type installation, deduct 20 from the LwA value shown.

Using a directivity factor of 1.

Estimated Sound Pressure based on free field, spherical (Q = 1) radiation at the stated distance.

Definitions:

LwA The overall (single value) fan sound power level, 'A' weighted.

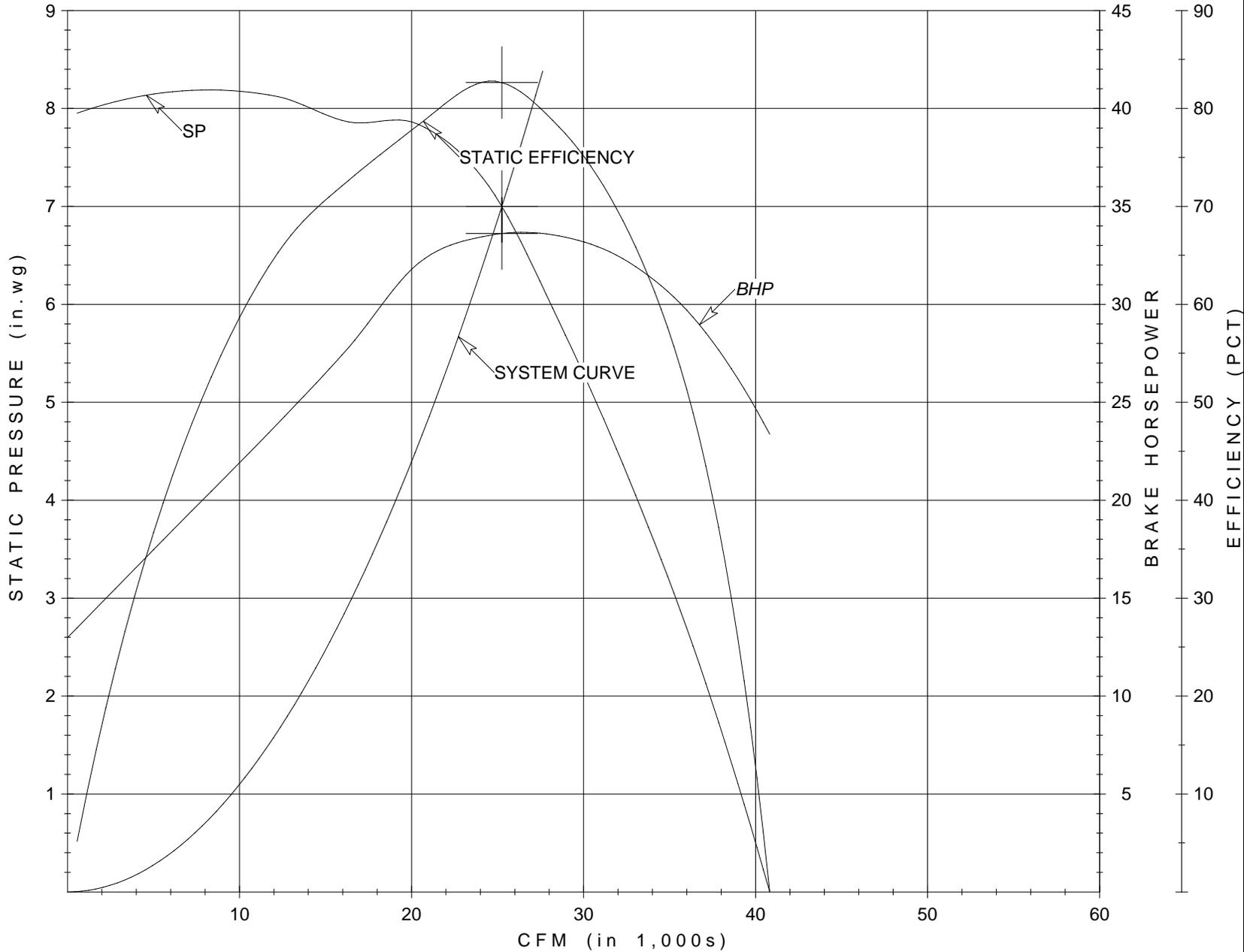
dBA The environment for each fan installation influences its measured sound value, therefore dBA levels cannot be guaranteed. Consult AMCA Publication 303 for further details.
 A fan's dBA is influenced by nearby reflective surfaces.



Customer: CCAC	Fan Tag: ERU-1-2 EF	CFM: _____ 25,250
Job ID: EQ 15044	Model: 402 BAE-SW	SP: _____ 7 in.wg
Represented By: Twin City Fan Companies, Ltd. (763) 551-7600		RPM: _____ 1137

92

TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



BHP: _____	33.61
Outlet Velocity: _____	2,712
Density: _____	0.075

Inlet Sound Power	
Octave	Level
1	_____ 94
2	_____ 98
3	_____ 94
4	_____ 86
5	_____ 85
6	_____ 82
7	_____ 78
8	_____ 73

in db re 10⁻¹² watts



Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
 Phone (763) 551-7600 · Fax (763) 551-7601 · www.tcf.com



Customer: W/A
 Job Name:
 Job ID:

October 28, 2010
 Page 1 of 2

Fan Description		Fan Performance	
Tag	AHU-1 SF	Total CFM	42,500
# fans per system	2	CFM/fan	21,250
Type	EPFN	Operating SP (in.wg)	7
Size	365	Standard SP (in.wg)	7
Width	SWSI	RPM	1338
Class	II	Tip Speed (fpm)	12,785
Wheel diameter (in.)	36.5	Oper. BHP/fan	30.64
Percentage width	90%	Standard BHP/fan	30.64
Percentage diameter	100%	Tot. Oper. BHP	61.29
		Tot. Standard BHP	61.29
		Outlet area (sq. ft)	N/A
		Outlet Velocity (fpm)	N/A
		Temperature (°F)	70
		Altitude (ft)	0
		Density (lb/ft³)	0.075
		Max RPM for Class	1465
		Static Efficiency	76.30
		Mechanical Efficiency	76.30

Modifiers

2 fans operating in system, % width: 90%

Sound

Individual Sound Power Levels in dB re. 10⁻¹² Watts:

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	94	99	98	80	80	77	73	71	92
Level at Outlet	93	97	97	90	86	83	78	74	93

Total Package Sound Power Levels in dB re. 10⁻¹² Watts:

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	97	102	101	83	83	80	76	74	95
Level at Outlet	96	100	100	93	89	86	81	77	96

Individual fan estimated sound pressure level in dBA (re: 0.0002 microbar) based on a single* ducted installation:

Distance in ft	1	3	5
dBA at Inlet	92	82	78
dBA at Outlet	93	83	79

*To estimate dBA level for ducted inlet and ducted outlet (into and out of the room) type installation, deduct 20 from the LwA value shown.

Using a directivity factor of 1.

Estimated Sound Pressure based on free field, spherical (Q = 1) radiation at the stated distance.

12/01/2010

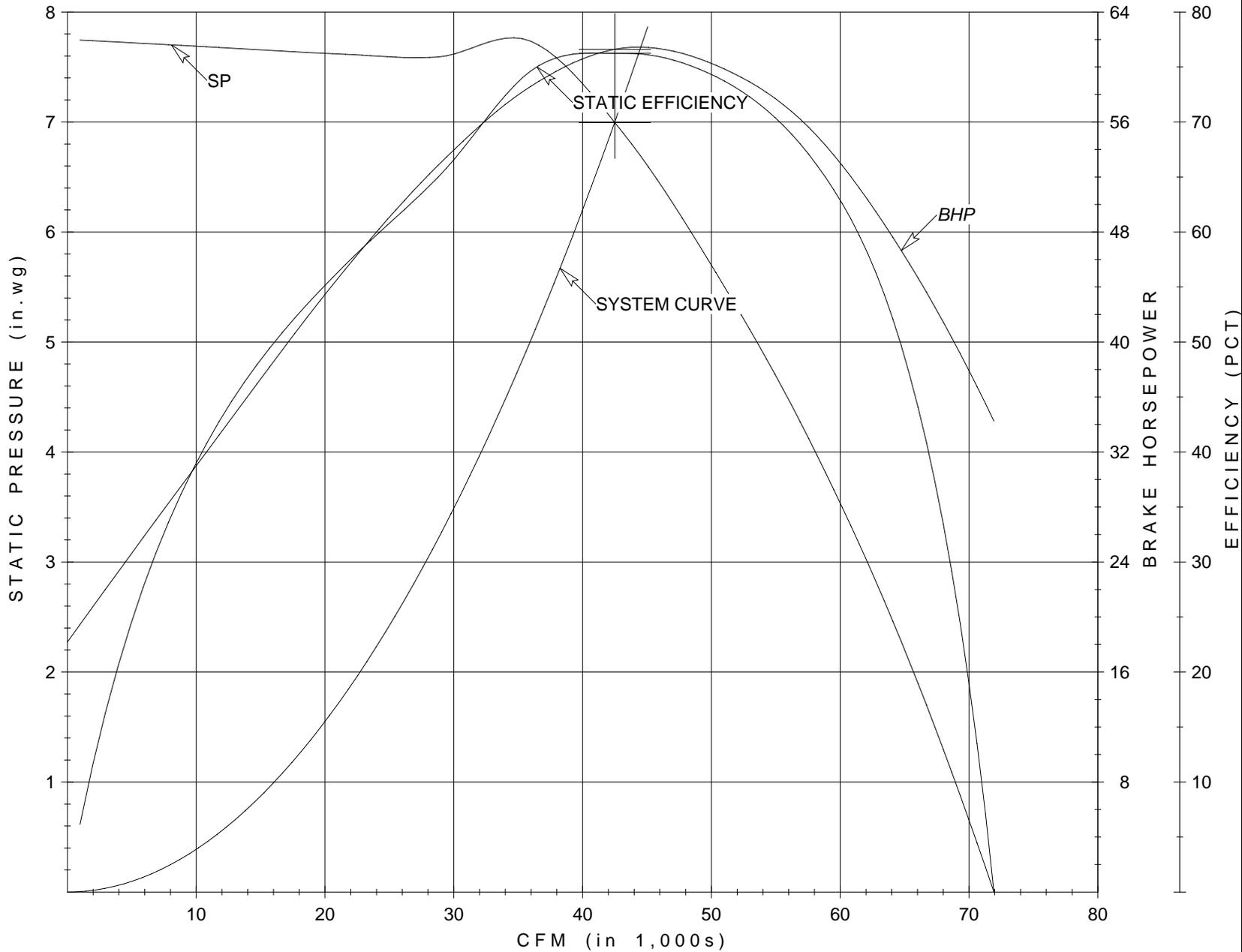


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Mech.28

Customer: CCAC	Fan Tag: AHU-1 SF	Total CFM: - 42,500
Job ID: EQ 15044	Model: 365 EPFN	SP: _____ 7 in.wg
Represented By: Twin City Fan Companies, Ltd. (763) 551-7600		RPM: _____ 1338

TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



BHP: __ 30.64 / fan
Outlet Velocity: - N/A
Density: __ 0.075
Corrected for: 2 fans operating in system % width: 90%
Total Package Sound Power Level
Octave ____ In/Out
1 _____ 97 / 96
2 _____ 102 / 100
3 _____ 101 / 100
4 _____ 83 / 93
5 _____ 83 / 89
6 _____ 80 / 86
7 _____ 76 / 81
8 _____ 74 / 77
in db re 10 ⁻¹² watts
10/28/2010
Page: 1 of 1 - #976



Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
 Phone (763) 551-7600 · Fax (763) 551-7601 · www.tcf.com



Customer: W/A
 Job Name:
 Job ID:

October 28, 2010
 Page 1

Fan Description

Tag AHU-2 SF
 Type EPFN
 Size 365
 Width SWSI
 Class II
 Wheel diameter (in.) 36.5
 Percentage width 100%
 Percentage diameter 100%

Fan Performance

CFM 23,500
 Operating SP (in.wg) 5.5
 Standard SP (in.wg) 5.5
 RPM 1234
 Tip Speed (fpm) 11,792
 Oper. BHP 26.74
 Standard BHP 26.74
 Outlet area (sq. ft) N/A
 Outlet Velocity (fpm) N/A
 Temperature (°F) 70
 Altitude (ft) 0
 Density (lb/ft³) 0.075
 Max RPM for Class 1465
 Static Efficiency 75.99
 Mechanical Efficiency 75.99

Sound

Sound Power Levels in dB re. 10⁻¹² Watts:

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	93	100	96	82	82	79	73	69	91
Level at Outlet	92	97	96	90	88	84	78	73	94

Estimated sound pressure level in dBA (re: 0.0002 microbar) based on a single* ducted installation:

Distance in ft	1	3	5
dBA at Inlet	91	81	77
dBA at Outlet	94	84	80

*To estimate dBA level for ducted inlet and ducted outlet (into and out of the room) type installation, deduct 20 from the LwA value shown.

Using a directivity factor of 1.

Estimated Sound Pressure based on free field, spherical (Q = 1) radiation at the stated distance.

Definitions:

LwA The overall (single value) fan sound power level, 'A' weighted.

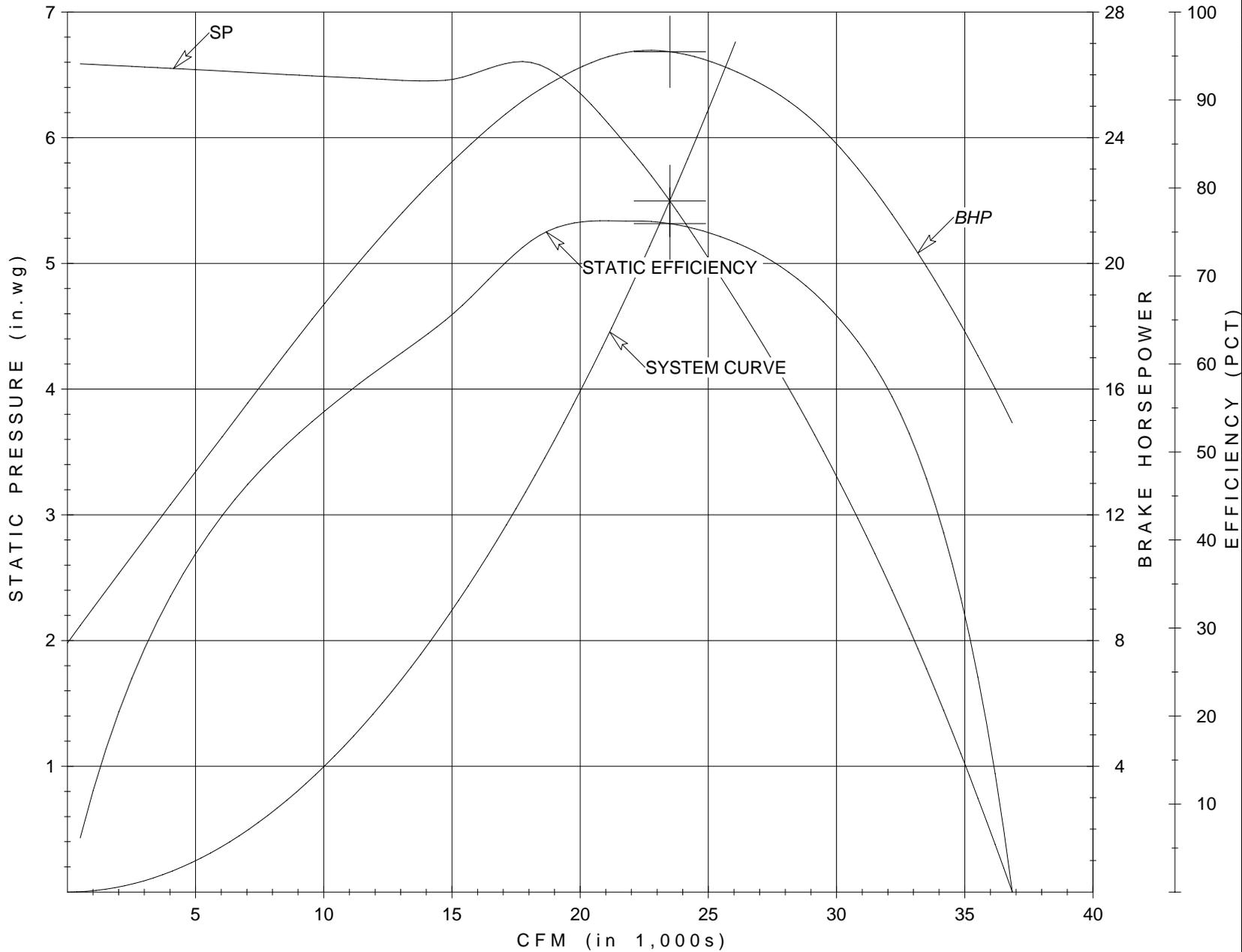
dBA The environment for each fan installation influences its measured sound value, therefore dBA levels cannot be guaranteed. Consult AMCA Publication 303 for further details.
 A fan's dBA is influenced by nearby reflective surfaces.



Customer: CCAC	Fan Tag: AHU-2 SF	CFM: _____ 23,500
Job ID: EQ 15044	Model: 365 EPFN	SP: _____ 5.5 in.wg
Represented By: Twin City Fan Companies, Ltd. (763) 551-7600		RPM: _____ 1234
		BHP: _____ 26.74
		Outlet Velocity: - N/A
		Density: _____ 0.075

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TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Level	
Octave	In/Out
1	93 / 92
2	100 / 97
3	96 / 96
4	82 / 90
5	82 / 88
6	79 / 84
7	73 / 78
8	69 / 73

in db re 10⁻¹² watts



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 Phone (763) 551-7600 · Fax (763) 551-7601 · www.tcf.com



Customer: W/A
 Job Name:
 Job ID:

October 28, 2010
 Page 1

Fan Description		Fan Performance	
Tag	AHU-2 RF	CFM	23,500
Type	EPFN	Operating SP (in.wg)	2.5
Size	330	Standard SP (in.wg)	2.5
Width	SWSI	RPM	1302
Class	II	Tip Speed (fpm)	11,248
Wheel diameter (in.)	33	Oper. BHP	15.48
Percentage width	100%	Standard BHP	15.48
Percentage diameter	100%	Outlet area (sq. ft)	N/A
		Outlet Velocity (fpm)	N/A
		Temperature (°F)	70
		Altitude (ft)	0
		Density (lb/ft³)	0.075
		Max RPM for Class	1620
		Static Efficiency	59.66
		Mechanical Efficiency	59.66

Sound

Sound Power Levels in dB re. 10⁻¹² Watts:

Octave Bands	1	2	3	4	5	6	7	8	LwA
Level at Inlet	85	91	102	96	85	82	75	68	97
Level at Outlet	86	89	101	98	91	88	80	71	99

Estimated sound pressure level in dBA (re: 0.0002 microbar) based on a single* ducted installation:

Distance in ft	1	3	5
dBA at Inlet	97	87	83
dBA at Outlet	99	89	85

*To estimate dBA level for ducted inlet and ducted outlet (into and out of the room) type installation, deduct 20 from the LwA value shown.

Using a directivity factor of 1.

Estimated Sound Pressure based on free field, spherical (Q = 1) radiation at the stated distance.

Definitions:

LwA The overall (single value) fan sound power level, 'A' weighted.

dBA The environment for each fan installation influences its measured sound value, therefore dBA levels cannot be guaranteed. Consult AMCA Publication 303 for further details.
 A fan's dBA is influenced by nearby reflective surfaces.

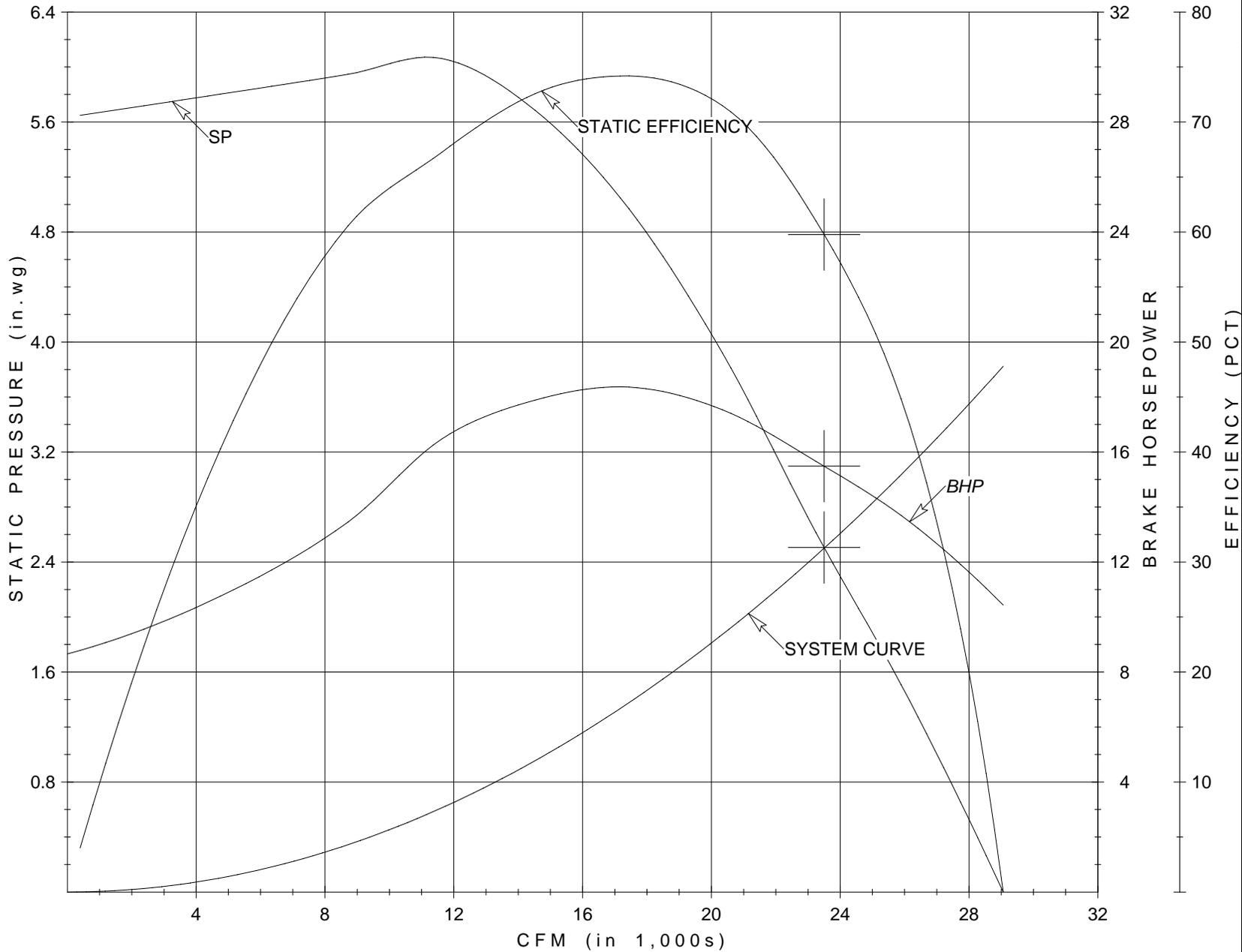


Customer: CCAC	Fan Tag: AHU-2 RF
Job ID: EQ 15044	Model: 330 EPFN
Represented By: Twin City Fan Companies, Ltd. (763) 551-7600	

CFM: _____	23,500
SP: _____	2.5 in.wg
RPM: _____	1302
BHP: _____	15.48
Outlet Velocity: -	N/A
Density: _____	0.075

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TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Level	
Octave	In/Out
1	85 / 86
2	91 / 89
3	102 / 101
4	96 / 98
5	85 / 91
6	82 / 88
7	75 / 80
8	68 / 71

in db re 10⁻¹² watts

Construction Features

Wheels

High efficiency, non-overloading airfoil wheels are provided on all sizes and arrangements.

Arr. 1 and 3 – Aluminum wheels using extruded aluminum blades are standard to size 245 on arrangement 1 and 3 fans, and available as an option on larger sizes. Steel wheels are standard on sizes 270 and larger.

Arr. 4 – Aluminum wheels using extruded aluminum blades are standard to size 600 on direct drive arrangement 4 fans, a popular choice for applications requiring precision balance and improved reliability.

Inlet Cones

Heavy-gauge, spun steel inlet cones are closely matched to the wheel intake rim to ensure efficient and quiet operation.

Structural Frame

Frames are constructed of heavy-gauge steel, continuously welded at all connections for maximum strength and rigidity. The “cross frame” bearing support is designed for maximum stability and load distribution.

Shafts

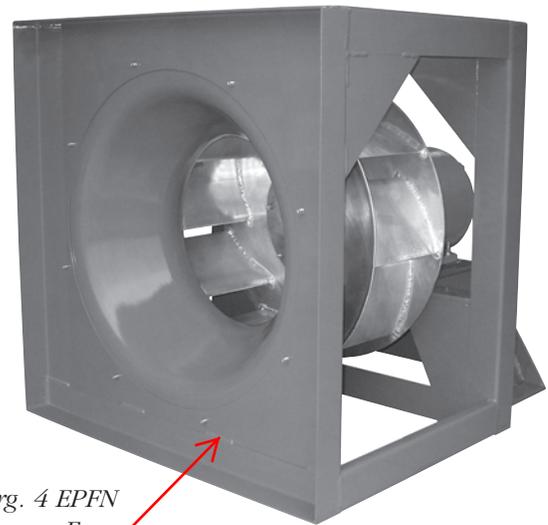
Shafts are AISI Grade 1040 or 1045 hot-rolled steel accurately turned, ground, polished, and ring-gauged for verification. Shafts are generously sized for a first critical speed of at least 1.43 times the maximum speed for the class.

Fan Bearings

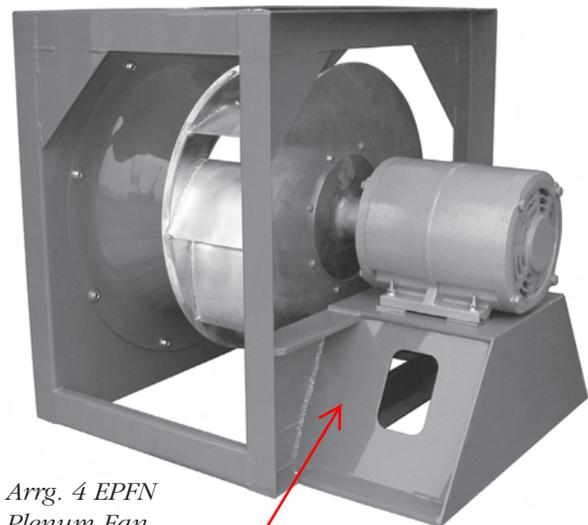
Either ball (adapter mount) or spherical roller, heavy-duty, self-aligning, pillow block type bearings are provided. Bearing selection is based on minimum L-10 life of 80,000 hours. Considering the long life offered with our standard bearing selections, we do not recommend upgrades to split-roller bearings due to their large size, especially on Arrangement 3 fans.

Inlet Collar

Horizontal configurations are designed to be flex-connected to the perimeter of the square panel without the addition of an inlet collar.



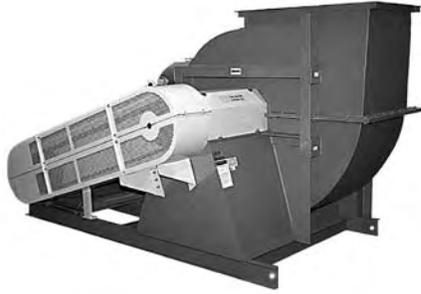
*Arr. 4 EPFN
Plenum Fan*



*Arr. 4 EPFN
Plenum Fan*

AHU-1 -2 FAN

SWSI Arrangements



Arrangement 1 fan with optional unitary base, horizontal split housing, shaft and V-belt drive guard.

Arrangement 1 SWSI — Single Width, Single Inlet

Arrangement 1 fans are usually belt driven. The wheel is overhung on the shaft, i.e., mounted at the end of the shaft. The motor can be mounted in any of the four AMCA standard motor positions, W, X, Y, or Z. The two fan bearings are mounted on the bearing pedestal, out of the airstream. Arrangement 1 fans are thus recommended for high temperature or contaminated air applications. Belt driven configurations offer performance flexibility. If the performance requirements change after the fan has been installed, it is simple and inexpensive to change the drive.

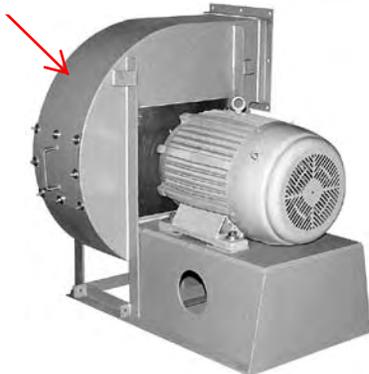
Extended lube line at inlet — standard on all Arrangement 3 fans.



Arrangement 3 SWSI — Single Width, Single Inlet

Arrangement 3 is available in belt driven only. Arrangement 3 SWSI has one bearing located in the airstream. The wheel is mounted between the bearings and supported by the fan housing, which makes it a structurally sound, compact, and economical arrangement.

ERU-1 -2 FAN



Direct drive Arrangement 4 with bolted access door and shaft seal.

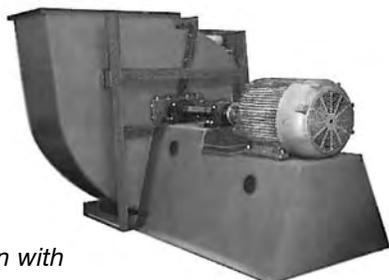
Arrangement 4 SWSI — Single Width, Single Inlet

Arrangement 4 is available in direct drive only. The fan wheel is mounted directly on the motor shaft with the motor mounted on a pedestal. An Arrangement 4 design offers low maintenance as there are no fan bearings, fan shaft or drive parts to maintain. Arrangement 4 is typically limited to size 365 or smaller.

Typical Direct Drive Speeds

60 Hz OPERATION		50 Hz OPERATION	
Synchronous Speed	Full Load Speed	Synchronous Speed	Full Load Speed
3600	3500	3000	2900
1800	1750	1500	1450
1200	1170	1000	975
900	870	750	725

The actual full load speed of the motor can vary slightly depending upon motor HP and motor design.



Arrangement 8 fan with optional coupling.

Arrangement 8 SWSI — Single Width, Single Inlet

Arrangement 8 is a modified version of Arrangement 1 used for direct drive. The Arrangement 1 bearing pedestal is extended to accommodate the motor. A flexible coupling connects the fan and motor shaft. Refer to the typical direct drive speeds under Arrangement 4.

Recommended for 250 HP and larger applications.

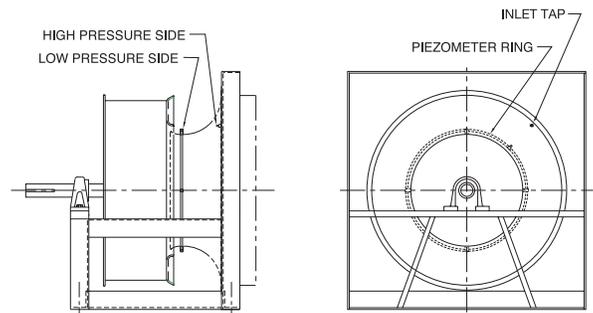
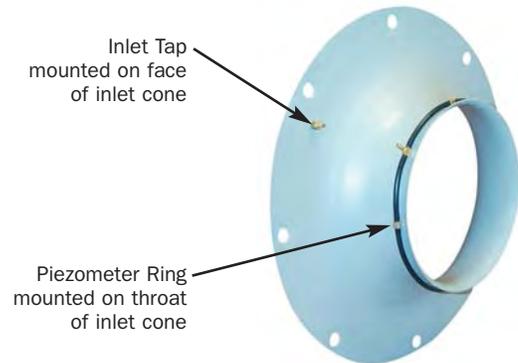
Piezometer Ring (Airflow Measuring System)

Twin City Fan is pleased to introduce The Piezometer Ring Airflow Measuring System, now available as an accessory for our housed and plenum fans. The system consists of a Piezometer ring mounted at the throat and a static pressure tap mounted on the face of the inlet cone. A differential pressure transducer and digital display can also be provided. Based on Twin City Fan laboratory tests, the system was determined to be accurate within $\pm 5\%$.

How it Works

The System is based on the principle of a flow nozzle. The inlet cone of the fan is used as the flow nozzle, and the flow can be calculated by measuring the static pressure drop through the inlet cone.

The pressure drop is measured from the tap located on the face of the inlet cone to the piezometer ring in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer ring is connected to the low-pressure side (see diagram at right).



Demonstration

Shown below is a Twin City Fan model 165 BCV fitted with a Piezometer Ring Airflow Measuring System, operating at 1100 RPM. With an unobstructed inlet, the digital display indicates the fan is producing 1713 CFM, which closely matches rated performance (see photo A). After placing an obstruction in the inlet, the airflow is reduced to 1597 CFM (see photo B).



A. Fan operating with unobstructed inlet produces 1713 CFM



B. Fan operating with obstructed inlet produces 1597 CFM





Twin City Fan & Blower

INSTALLATION, OPERATION & MAINTENANCE MANUAL

Airflow Measuring System Using Piezometer Ring

ENGINEERING SUPPLEMENT

ES-105

Issue Date: 1-1-05

Rev. Date: 9-1-05

Twin City Fan now offers an air measuring device as an option on centrifugal fans. It is based on the principle of a flow nozzle. The inlet cone of the fan is used as the flow nozzle. By measuring the pressure drop through the inlet cone, the flow can be calculated. The system consists of a piezometer ring mounted in the throat and a static pressure tap mounted on the face of the inlet cone. A differential pressure transducer and a digital display can be provided. The display must be capable of performing the square root function in order to read out in CFM directly. By testing fans in the laboratory,

Twin City Fan was able to determine flow coefficients for various fan types. The flow coefficients were combined to give the equations listed below by fan type. Based on testing performed in Twin City Fan's laboratory, the accuracy of the system was determined to be +/- 5%.

The pressure drop is measured from the tap located on the face of the funnel to the piezometer ring in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer ring is connected to the low-pressure side.

Measurement of Airflow

The equations below are accurate for flow estimation for flows from 40% to 100% of wide-open volume. According to testing done previously at Twin City Fan, several factors affect the accuracy of this method of determining flow. The equations below assume the following:

- There are no vanes or other obstructions in or near the inlet
- Even flow entering the funnel (no pre-swirl)
- Standard wheel to inlet cone overlap
- Accurate determination of air density at the inlet
- Free inlet (consult Twin City Fan for ducted inlet factors)

Non-Standard Density Method

One of the following equations is used to measure the flow:

$$ACFM = C1 * A * \sqrt{\Delta P / \rho}$$

where: A = Actual inlet funnel throat area (square feet) - from tables on page 2

ΔP = The differential in static pressure from the piezometer ring and the front pressure tap (inches w.g.)

ρ = Air density (pounds mass/cubic foot)

C1 = Value from Table 1 below

Standard Density Method

The equations can be simplified by assuming standard density and assuming funnel dimensions match drawing dimensions. The following tables show the factor (F) for each fan size and type. The equation then becomes the following:

For standard air ($\rho = 0.075$ lb/ft³):

$$ACFM = F \sqrt{\Delta P}$$

where: F = factor from tables on page 2

ΔP = The differential in static pressure from the piezometer ring and the front pressure tap (inches w.g.)

Table 1: C1 Values

Product	C1 Free Inlet	C1* Ducted Inlet
EPFN/EPQN (Arr. 1 or 4)	692.03	740.14
EPF/EPQ (Arr. 3)	667.52	713.93
APF/APQ	753.06	794.06
BC/BCS/BAF SWSI	735.42	786.56
BC/BCS/BAF DWDI	1470.84	1573.12
TSL	735.42	753.56
QSL	696.00	735.83
BAE-SW **	720.4	735.8
BAE-DW**	1440.8	1471.6

* Values for ducted C1 factors are based on duct diameter matching standard inlet collar diameter.

** BAE sizes smaller than 182 use BC\BCS\BAF Factors.

Table 2: EPF/EPQ (Arrangement 3) and EPFN/EPQN (Arrangement 1 & 4)

Size	EPF/EPQ Free Inlet F	EPFN/EPQN Free Inlet F	EPF/EPQ Ducted Inlet F	EPFN/EPQN Ducted Inlet F	A
122	792.17	821.25	847.24	878.35	0.325
150	1184.60	1228.09	1266.96	1313.47	0.486
165	1440.53	1493.42	1540.68	1597.24	0.591
182	1757.39	1821.92	1879.58	1948.58	0.721
200	2108.38	2185.80	2254.97	2337.76	0.865
222	2617.81	2713.93	2799.81	2902.60	1.074
245	3168.67	3285.02	3388.97	3513.39	1.300
270	3856.03	3997.61	4124.12	4275.53	1.582
300	4770.07	4945.21	5101.71	5289.01	1.957
330	5757.23	5968.62	6157.51	6383.56	2.362
365	7032.01	7290.21	7520.92	7797.03	2.885
402	8555.41	8869.55	9150.23	9486.16	3.510
445	10444.42	10827.92	11170.58	11580.68	4.285
490	12669.80	13135.01	13550.69	14048.16	5.198
542	15541.11	16111.75	16621.62	17231.84	6.376
600	19004.71	19702.52	20326.03	21072.24	7.797
660	22994.79	23839.12	24593.53	25496.41	9.434
730	28128.04	29160.84	30083.67	31188.11	11.54

Table 5: QSL

Size	Free Inlet F	Ducted Inlet F	A
150	1832.36	1937.23	0.721
165	2198.32	2324.14	0.865
182	2729.48	2885.70	1.074
200	3303.84	3492.93	1.300
222	4020.52	4250.63	1.582
245	4973.55	5258.21	1.957
270	6002.82	6346.39	2.362
300	7331.98	7751.62	2.885
330	8920.36	9430.92	3.510
365	10889.96	11513.24	4.285
402	13210.27	13966.36	5.198
445	16204.06	17131.49	6.376
490	19815.41	20949.54	7.797
542	23975.70	25347.94	9.434
600	29327.92	31006.49	11.54
660	35859.36	37911.75	14.11
730	43610.67	46106.71	17.16

Table 4: BC/BSC/BAF

Size	SWSI Free Inlet F	DWDI Free Inlet F	SWSI Ducted Inlet F	DWDI Ducted Inlet F	A
105	641.87	1283.74	686.51	1373.01	0.239
122	872.90	1745.81	933.61	1867.21	0.325
135	1058.21	2116.41	1131.79	2263.58	0.394
150	1305.20	2610.39	1395.96	2791.92	0.486
165	1587.21	3174.41	1697.58	3395.16	0.591
182	1936.99	3873.98	2071.69	4143.38	0.721
200	2321.58	4643.16	2483.02	4966.04	0.865
222	2883.02	5766.04	3083.50	6167.00	1.074
245	3491.62	6983.24	3734.42	7468.84	1.300
270	4247.77	8495.55	4543.16	9086.32	1.582
300	5254.03	10508.05	5619.38	11238.86	1.957
330	6342.73	12685.46	6783.80	13567.59	2.362
365	7747.97	15495.94	8286.75	16573.50	2.885
402	9426.99	18853.98	10082.53	20165.06	3.510
445	11507.43	23014.86	12307.64	24615.28	4.285
490	13957.43	27914.86	14928.01	29856.02	5.198
542	17121.05	34242.10	18311.62	36623.24	6.376
600	20938.50	41877.00	22394.53	44789.06	7.797
660	25334.37	50668.73	27096.08	54192.16	9.434
730	30991.88	61983.75	33147.00	66294.01	11.54
807	37901.44	75802.87	40537.05	81074.09	14.11
890	46079.00	92158.01	49283.27	98566.54	17.16
982	56192.01	112384.00	60099.52	120199.04	20.93

Table 6: TSL

Size	Free Inlet F	Ducted Inlet F	A
122	872.75	894.27	0.325
150	1305.09	1337.28	0.486
165	1587.06	1626.20	0.591
182	1936.15	1983.91	0.721
200	2322.85	2380.14	0.865
222	2884.09	2955.23	1.074
245	3490.99	3577.10	1.300
270	4248.26	4353.05	1.582
300	5255.28	5384.90	1.957
330	6342.85	6499.31	2.362
365	7747.30	7938.40	2.885
402	9425.66	9658.16	3.510
445	11506.83	11790.66	4.285
490	13958.57	14302.88	5.198
542	17121.95	17544.28	6.376
600	20937.86	21454.32	7.797
660	25333.82	25958.71	9.434
730	30989.22	31753.60	11.54
807	37890.63	38825.25	14.11
890	46081.02	47217.66	17.16

(Sizes smaller than 182 use Table 4: BC/BSC/BAF)

Table 7: BAE-SW/BAE-DW

Size	SWSI Free Inlet F	DWDI Free Inlet F	SWSI Ducted Inlet F	DWDI Ducted Inlet F	A
182	1896.61	3793.22	1937.16	3874.31	0.721
200	2275.41	4550.82	2324.05	4648.10	0.865
222	2825.19	5650.38	2885.58	5771.16	1.074
245	3419.69	6839.38	3492.79	6985.58	1.300
270	4161.50	8322.99	4250.46	8500.91	1.582
300	5147.95	10295.89	5257.99	10515.99	1.957
330	6213.31	12426.62	6346.13	12692.26	2.362
365	7589.08	15178.15	7751.31	15502.62	2.885
402	9233.16	18466.63	9430.53	18861.07	3.510
445	11271.82	22543.63	11512.77	23025.55	4.285
490	13673.49	27346.98	13965.79	27931.57	5.198
542	16772.25	33544.50	17130.79	34261.59	6.376
600	20510.23	41020.47	20948.68	41897.36	7.797
660	24816.41	49632.82	25346.91	50693.82	9.434
730	30356.30	60712.61	31005.23	62010.46	11.540
807	37116.76	74233.52	37910.21	75820.42	14.110
890	45139.88	90279.75	46104.83	92209.66	17.160
982	55056.97	110113.94	56233.92	112467.85	20.930

Table 3: APF/APQ

Size	Free Inlet F	Ducted Inlet F	A
121	944.92	996.36	0.344
141	1206.40	1272.08	0.439
161	1518.58	1601.26	0.552
181	1929.92	2035.00	0.702
201	2378.68	2508.19	0.865
221	2979.06	3141.26	1.083
251	3779.67	3985.45	1.375
281	4792.02	5052.92	1.743
321	6093.21	6424.95	2.216
351	7719.69	8139.98	2.807
391	9514.73	10032.75	3.460
441	11916.25	12565.02	4.334
491	14881.53	15691.74	5.412
551	18668.71	19685.12	6.789
631	24372.82	25699.79	8.864
711	30836.22	32515.09	11.21
791	38058.92	40131.02	13.84

Transducer Sizing for Piezometer Ring

Selecting a pressure transducer with the appropriate range is critical in order to get accurate measurements using the piezometer ring. Since most transducers list accuracy as a percent of full scale, if the range selected is too high, this can have a significant impact on the accuracy of the flow measurement. If the range is too low, there is risk of damaging the instrument and/or getting inaccurate readings or no reading at all.

The following steps are for sizing the pressure transducer for use with the piezometer ring flow measurement system:

1. Determine the maximum flow rate in CFM that the fan is expected to produce. This maximum should be the greater of normal, maximum, and/or emergency conditions.
2. Find the formula for calculating the actual flow rate from page 1 of this document for the corresponding size and type of fan being used.
3. Calculate the pressure drop corresponding to the maximum flow rate determined in Step 1.
4. Select the pressure transducer with the smallest range that includes the pressure drop calculated in Step 3.
5. Now take the maximum range from the pressure transducer selected in Step 4 and use that to calculate the maximum flow rate that could be measured with this transducer.
6. Determine an acceptable safety factor for sizing the transducer.
7. Multiply the maximum flow rate from Step 1 by the safety factor. If the maximum flow rate from Step 5 is less than the result, bump up the transducer to the next largest size. Otherwise, the transducer from Step 4 should be used.

Example:

Company XYZ has a size 270 BC SWSI fan to be installed with design conditions of 12,000 CFM at 5 inches w.g. and standard density. What size transducer should be used?

1. After speaking to the design engineer, it was determined that 12,000 CFM is the actual maximum and most of the time the fan will be running closer to 10,000 CFM. Therefore, 12,000 CFM will be used for the calculations.
2. The calculation for this fan type and size is:
 $ACFM = 4247.77 * \sqrt{(\Delta P)}$ for standard density
 Note that if the density was other than standard air, the formula would be different.
3. By rearranging the formula in Step 2, the following formula is obtained:
 $\Delta P = (ACFM/4247.77)^2$
 so, $\Delta P = (12000/4247.77)^2 = 7.98$ inches w.g.
4. For the pressure transducer models being considered, the ranges are 0-3, 0-6, 0-10, and 0-20. Therefore, for this flow rate the transducer model is the 0-10 inches w.g. model.
5. The maximum for this transducer is 10 inches, which corresponds to the following flow rate:
 $ACFM = 4247.77 * \sqrt{(10)} = 13433$ CFM
6. Since 12,000 CFM is the maximum and normal operating conditions are 10,000 CFM, a 10% safety factor should be plenty for this application
7. From step 1, $12000 \text{ CFM} * 1.1 = 13200$ CFM. This is less than 13433 CFM, so the 0-10 inch pressure transducer is acceptable.

Premium Efficient Super-E® Motors

BALDOR • RELIANCE™

Three Phase, Totally Enclosed, Foot Mounted

1/2 thru 200 Hp

NEMA 56 thru 447T



Applications: Energy saving applications where continuous or frequent duty is required. Suitable for use with inverter drives for variable torque and constant torque ratings as shown on page 193. NEMA Premium® efficiency, Inverter Ready per NEMA standard MG1 Part 31.4.4.2. I

Features: Super-E® / XE motors have Class F insulation, 1.15 service factor, low-loss electrical grade lamination steel, NEMA Premium® efficiency and 3 year warranty.

Hp	RPM	NEMA Frame	Enclosure	Catalog Number	List Price	Mult. Sym.	"C" Dim.	Aprx. Wt. (lb)	Full Load Efficiency	Voltage	Full Load Amps	Notes (a)
1/2	1800	56	TEFC	EM3538	444	K	11.24	26	84	230/460	0.85	1
		56	TEFC	↳P56X1313	444	K	12.23	28	80	230/460	0.85	19,30
1	3600	56	TEFC	EM3545	494	K	12.25	30	84	230/460	1.4	1,30
		56	TENV	↳P56X1318	494	K	11.14	29	87.5	230/460	1.35	30
	1800	56	TEFC	EM3546	497	K	13.23	36	87.5	208-230/460	1.5	1
		56	TEFC	↳P56X1319	497	K	13.23	39	86.5	230/460	1.4	30
		143T	TEFC	EM3546T	550	LS	13.31	37	87.5	230/460	1.5	1,30
		143T	TEFC	↳P14X1543	550	LS	13.31	33	87.5	230/460	1.5	30
		143T	TEFC	EM3581T	705	L1	12.53	54	87.5	230/460	1.5	1,30
		143T	TEFC	↳P14G7803	705	L1	12.53	64	86.5	230/460	1.4	30
	1200	56	TEFC	EM3556	648	K	13.23	39	82.5	208-230/460	1.8	1
		56	TEFC	↳P56X1512	648	K	14.10	47	84	230/460	1.7	30
145T		TEFC	EM3582T	789	L1	12.55	56	82.5	230/460	1.8	1,30	
145T		TEFC	↳P14G7804	789	L1	12.75	67	82.5	230/460	1.8	30	

PRODUCT OVERVIEW

Catalog Number: EM4102T

Description: 20HP, 1180RPM, 3PH, 60HZ, 286T, 1060M, TEFC, F1

Shipping Weight: 451

List Price: .

Multiplier Symbol: .



FEATURES

Suitable for mounting in any position. Ball bearings, heavy gauge steel and cast iron frames, and gasketed conduit boxes. EM and ECP Super-E® motors have NEMA Premium™ efficiency and 3 year warranty.

APPLICATIONS

Pumps, compressors, fans, conveyors, machine tools and other general purpose three phase applications.

Baldor Electronic Catalog Version 9.0
Baldor Electric Company

12/01/2010

Mech.41

Catalog Number:	EM4102T
Specification Number:	10C151X674G1
Horsepower	20
Kilowatt:	14.92
Voltage:	230/460
Hertz:	60
Phase:	3
Full Load Amps:	25.0
Usable at 208 Volts:	Yes
RPM:	1180
Frame:	286T
Service Factor:	1.15
Rating:	40C AMB-CONT
NEMA Design Code:	B
Insulation Class:	F
Full Load Efficiency:	92.4
Power Factor:	81
Enclosure:	TEFC
Baldor Type:	1060M
DE Bearing:	6311
ODE Bearing:	6309
Electrical Specification Number:	10WGX674
Mechanical Specification Number:	10LYC151
Base:	RG
Mounting:	F1

Baldor Electronic Catalog Version 9.0

Baldor Electric Company

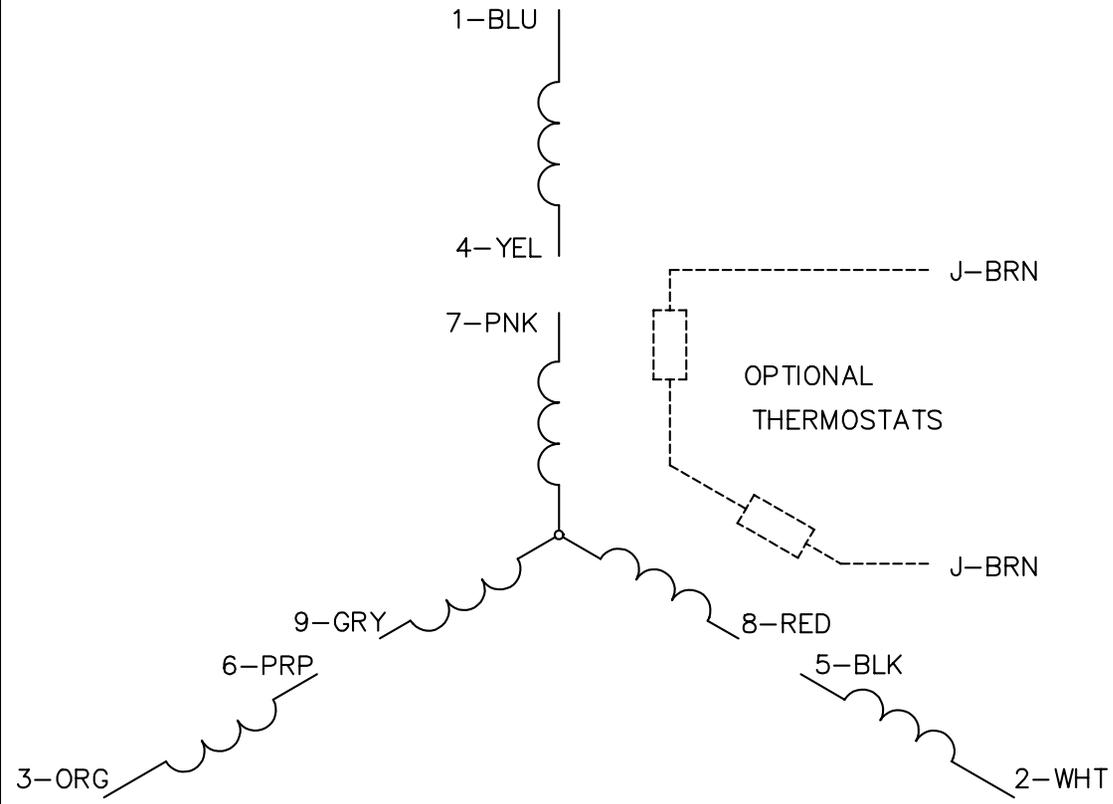
12/01/2010

Mech.42

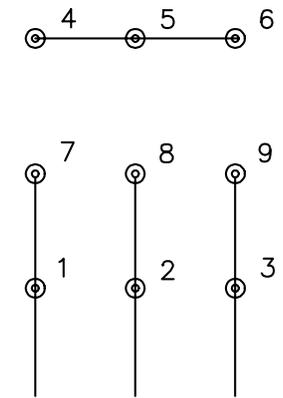
Performance Data: EM4102T

RATING - NOMINALS		CHARACTERISTICS	
Rated Output:	20	Full Load Torque:	89
Volts:	230/460	Break Down Torque:	294
Full Load Amps:	50/25	Locked Rotor Torque:	286
Speed:	1180	Starting Current(Amps):	178
Hertz:	60	No-Load Current(Amps):	11.1
Phase:	3	Line-line Resist. @ 25° C:	0.395 A ph 0 B ph
NEMA Design Code:	B	Temp Rise, C @ FL:	66
LR KVA Code:	H		
Efficiency:	92.4		
Power Factor:	81		
Service Factor:	1.15		
Rating - Duty:	40C AMB-CONT		

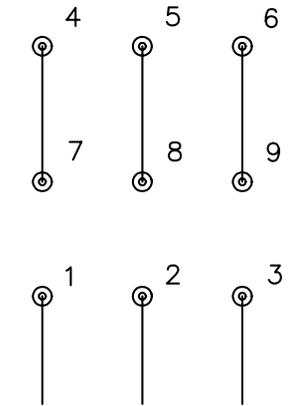
LOAD CHARACTERISTICS - TESTED							
% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor:	41	65	75	81	83	84	
Efficiency:	87.9	92.3	92.9	92.8	92	91.1	
Speed (RPM):	1195	1190	1184	1180	1173	1167	
Line Amperes:	12.4	15.5	19.9	25	30.7	36.5	28.4



LOW VOLTAGE (2Y)



HIGH VOLTAGE (1Y)



NOTES:

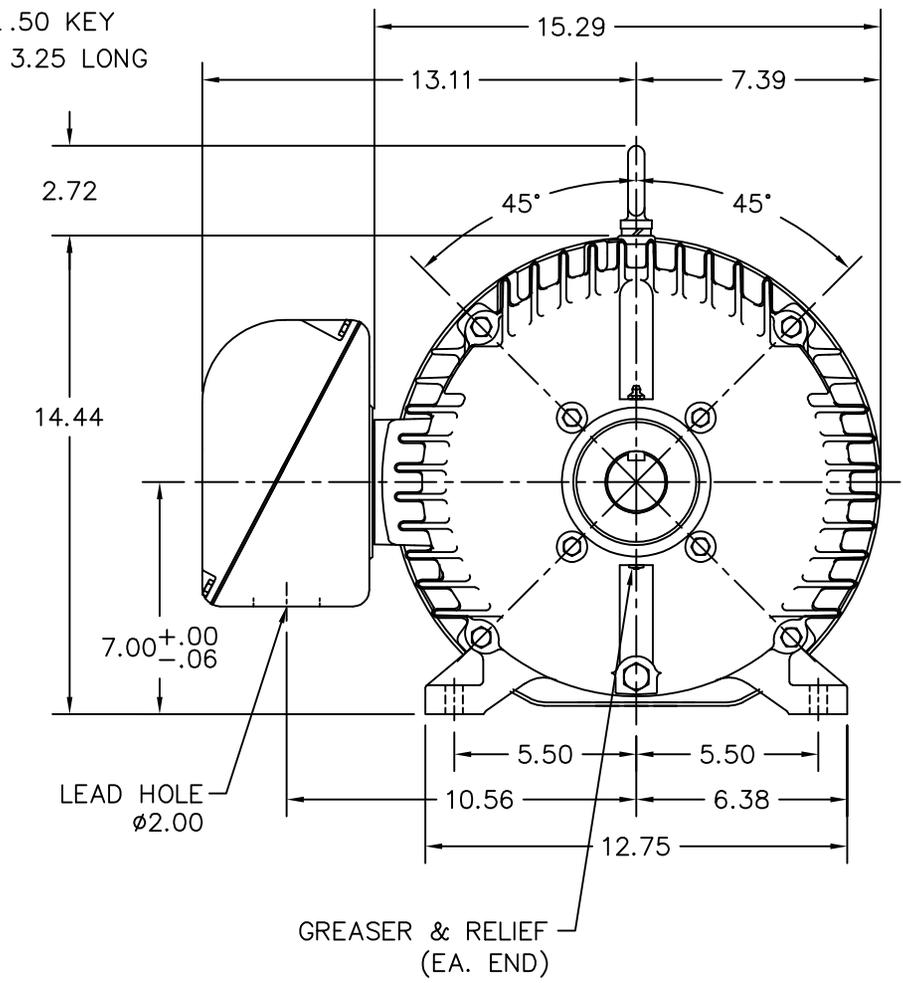
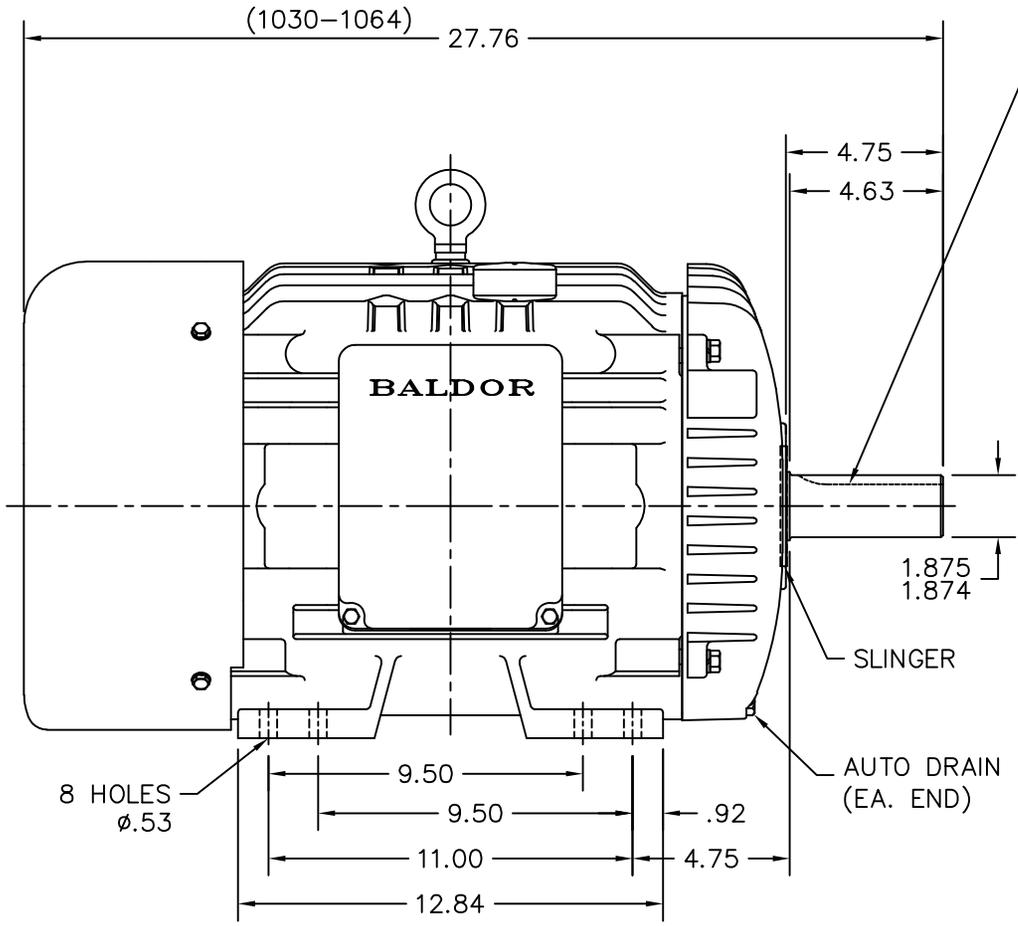
1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
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BALDOR ELECTRIC Co.

3PH, DV, 9 LEADS

CD0005



CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT MOTOR PERFORMANCE IS SUITABLE IN THE APPLICATION.

REV. DESC: ADDED "64 STACK"			
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10LYC151		FILE: AAA00014809	REF: 10LYC151
		MTL: -	

BALDOR ELECTRIC Co.

STD HOR 284-6T TEFC

10LYC151

**PRODUCT OVERVIEW****Catalog Number:** EM4117T**Description:** 30HP, 1180RPM, 3PH, 60HZ, 326T, 1260M, TEFC, F1**Shipping Weight:** 572**List Price:** 4053**Multiplier Symbol:** L1**FEATURES**

Suitable for mounting in any position. Ball bearings, heavy gauge steel and cast iron frames, and gasketed conduit boxes. EM and ECP Super-E® motors have NEMA Premium™ efficiency and 3 year warranty.

APPLICATIONS

Pumps, compressors, fans, conveyors, machine tools and other general purpose three phase applications.

Baldor Electronic Catalog Version 9.0
Baldor Electric Company

Catalog Number:	EM4117T
Specification Number:	12C051X511G1
Horsepower	30
Kilowatt:	22.38
Voltage:	230/460
Hertz:	60
Phase:	3
Full Load Amps:	39
Usable at 208 Volts:	Yes
RPM:	1180
Frame:	326T
Service Factor:	1.15
Rating:	40C AMB-CONT
NEMA Design Code:	A
Insulation Class:	F
Full Load Efficiency:	93
Power Factor:	79
Enclosure:	TEFC
Baldor Type:	1260M
DE Bearing:	6312
ODE Bearing:	6311
Electrical Specification Number:	12WGX511
Mechanical Specification Number:	12LYC051
Base:	RG
Mounting:	F1

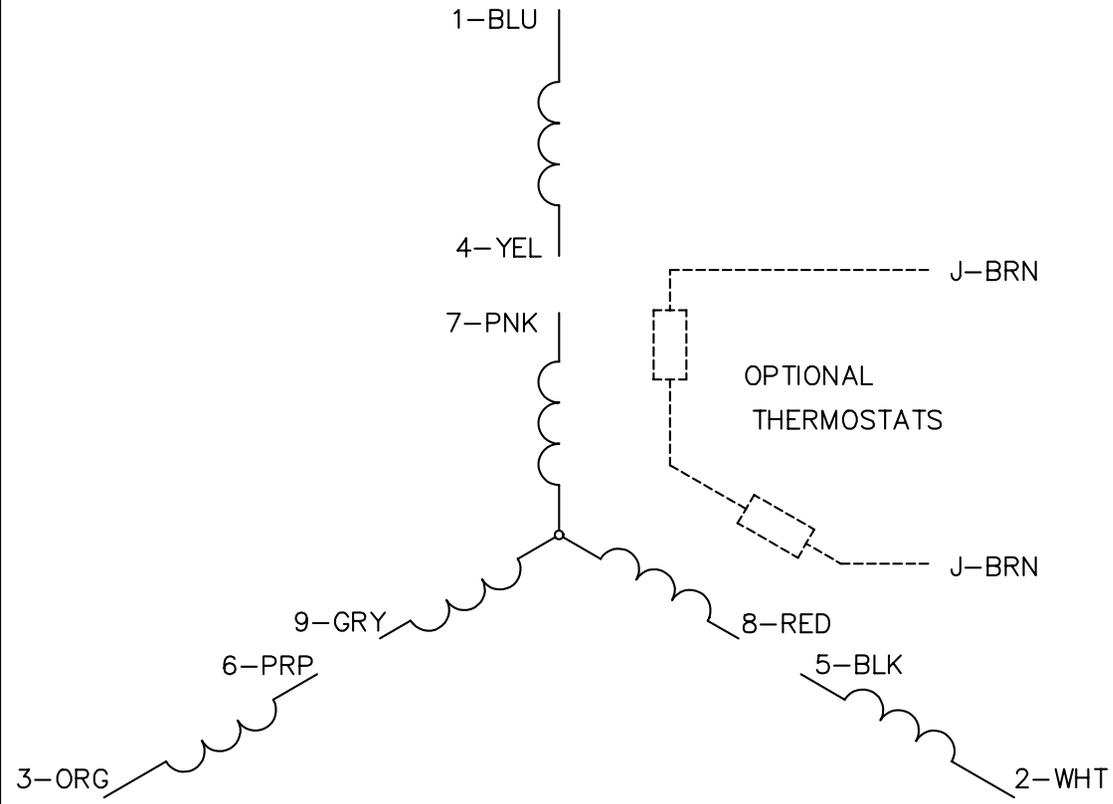
Baldor Electronic Catalog Version 9.0

Baldor Electric Company

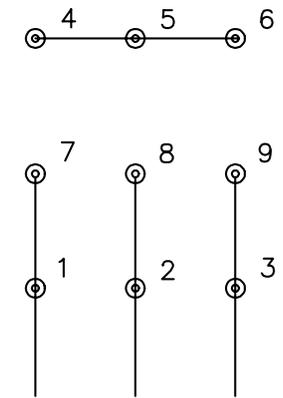
Performance Data: EM4117T

RATING - NOMINALS		CHARACTERISTICS	
Rated Output:	30	Full Load Torque:	134
Volts:	230/460	Break Down Torque:	395
Full Load Amps:	78/39	Locked Rotor Torque:	410
Speed:	1180	Starting Current(Amps):	285
Hertz:	60	No-Load Current(Amps):	18
Phase:	3	Line-line Resist. @ 25° C:	0.207 A ph 0 B ph
NEMA Design Code:	A	Temp Rise, C @ FL:	51
LR KVA Code:	J		
Efficiency:	93		
Power Factor:	79		
Service Factor:	1.15		
Rating - Duty:	40C AMB-CONT		

LOAD CHARACTERISTICS - TESTED							
% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor:	39	61	72	78	80	81	
Efficiency:	87.7	92.4	93.2	93	92.5	91.8	
Speed (RPM):	1195	1192	1188	1183	1178	1174	
Line Amperes:	19.6	24.6	31.2	39.3	47.4	56.1	44.2

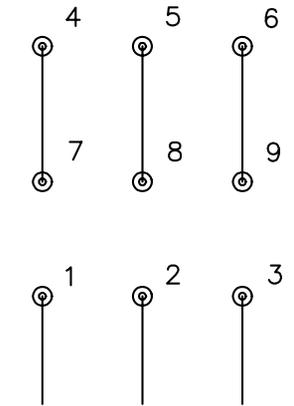


LOW VOLTAGE (2Y)



LINE

HIGH VOLTAGE (1Y)



LINE

NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
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		MTL: -	

BALDOR ELECTRIC Co.

3PH, DV, 9 LEADS

CD0005

**PRODUCT OVERVIEW****Catalog Number:** EM4308T**Description:** 40HP, 1185RPM, 3PH, 60HZ, 364T, 1468M, TEFC, F1**Shipping Weight:** 807**List Price:** 5051**Multiplier Symbol:** L1**FEATURES**

Suitable for mounting in any position. Ball bearings, heavy gauge steel and cast iron frames, and gasketed conduit boxes. EM and ECP Super-E® motors have NEMA Premium™ efficiency and 3 year warranty.

APPLICATIONS

Pumps, compressors, fans, conveyors, machine tools and other general purpose three phase applications.

Baldor Electronic Catalog Version 9.0
Baldor Electric Company

Catalog Number:	EM4308T
Specification Number:	14C051X494G1
Horsepower	40
Kilowatt:	29.84
Voltage:	230/460
Hertz:	60
Phase:	3
Full Load Amps:	50.5
Usable at 208 Volts:	No
RPM:	1185
Frame:	364T
Service Factor:	1.15
Rating:	40C AMB-CONT
NEMA Design Code:	B
Insulation Class:	F
Full Load Efficiency:	94.1
Power Factor:	79
Enclosure:	TEFC
Baldor Type:	1468M
DE Bearing:	6313
ODE Bearing:	6312
Electrical Specification Number:	14WGX494
Mechanical Specification Number:	14LYC051
Base:	RG
Mounting:	F1

Baldor Electronic Catalog Version 9.0

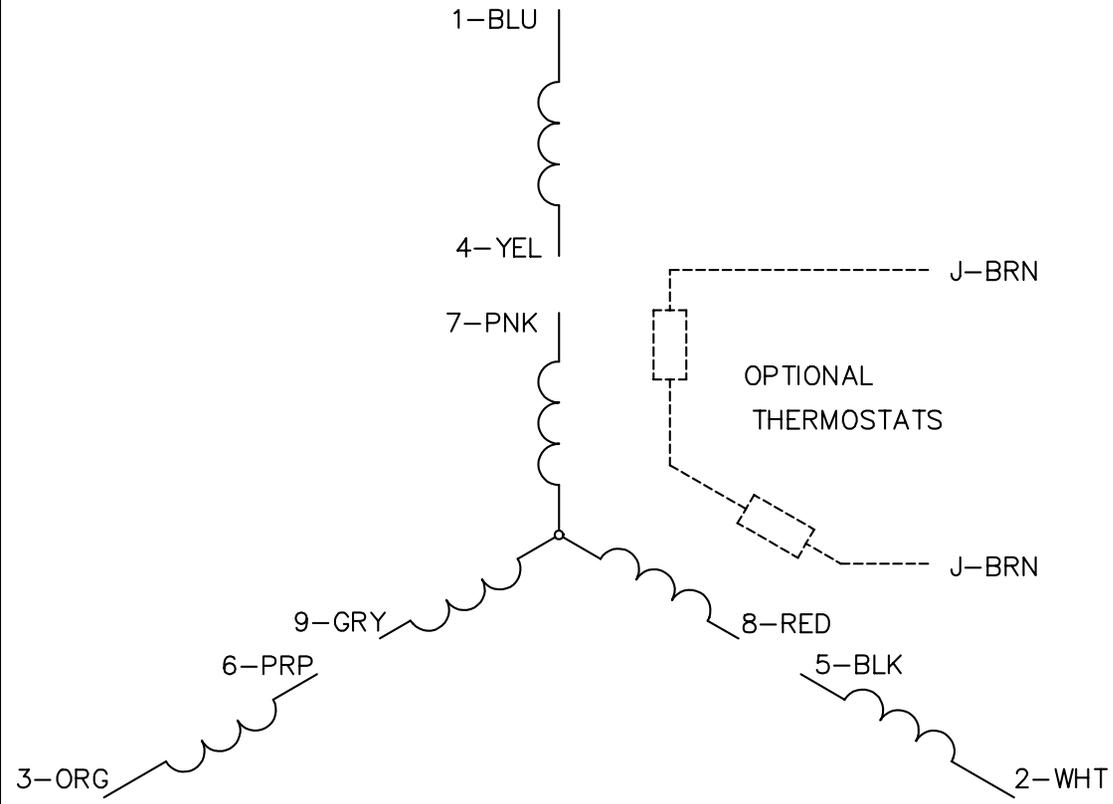
Baldor Electric Company

Performance Data: EM4308T

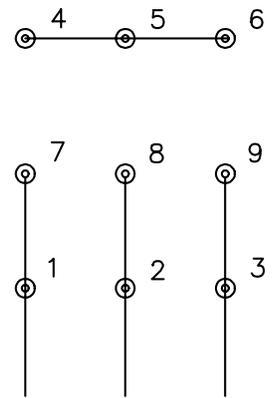
RATING - NOMINALS		CHARACTERISTICS	
Rated Output:	40	Full Load Torque:	177
Volts:	230/460	Break Down Torque:	560
Full Load Amps:	101/50.5	Locked Rotor Torque:	310
Speed:	1185	Starting Current(Amps):	355
Hertz:	60	No-Load Current(Amps):	23
Phase:	3	Line-line Resist. @ 25° C:	0.144 A ph 0 B ph
NEMA Design Code:	B	Temp Rise, C @ FL:	49
LR KVA Code:	H		
Efficiency:	94.1		
Power Factor:	79		
Service Factor:	1.15		
Rating - Duty:	40C AMB-CONT		

LOAD CHARACTERISTICS - TESTED							
% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor:	42	62	73	79	81	82	
Efficiency:	89.6	93.3	94.3	94.3	93.9	93.3	
Speed (RPM):	1196	1193	1191	1187	1183	1179	
Line Amperes:	25.6	31.9	40.9	50.7	61.6	73	57.2

12/01/2010

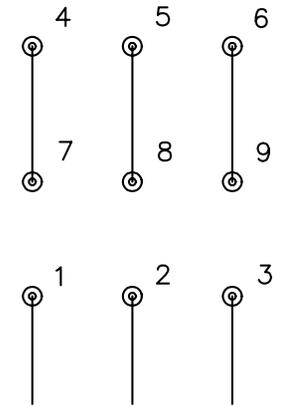


LOW VOLTAGE (2Y)



LINE

HIGH VOLTAGE (1Y)



LINE

NOTES:

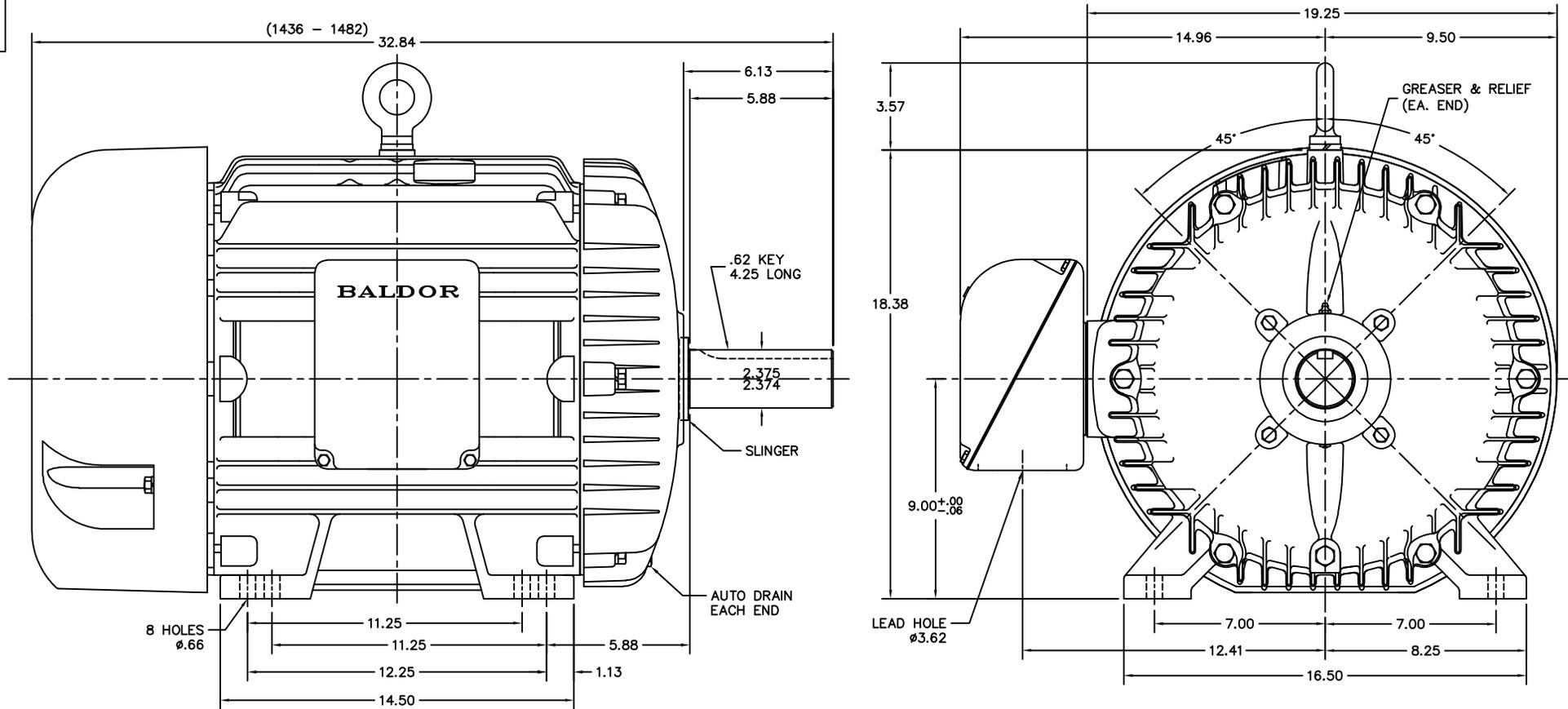
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REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
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BALDOR ELECTRIC Co.

3PH, DV, 9 LEADS

14LYC051



CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT MOTOR PERFORMANCE IS SUITABLE IN THE APPLICATION.

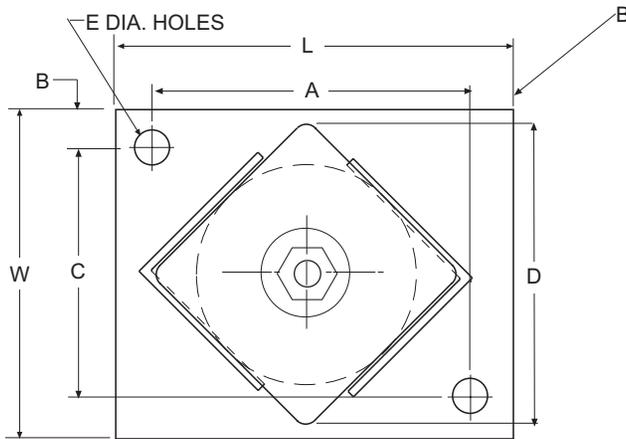
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BALDOR ELECTRIC Co.

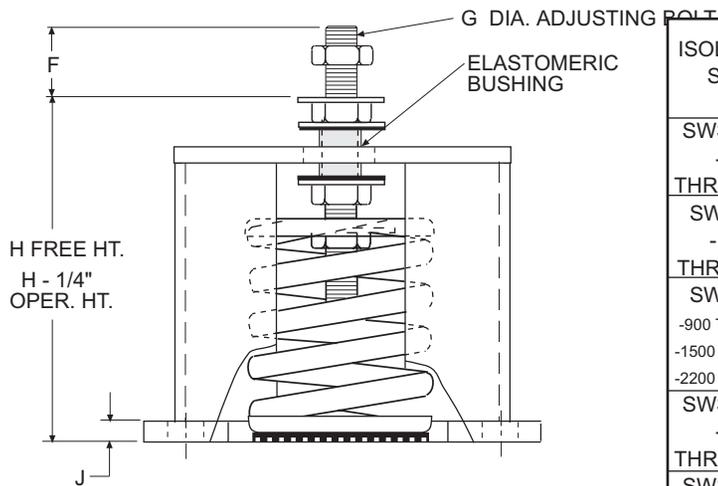
STD HOR TEFC 364-5T

14LYC051

NOTES



1. SWSR ISOLATOR HAS BEEN DESIGNED TO WITHSTAND ULTIMATE SEISMIC FORCES IN EXCESS OF 1G HORIZONTALLY AND VERTICALLY WHEN PROPERLY INSTALLED AND APPROPRIATELY MOUNTED TO EQUIPMENT. SEE TABLE BELOW FOR ALLOWABLE DESIGN RATINGS. INTERPOLATE TO OBTAIN ALLOWABLE FOR ISOLATOR SIZE IN BETWEEN GIVEN RANGE.
2. SWSR ISOLATOR HAS BEEN DESIGNED TO LIMIT MOTION UNDER SEISMIC FORCES TO APPROXIMATELY 1/4".
3. ALL ISOLATOR RATINGS ARE BASED ON ITW RAMSET/RED HEAD TRUBOLT WEDGE ANCHORS (OR EQUAL) IN STONE AND AGGREGATE CONCRETE (Fc-3000 PSI). DISTANCE FROM CENTERLINE OF ANCHOR TO EDGE OF CONCRETE MUST BE SIX TIMES THE ANCHOR DIAMETER. USE A307 MACHINE BOLT WHEN MOUNTING TO STEEL.
4. HOUSING WILL BE ELEVATED APPROXIMATELY 1/4" WHEN INSTALLED UNLOADED. PULL DOWN TO FLOOR LINE WITH ANCHOR BOLTS TO ACHIEVE H FREE HEIGHT.
5. FINISH
 - STANDARD: HOUSING PAINTED WITH INDUSTRIAL ENAMEL. SPRINGS PVC COATED.
 - OPTIONAL: (RECOMMENDED FOR OUTDOOR APPLICATIONS) HOUSING HOT-DIP GALVANIZED. SPRINGS PVC COATED.



ISOLATOR SIZE	DIMENSIONS (IN)											ANCH. DIA. X EMBED. (IN)	ALLOWABLE G RATING	
	L	W	H	A	B	C	D	E	F	G	J		HOR.	VERT.
SWSR-1A -15 THRU -600	6	3	4-3/4	4-1/2	3/4	1-1/2	3	5/8	1	1/2	1/4	1/2 X 4-1/2	55.6 TO 1.4	127 TO 3.4
SWSR-1 -150 THRU -800	7-5/8	6	6-3/8	5-3/8	1-1/8	3-3/4	5	7/8	1-1/2	5/8	3/8	3/4 X 4-1/2	9.3 TO 1.8	12.0 TO 1.4
SWSR-1 -900 TO -1400 -1500 TO -2100 -2200 TO -2800	7-5/8	6	6-3/8	5-3/8	1-1/8	3-3/4	5	7/8	1-1/2	5/8	3/8	3/4 X 6-1/2	1.6 TO 1.0 0.9 TO 0.7 0.6 TO 0.5	2.2 TO 1.4 1.4 TO 1.1 1.1 TO 0.9
SWSR-2A -50 THRU -700	7-5/8	6	7-3/8	5-3/8	1-1/8	3-3/4	5	7/8	1-1/2	5/8	3/8	3/4 X 4-1/2	28.0 TO 2.0	35.5 TO 2.6
SWSR-2A -800 TO -1400 -1500 TO -1800	7-5/8	6	7-3/8	5-3/8	1-1/8	3-3/4	5	7/8	1-1/2	5/8	3/8	3/4 X 6-1/2	1.8 TO 1.0 0.9 TO 0.8	2.6 TO 1.4 1.4 TO 1.1

OTHER MATERIALS, COMPOUNDS OR FINISHES WITH EQUAL OR SUPERIOR PROPERTIES MAY BE SUBSTITUTED AS THEY BECOME AVAILABLE.



CERTIFIED FOR:

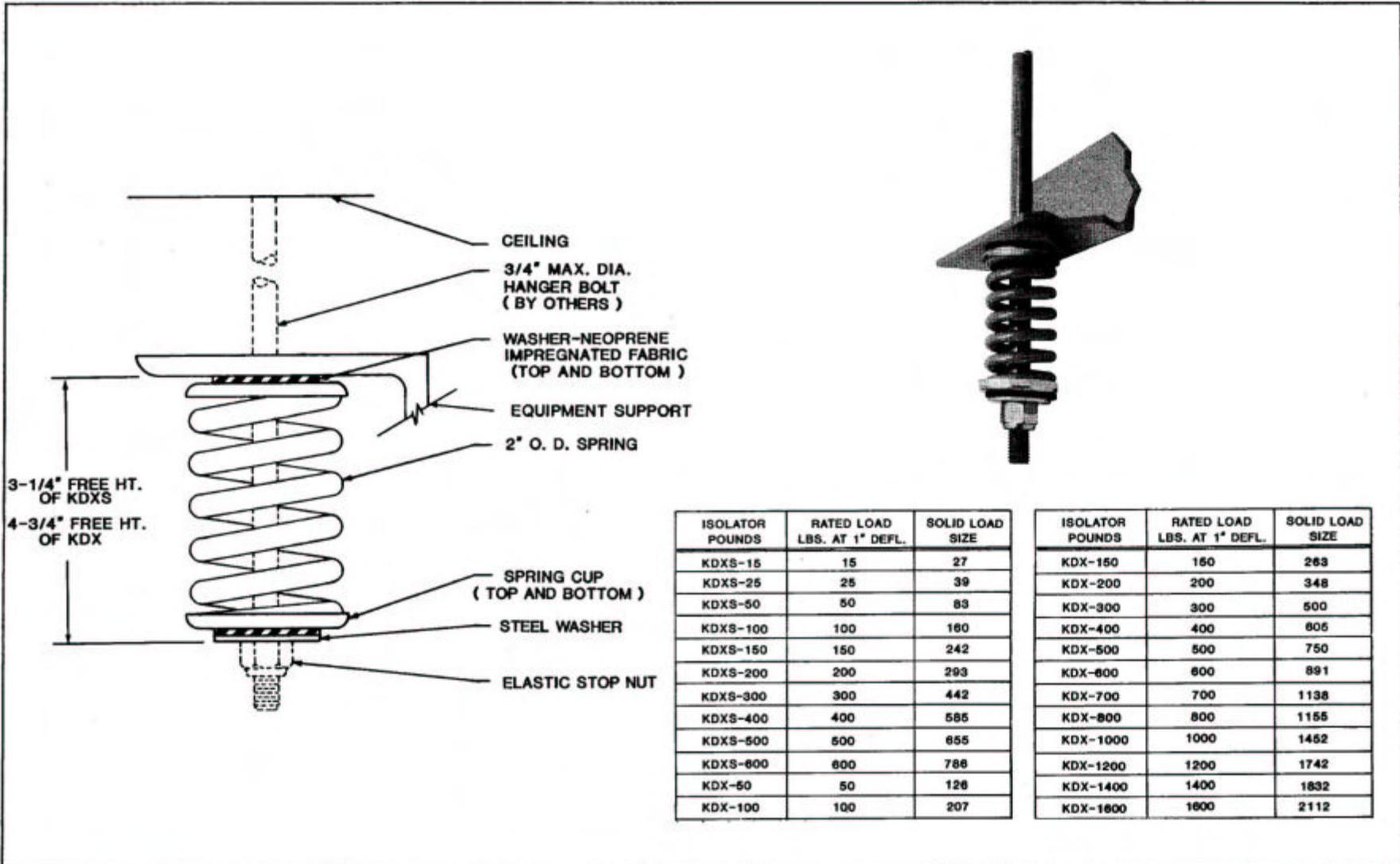
PURCHASER _____
 ORDER NO. _____
 PROJECT _____

TYPE SWSR SEISMICALLY RESTRAINED
 VIBRATION ISOLATOR
 FOR 1" & 2" DEFLECTION

AMBER/BOOTH COMPANY

HOUSTON, TEXAS

SCALE	NONE	DWG. NO.	REV.
DATE	01/19/87	SR-1102	4
			12/01



ISOLATOR POUNDS	RATED LOAD LBS. AT 1\"/>	
KDXS-15	15	27
KDXS-25	25	39
KDXS-50	50	83
KDXS-100	100	160
KDXS-150	150	242
KDXS-200	200	293
KDXS-300	300	442
KDXS-400	400	585
KDXS-500	500	655
KDXS-600	600	786
KDX-50	50	126
KDX-100	100	207

ISOLATOR POUNDS	RATED LOAD LBS. AT 1\"/>	
KDX-150	150	263
KDX-200	200	348
KDX-300	300	500
KDX-400	400	605
KDX-500	500	750
KDX-600	600	891
KDX-700	700	1138
KDX-800	800	1155
KDX-1000	1000	1452
KDX-1200	1200	1742
KDX-1400	1400	1832
KDX-1600	1600	2112

CERTIFIED FOR

PURCHASER _____

ORDER NO. _____

PROJECT _____

Thrust Restraint
 TYPE KDXS AND KDX
 VIBRATION ISOLATORS
 FOR 1\"/>

AMBER/BOOTH COMPANY, INC.
 HOUSTON, TEXAS

SCALE	NONE	DWG. NO.	REV.
DATE	8-6-85	H-1030	2



Cooling Coil Schedule

Unit No.	Coil Tag	Air Flow (CFM)	Face Velocity (FPM)	No. Coils	Size H x L Each	Rows	Fins per in.	Sensible Cooling	Total Cooling	Mfg.	Model	Fin Design	Turbulators	* Handing
AHU-1	CC-1	42,500	506	2	55.5x109	8	9	1,859	2,735	Heatcraft	5WD0908C	C	Not Included	Right
AHU-2	CC-2	23,500	458	2	43.5x85	8	9	711.1	970.3	Heatcraft	5WS0908A	A	Not Included	Left

Unit No.	Coil Tag	Ent Temp (Air) DB (F)	Ent Temp (Air) WB (F)	Lvg Temp (Air) DB (F)	Lvg Temp (Air) WB (F)	Ent Temp Fluid (F)	Lvg Temp Fluid (F)	Flow Rate (GPM)	Fluid Press Drop (Ft H ₂ O)	Air Press Drop (in H ₂ O)	Fluid
AHU-1	CC-1	92.0	72.0	52.0	51.8	45.0	55.0	543.5	15.2	1.34	Water
AHU-2	CC-2	80.1	65.8	52.4	51.9	45.0	55.7	181.0	10.1	0.58	Water

Unit No.	Coil Tag	Fin Material	Tube Material	Casing Material	Intermediate Drain	Coating	Flange Size
AHU-1	CC-1	Aluminum heavy (.0075" thickness)	5/8 Copper heavy wall (.025 thickness)	Stainless Steel	Yes	None	3/4"
AHU-2	CC-2	Aluminum heavy (.0075" thickness)	5/8 Copper heavy wall (.025 thickness)	Stainless Steel	Yes	None	3/4"

* Heatcraft – Hand is determined by facing the coil with air hitting in back of head.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/10/2010
From:
Company:
Return Tel:
Return Fax:

Construction

Item: CC-1
Coils Per Bank: 2
Allow Opp. End: Yes
Tube OD IN: 5/8
Coil Duty: Cool-Standard
Fins Per Inch: 9
Rows: 8
Fin Surface: Optimize ABC
Fin Height (IN): 55.50
Finned Length (IN): 109.0
Tubing Mat. (IN): 0.025 Copper
TurboSpirals: No
Fin Mat. (IN): 0.0075 Aluminum
Conn Qty/Size (IN): 1 / 3.00
Circuiting: Double

Air Side

Air Flow (Sft^3/min) 42,500
Altitude FT: .00
Ent. Air DB/WB °F: 92.00 / 72.00
Lvg. Air DB/WB °F: 52.00 / 51.90
Total / Sensible MBH: .00 / .00
Max Air PD "H2O: .00

Fluid Side

Fluid Type: Water
Ent. Fluid : 45.00
Lvg. Fluid : .00
Fluid Flow gal/min: 543.5
Max FPD FT H2O: .00

O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		Coil 1	Coil 2	Coil 3	Coil 4	Coil 5	Coil 6 ✓
Model Number:							5WD0908C
Air Velocity:	(Sft/min)						505.8
Total Capacity:	MBH						2,735
Sens. Capacity:	MBH						1,859
Lvg. Air DB:	°F						52.01
Lvg. Air WB:	°F						51.83
Standard APD	"H2O						1.34
Lvg. Fluid:	°F						55.03
Fluid Flow:	gal/min						543.5
Fluid PD:	FT H2O						15.21
Fluid Vel.:	ft/s						4.13
Conn Size:	IN						(1) 3.000
Internal Volume:	in^3						10,290
Weight (Dry):	lbm						1,004
Weight (w/Fluid):	lbm						1,402
Notes:							AIL

Notes:

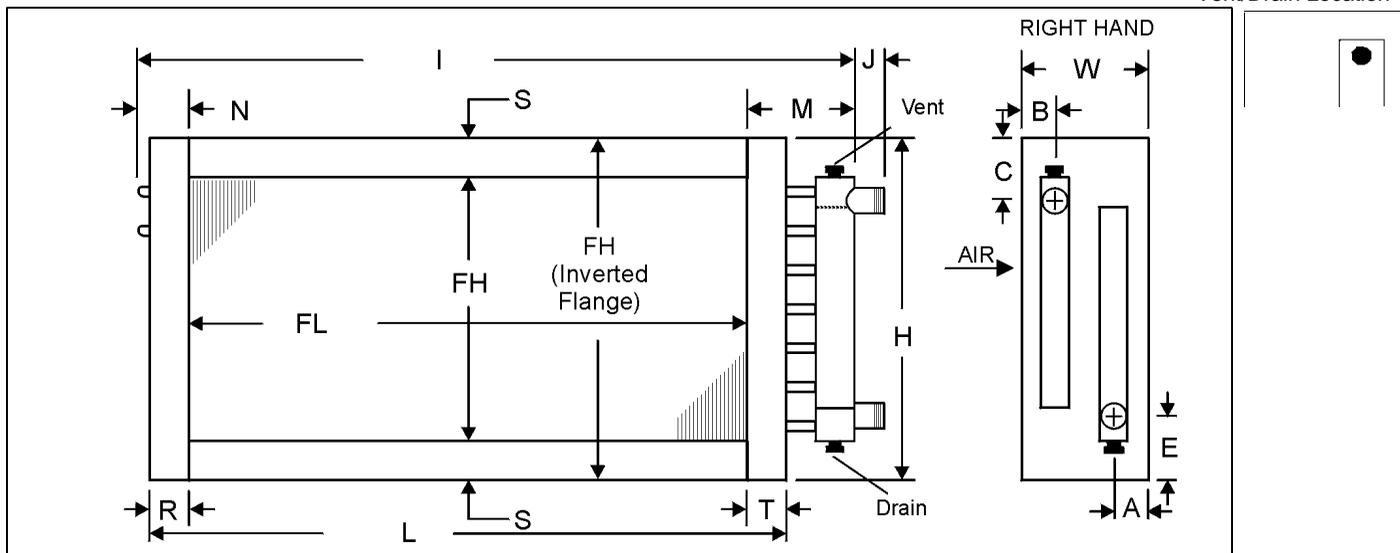
- A) ARI Certified And Rated In Accordance With ARI 410.
- L) Coil rating valid for Heatcraft coils only.
- I) Header Pressure Drop Exceeds 30% of Total Fluid Pressure Drop.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/10/2010
From:
Company:
Return Tel:
Return Fax:

ITEM	QTY	MODEL NUMBER						HAND
		TYPE	FPI	ROWS	FIN	FH (IN)	FL (IN)	
CC-1	2	5WD	09	08	C	55.50	109.00	Right

MATERIALS OF CONSTRUCTION		OPTIONS			
Finns	0.0075 Aluminum	Coating	None	TurboSpirals	No
Tubes	0.025 Copper	Casing Type	Flanged	Moisture Eliminator	No
Casing	304L S/S	Vent & Drain	.50 FPT on Face	Mounting Holes	No
Conn. Material	Carbon Steel			Label Kit	No
Conn. Type	MPT			Drain Headers	No
Conn. Size	3			Tube Ferrules	No
Weight (LBS)	1004.0				



DIMENSIONAL DATA(IN)														
A	B	C	E	H	I	J	L	M	N	R	S	T	W	SJC
2.35	2.35	12.00	12.00	58.50	117.1	7.00	112.0	5.62	2.50	1.50	.75	1.50	12.50	

NOTES:

GENERAL NOTES:

1. All dimensions are in (IN)
2. Manually verifying dimensions is highly recommended.
3. Two intermediate tube supports fabricated from heavy gauge stock of the same material as the fins will be provided.
4. The supply line should be connected to the lower connection on the leaving air side for counterflow operation.
5. Coils will vent and drain through factory-installed vent and drain fittings when mounted level for horizontal flow.
6. Connection location other than standard could affect vent and drain locations. Consult factory.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/16/2010
From:
Company:
Return Tel:
Return Fax:

Construction

Item: AHU-2 CC
Coils Per Bank: 2
Allow Opp. End: No
Tube OD IN: 5/8
Coil Duty: Cool-Standard
Fins Per Inch: 9
Rows: 8
Fin Surface: Optimize ABC
Fin Height (IN): 43.50
Finned Length (IN): 85.00
Tubing Mat. (IN): 0.025 Copper
TurboSpirals: No
Fin Mat. (IN): 0.0075 Aluminum
Conn Qty/Size (IN): 1 / 2.50
Circuiting: Single

Air Side

Air Flow (Sft^3/min) 23,500
Altitude FT: .00
Ent. Air DB/WB °F: 80.10 / 65.80
Lvg. Air DB/WB °F: 53.00 / 52.00
Total / Sensible MBH: .00 / .00
Max Air PD "H2O: .00

Fluid Side

Fluid Type: Water
Ent. Fluid : 45.00
Lvg. Fluid : .00
Fluid Flow gal/min: 181.0
Max FPD FT H2O: .00

O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		Coil 1	Coil 2	Coil 3	Coil 4 ✓	Coil 5	Coil 6
Model Number:					5WS0908A		
Air Velocity:	(Sft/min)				457.6		
Total Capacity:	MBH				970.3		
Sens. Capacity:	MBH				711.1		
Lvg. Air DB:	°F				52.43		
Lvg. Air WB:	°F				51.90		
Standard APD	"H2O				.58		
Lvg. Fluid:	°F				55.69		
Fluid Flow:	gal/min				181.0		
Fluid PD:	FT H2O				10.08		
Fluid Vel.:	ft/s				3.51		
Conn Size:	IN				(1) 2.500		
Internal Volume:	in^3				6,353		
Weight (Dry):	lbm				634.7		
Weight (w/Fluid):	lbm				879.8		
Notes:					BIL		

Notes:

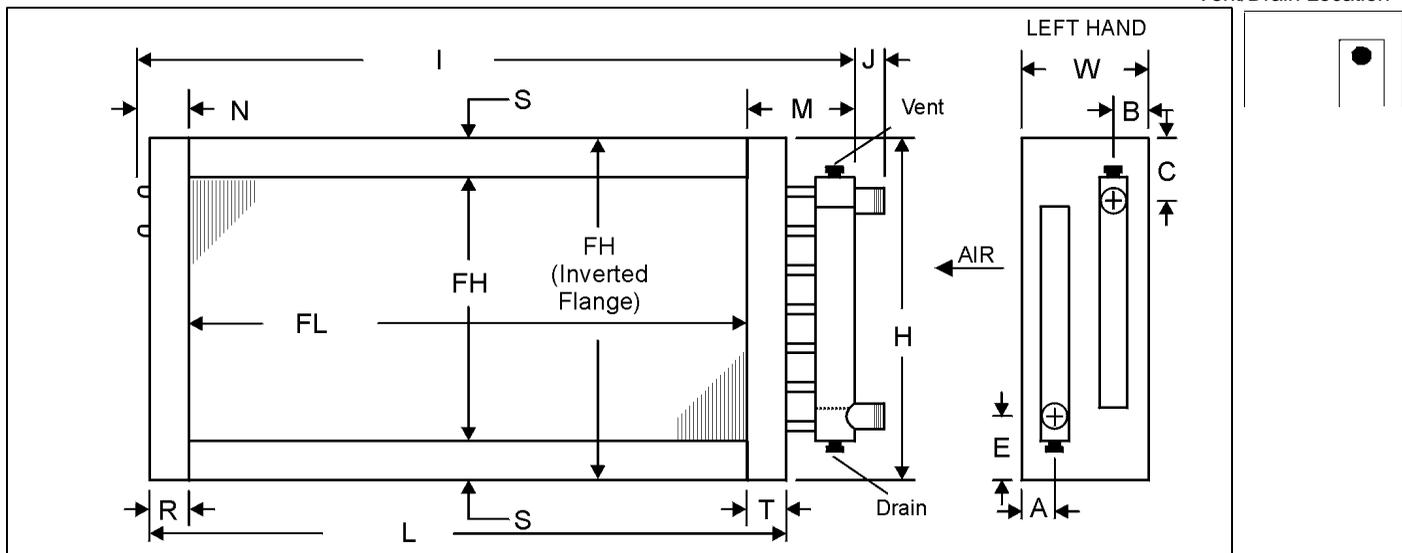
- B) Rated In Compliance With ARI 410.
- I) Header Pressure Drop Exceeds 30% of Total Fluid Pressure Drop.
- L) Coil rating valid for Heatcraft coils only.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/16/2010
From:
Company:
Return Tel:
Return Fax:

ITEM	QTY	MODEL NUMBER						HAND
		TYPE	FPI	ROWS	FIN	FH (IN)	FL (IN)	
AHU-2 CC	2	5WS	09	08	A	43.50	85.00	Left

MATERIALS OF CONSTRUCTION		OPTIONS				
Finns	0.0075 Aluminum	Coating	None		TurboSpirals	No
Tubes	0.025 Copper	Casing Type	Flanged		Moisture Eliminator	No
Casing	304L S/S	Vent & Drain	.50 FPT on Face		Mounting Holes	No
Conn. Material	Carbon Steel				Label Kit	Yes
Conn. Type	MPT				Drain Headers	No
Conn. Size	2.5				Tube Ferrules	No
Weight (LBS)	635.0					



DIMENSIONAL DATA(IN)														
A	B	C	E	H	I	J	L	M	N	R	S	T	W	SJC
1.70	1.70	12.00	12.00	46.50	92.75	7.00	88.00	5.25	2.50	1.50	.75	1.50	12.50	

NOTES:

GENERAL NOTES:

1. All dimensions are in (IN)
2. Manually verifying dimensions is highly recommended.
3. One intermediate tube support fabricated from heavy gauge stock of the same material as the fins will be provided.
4. The supply line should be connected to the lower connection on the leaving air side for counterflow operation.
5. Coils will vent and drain through factory-installed vent and drain fittings when mounted level for horizontal flow.
6. Connection location other than standard could affect vent and drain locations. Consult factory.



Energy Recovery Coil Schedule

Unit No.	Coil Tag	Air Flow (CFM) Total	Face Velocity (FPM)	No. Coils	Size H x L Each	Rows	Fins per in.	Total (MBH)	Mfg.	Model	Fin Design	Turbulators	* Handing
AHU-1	AHU ERC-1	42,5000	520	2	54x109	6	9	1,102/1,283	Heatcraft	5WS0906B	B	Not Included	Right
ERU-1	ERU ERC-1	25,250	475	2	37.5x102	8	10	189.7/638.5	Heatcraft	5WS1008B	B	Not Included	Left
ERU-2	ERU ERC-2	25,250	475	2	37.5x102	8	10	189.7/638.5	Heatcraft	5WS1008B	B	Not Included	Right

Unit No.	Coil Tag	Ent Temp (Air) DB (F)	Lvg Temp (Air) DB (F)	Ent Temp Fluid (F)	Lvg Temp Fluid (F)	Flow Rate (GPM)	Fluid Press Drop (Ft H ₂ O)	Max Air Pressure (in H ₂ O)	Fluid
AHU-1	AHU ERC-1	92/-10	68.9/17.8	47.0	55.8/36.8	275	8.9/9.3	0.52	Propylene 40%
ERU-1	ERU ERC-1	63.5/68.0	70.4/44.9	71.5/41.0	68.7/50.3	137	8.0/8.6	0.66	Water
ERU-2	ERU ERC-2	63.5/68.0	70.4/44.9	71.5/41.0	68.7/50.3	137	8.0/8.6	0.66	Water

Unit No.	Coil Tag	Fin Material	Tube Material	Casing Material	Coating	Flange Size
AHU-1	AHU ERC-1	Aluminum heavy (.0075" thickness)	5/8 Copper heavy wall (.025 thickness)	Stainless Steel	None	3/4"
ERU-1	ERU ERC-1	Aluminum heavy (.0075" thickness)	5/8 Copper heavy wall (.025 thickness)	Stainless Steel	Phenolic	3/4"
ERU-2	ERU ERC-2	Aluminum heavy (.0075" thickness)	5/8 Copper heavy wall (.025 thickness)	Stainless Steel	Phenolic	3/4"

* Heatcraft – Hand is determined by facing the coil with air hitting in back of head.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/10/2010
From:
Company:
Return Tel:
Return Fax:

Construction

Item: AHU-1 ERC Summer
Coils Per Bank: 2
Allow Opp. End: Yes
Tube OD IN: 5/8
Coil Duty: Cool-Standard
Fins Per Inch: 9
Rows: 6
Fin Surface: Optimize ABC
Fin Height (IN): 54.00
Finned Length (IN): 109.0
Tubing Mat. (IN): 0.025 Copper
TurboSpirals: No
Fin Mat. (IN): 0.0075 Aluminum
Conn Qty/Size (IN): 1 / Optimize
Circuiting: One & One Half

Air Side

Air Flow (Sft^3/min) 42,500
Altitude FT: .00
Ent. Air DB/WB °F: 92.00 / 72.00
Lvg. Air DB/WB °F: 85.40 / 70.30
Total / Sensible MBH: .00 / .00
Max Air PD "H2O: .00

Fluid Side

Fluid Type: Propylene
Percent Glycol: 40
Ent. Fluid : 47.00
Lvg. Fluid : .00
Fluid Flow gal/min: 275.0
Max FPD FT H2O: .00

O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		Coil 1	Coil 2	Coil 3	Coil 4	Coil 5 ✓	Coil 6
Model Number:						5WM0906B	
Air Velocity:	(Sft/min)					519.9	
Total Capacity:	MBH					1,102	
Sens. Capacity:	MBH					1,075	
Lvg. Air DB:	°F					68.87	
Lvg. Air WB:	°F					64.78	
Standard APD	"H2O					.52	
Lvg. Fluid:	°F					55.75	
Fluid Flow:	gal/min					275.0	
Fluid PD:	FT H2O					8.88	
Fluid Vel.:	ft/s					2.86	
Conn Size:	IN					(1) 3.000	
Internal Volume:	in^3					7,700	
Weight (Dry):	lbm					750.1	
Weight (w/Fluid):	lbm					1,057	
Notes:						IL	

Notes:

I) Header Pressure Drop Exceeds 30% of Total Fluid Pressure Drop. L) Coil rating valid for Heatcraft coils only.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/10/2010
From:
Company:
Return Tel:
Return Fax:

Construction

Item: AHU-1 ERC Winter
Coils Per Bank: 2
Allow Opp. End: No
Tube OD IN: 5/8
Coil Duty: Heat-Return Bend
Fins Per Inch: 9
Rows: 6
Fin Surface: B
Fin Height (IN): 54.00
Finned Length (IN): 109.0
Tubing Mat. (IN): 0.025 Copper
TurboSpirals: No
Fin Mat. (IN): 0.0075 Aluminum
Conn Qty/Size (IN): 1 / 3.00
Circuiting: One & One Half

Air Side

Air Flow (Sft^3/min) 42,500
Altitude FT: .00
Ent. Air DB °F: -10.00
Lvg. Air DB °F: 17.70
Total Capacity MBH: .00
Max Air PD "H2O: .00

Fluid Side

Fluid Type: Propylene
Percent Glycol: 40
Ent. Fluid : 47.00
Lvg. Fluid : .00
Fluid Flow gal/min: 275.0
Max FPD FT H2O: .00

O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		Coil 1	Coil 2	Coil 3	Coil 4 ✓	Coil 5	Coil 6
Model Number:					5WM0906B		
Air Velocity:	(Sft/min)				519.9		
Total Capacity:	MBH				1,283		
Lvg. Air DB:	°F				17.84		
Standard APD	"H2O				.52		
Lvg. Fluid:	°F				36.79		
Fluid Flow:	gal/min				275.0		
Fluid PD:	FT H2O				9.33		
Fluid Vel.:	ft/s				2.86		
Conn Size:	IN				(1) 3.000		
Internal Volume:	in^3				7,700		
Weight (Dry):	lbm				750.1		
Weight (w/Fluid):	lbm				1,058		
Notes:					IL		

Notes:

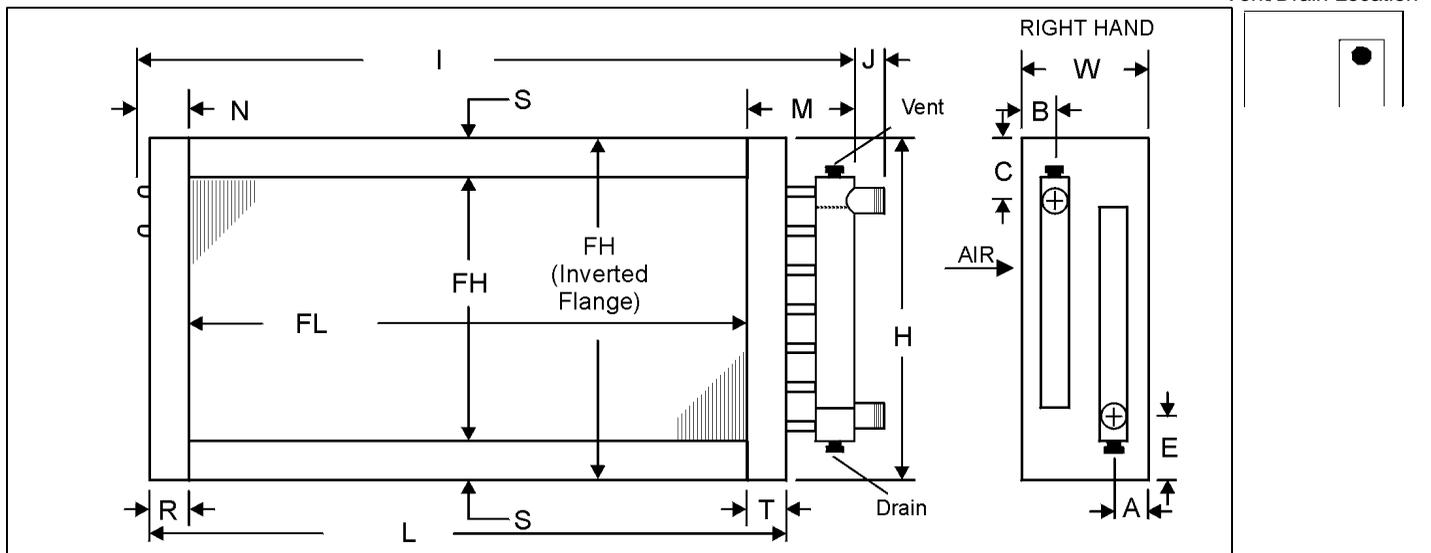
I) Header Pressure Drop Exceeds 30% of Total Fluid Pressure Drop. L) Coil rating valid for Heatcraft coils only.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/10/2010
From:
Company:
Return Tel:
Return Fax:

ITEM	QTY	MODEL NUMBER						HAND
		TYPE	FPI	ROWS	FIN	FH (IN)	FL (IN)	
AHU-1 ERC Summer-Winter	2	5WM	09	06	B	54.00	109.00	Right

MATERIALS OF CONSTRUCTION		OPTIONS				
Fins	0.0075 Aluminum	Coating	None		TurboSpirals	No
 Tubes	0.025 Copper	Casing Type	Flanged		Moisture Eliminator	No
Casing	304L S/S	Vent & Drain	.50 FPT on Face		Mounting Holes	No
Conn. Material	Carbon Steel				Label Kit	Yes
Conn. Type	MPT				Drain Headers	No
Conn. Size	3				Tube Ferrules	No
Weight (LBS)	750.0					



DIMENSIONAL DATA(IN)														
A	B	C	E	H	I	J	L	M	N	R	S	T	W	SJC
2.40	2.40	12.00	12.00	57.00	117.1	7.00	112.0	5.62	2.50	1.50	.75	1.50	10.00	

NOTES:

GENERAL NOTES:

1. All dimensions are in (IN)
2. Manually verifying dimensions is highly recommended.
3. Two intermediate tube supports fabricated from heavy gauge stock of the same material as the fins will be provided.
4. The supply line should be connected to the lower connection on the leaving air side for counterflow operation.
5. Coils will vent and drain through factory-installed vent and drain fittings when mounted level for horizontal flow.
6. Connection location other than standard could affect vent and drain locations. Consult factory.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/17/2010
From:
Company:
Return Tel:
Return Fax:

Construction

Item: ERU-1-2 ERC Summer
Coils Per Bank: 2
Allow Opp. End: No
Tube OD IN: 5/8
Coil Duty: Heat-Return Bend
Fins Per Inch: 10
Rows: 8
Fin Surface: B
Fin Height (IN): 37.50
Finned Length (IN): 102.0
Tubing Mat. (IN): 0.025 Copper
TurboSpirals: No
Fin Mat. (IN): 0.0075 Aluminum
Conn Qty/Size (IN): 1 / Optimize
Circuiting: Single

Air Side

Air Flow (Dft^3/min) 25,250
Altitude FT: .00
Ent. Air DB °F: 63.50
Lvg. Air DB °F: 70.10
Total Capacity MBH: .00
Max Air PD "H2O: .00

Fluid Side

Fluid Type: Water
Ent. Fluid : 71.50
Lvg. Fluid : .00
Fluid Flow gal/min: 137.0
Max FPD FT H2O: .00

O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		Coil 1	Coil 2	Coil 3	Coil 4 ✓	Coil 5	Coil 6
Model Number:					5WS1008B		
Air Velocity:	(Sft/min)				475.3		
Total Capacity:	MBH				189.7		
Lvg. Air DB:	°F				70.43		
Standard APD	"H2O				.66		
Lvg. Fluid:	°F				68.73		
Fluid Flow:	gal/min				137.0		
Fluid PD:	FT H2O				7.98		
Fluid Vel.:	ft/s				3.08		
Conn Size:	IN				(1) 2.500		
Internal Volume:	in^3				6,509		
Weight (Dry):	lbm				681.2		
Weight (w/Fluid):	lbm				930.7		
Notes:					BEL		

Notes:

- B) Rated In Compliance With ARI 410.
- E) Rated in accordance with ARI 410, actual performance may vary by application
- L) Coil rating valid for Heatcraft coils only.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/17/2010
From:
Company:
Return Tel:
Return Fax:

Construction

Item: ERU-1-2 ERC Winter
Coils Per Bank: 2
Allow Opp. End: No
Tube OD IN: 5/8
Coil Duty: Cool-Standard
Fins Per Inch: 10
Rows: 8
Fin Surface: Optimize ABC
Fin Height (IN): 37.50
Finned Length (IN): 102.0
Tubing Mat. (IN): 0.025 Copper
TurboSpirals: No
Fin Mat. (IN): 0.0075 Aluminum
Conn Qty/Size (IN): 1 / Optimize
Circuiting: Optimize

Air Side

Air Flow (Sft^3/min) 25,250
Altitude FT: .00
Ent. Air DB/WB °F: 68.00 / 53.00
Lvg. Air DB/WB °F: 44.90 / 42.50
Total / Sensible MBH: .00 / .00
Max Air PD "H2O: .00

Fluid Side

Fluid Type: Water
Ent. Fluid : 41.00
Lvg. Fluid : .00
Fluid Flow gal/min: 137.5
Max FPD FT H2O: .00

O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		C o i l 1	C o i l 2	C o i l 3	C o i l 4	C o i l 5 ✓	C o i l 6
Model Number:						5WS1008B	
Air Velocity:	(Sft/min)					475.3	
Total Capacity:	MBH					638.5	
Sens. Capacity:	MBH					638.5	
Lvg. Air DB:	°F					44.87	
Lvg. Air WB:	°F					42.05	
Standard APD	"H2O					.66	
Lvg. Fluid:	°F					50.25	
Fluid Flow:	gal/min					137.5	
Fluid PD:	FT H2O					8.57	
Fluid Vel.:	ft/s					3.09	
Conn Size:	IN					(1) 2.500	
Internal Volume:	in^3					6,509	
Weight (Dry):	lbm					681.2	
Weight (w/Fluid):	lbm					931.1	
Notes:						BEL	

Notes:

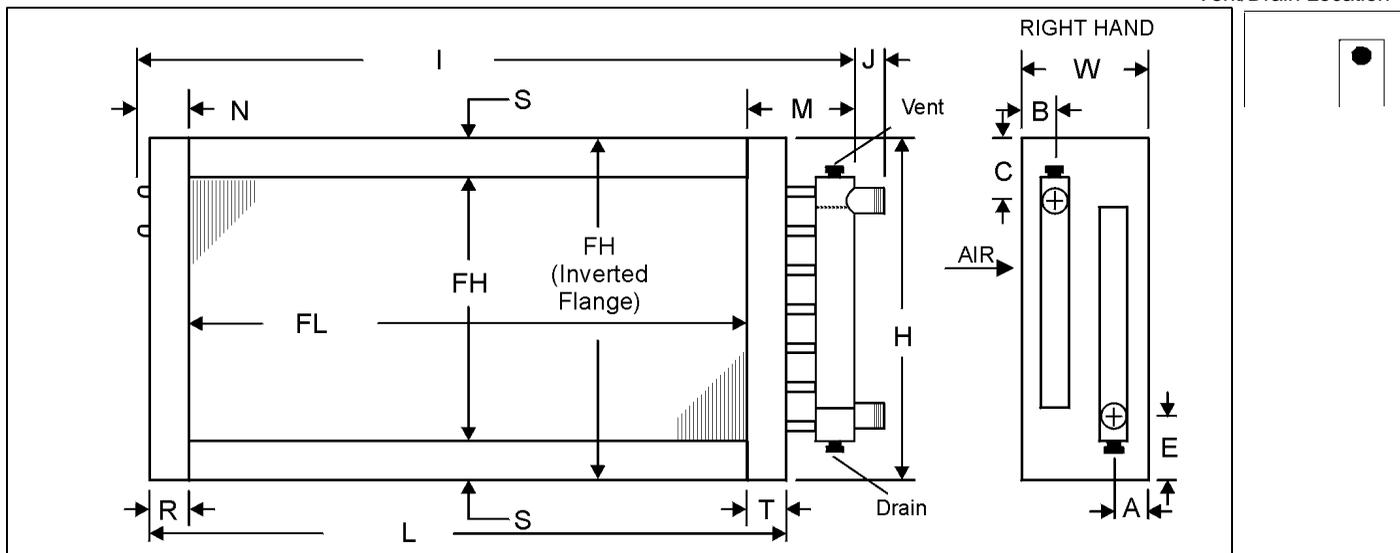
- B) Rated In Compliance With ARI 410.
- E) Rated in accordance with ARI 410, actual performance may vary by application
- L) Coil rating valid for Heatcraft coils only.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/17/2010
From:
Company:
Return Tel:
Return Fax:

ITEM	QTY	MODEL NUMBER						HAND
		TYPE	FPI	ROWS	FIN	FH (IN)	FL (IN)	
ERC-1 Summer-Winter	2	5WS	10	08	B	37.50	102.00	Right Left

MATERIALS OF CONSTRUCTION		OPTIONS			
Finns	0.0075 Aluminum	Coating	Electrofin Phenolic	TurboSpirals	No
Tubes	0.025 Copper	Casing Type	Flanged	Moisture Eliminator	No
Casing	304L S/S	Vent & Drain	.50 FPT on Face	Mounting Holes	No
Conn. Material	Carbon Steel			Label Kit	Yes
Conn. Type	MPT			Drain Headers	No
Conn. Size	2.5			Tube Ferrules	No
Weight (LBS)	681.0				



DIMENSIONAL DATA(IN)														
A	B	C	E	H	I	J	L	M	N	R	S	T	W	SJC
1.70	1.70	12.00	12.00	40.50	109.8	7.00	105.0	5.25	2.50	1.50	.75	1.50	12.50	

NOTES:

GENERAL NOTES:

1. All dimensions are in (IN)
2. Manually verifying dimensions is highly recommended.
3. Two intermediate tube supports fabricated from heavy gauge stock of the same material as the fins will be provided.
4. The supply line should be connected to the lower connection on the leaving air side for counterflow operation.
5. Coils will vent and drain through factory-installed vent and drain fittings when mounted level for horizontal flow.
6. Connection location other than standard could affect vent and drain locations. Consult factory.



Steam Coil Schedule

Unit No.	Coil Tag	Air Flow (CFM)	Face Velocity (FPM)	No. Coils	Size H x L Each	Rows	Fins per in.	Fin Design	Model
AHU-2	HC-2	23,500	560	2	42x72	1	4	A	Heatcraft 5JA

Unit No.	Coil Tag	Capacity (MBH)	Steam Pressure (PSI)	EADB	LADB	Flow Rate (lbs. / hr)	Air Pressure Drop (in. H ² O)	Fin Material
AHU-2	HC-2	593	5	44.6	67.8	617	0.05	Copper Heavy (.0095" thickness)

Unit No.	Coil Tag	Tube Material	Casing Material	Coating	Flange Size
AHU-2	HC-2	5/8 Copper heavy wall (.035 thickness)	Galvanized	None	1 1/2"

Customer:	Date:	11/4/2010
Contact:	From:	
Telephone:	Company:	
Cell:	Return Tel:	
Fax:	Return Fax:	
Job:		
Quote #:		

Construction

Item:	AHU-2 HC
Coils Per Bank:	2
Allow Opp. End:	No
Tube OD IN:	5/8
Style:	Distributing
Fins Per Inch:	Optimize
Rows:	Optimize
Fin Surface:	Optimize ABC
Fin Height (IN):	42.00
Finned Length (IN):	72.00
Tubing Mat. (IN):	0.035 Copper
Fin Mat. (IN):	0.0095 Aluminum
Face Area (SQ FT):	42.00
SJC:	189.4/0

Air Side

Air Flow (Sft^3/min)	23,500
Altitude FT:	.00
Ent. Air DB °F:	44.60
Lvg. Air DB °F:	57.00
Total Capacity MBH:	.00
Max Air PD "H2O:	.00

Steam Side

Pressure lbf/in^2:	5.00
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O U T P U T D A T A		M o s t E c o n o m i c a l			S p e c i f i e d C o i l		
		Coil 1 ✓	Coil 2	Coil 3	Coil 4	Coil 5	Coil 6
Model Number:		5JA0401A					
Air Velocity:	(Sft/min)	559.5					
Total Capacity:	MBH	593.4					
Lvg. Air DB:	°F	67.79					
Standard APD	"H2O	.05					
Condensate:	lbm/hr	617.0					
Conn. Size:	IN	2.000					
Weight:	lbm	123.6					
Notes:		BCJK					

Notes:

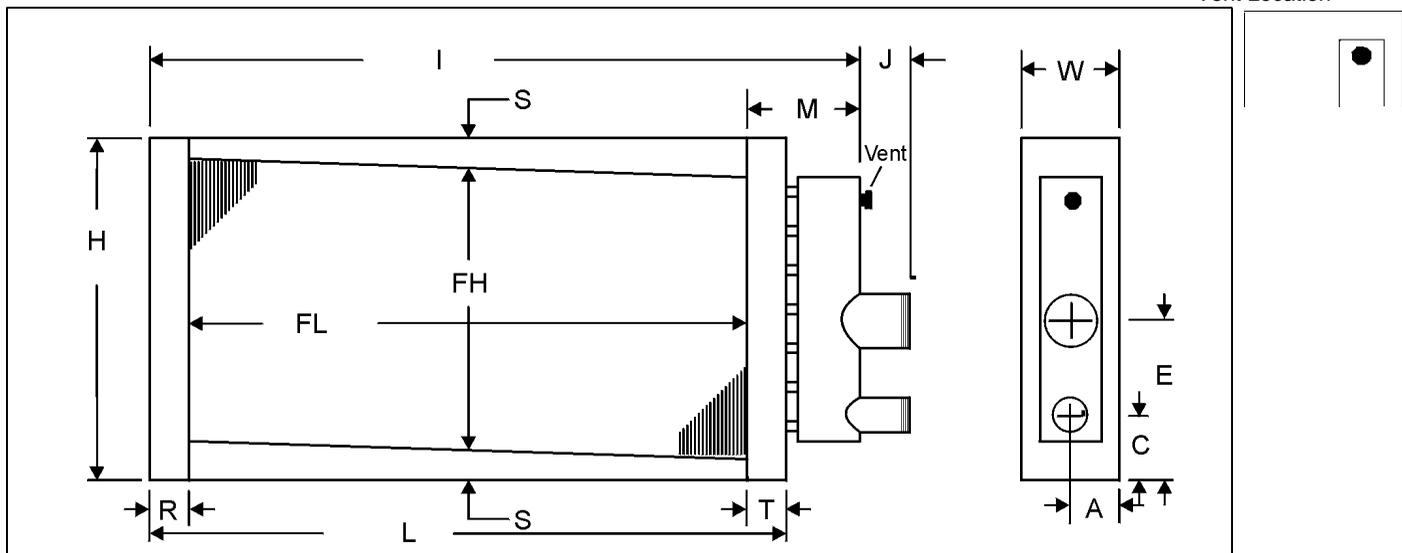
- B) Rated In Compliance With ARI 410.
- C) Coil Not Within Certified ARI Directory.
- J) Face and Row spacing on 1.50 IN centers.
- K) Coil rating valid for Heatcraft coils only.

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 11/4/2010
From:
Company:
Return Tel:
Return Fax:

ITEM	QTY	MODEL NUMBER						HAND
		TYPE	FPI	ROWS	FIN	FH (IN)	FL (IN)	
AHU-2 HC	2	5JA	04	01	A	42.00	72.00	N/A

MATERIALS OF CONSTRUCTION		OPTIONS				
Finns	0.0095 Aluminum	Coating	None		Mounting Holes	No
Tubes	0.035 Copper	Casing Type	Pitched Horizontal		Label Kit	Yes
Casing	Galvanized	Vent & Drain	.50 FPT on Face		Boxed Headers	No
Conn. Material	Carbon Steel				Vacuum Breaker	No
Conn. Type	MPT				Thermostatic Air Vent	No
Conn. Size	2.000/2.000					
Weight (LBS)	124.0					



DIMENSIONAL DATA(IN)												
A	C	E	H	I	J	L	M	R	S	T	W	SJC
2.50	2.52	22.14	45.00	78.00	3.00	75.00	4.50	1.50	1.50	1.50	5.00	189.4/0

NOTES:

GENERAL NOTES:

1. All dimensions are in (IN)
2. Manually verifying dimensions is highly recommended.
3. One intermediate tube support fabricated from heavy gauge stock of the same material as the fins will be provided.
4. Tubes are pitched toward return connection when installed for horizontal air flow.



Integral Face and Bypass Coil Schedule

Unit No.	Coil Tag	Mfg.	No. Coils	Model	CFM	Rows	FPI	Outlet Velocity (FPM)	Air Pressure Drop (in. H ₂ O)	Entering Air Temp	Leaving Air Temp
AHU-1	HC-1	Wing	1	VE-10T	42,500	2	10	731	0.33	-10	61.9

Unit No.	Coil Tag	Steam Pressure	Steam Load	Entering Water Temp	Leaving Water Temp	GPM	Feature Codes
AHU-1	HC-1	5	3,451.6	N/A	N/A	N/A	FC RC

Feature Codes	
FC	Side Mounted Controls(by others)
RC	Right Hand Control



VIFB Coil Performance

Prepared By:

Prepared For: CCAC-K Leroy Irvis Science & tech Ctr

Date: 11/11/2010

Coil Tag:

Project:

Heating Coil:	Performance shown is certified under ARI Standard 410.
Model No.	VE-10T Steam, 2 Row Coil
Fin Material	Aluminum
Fins per Inch	10 fpi
Tube Material	Copper
Airflow Direction	Horizontal
Airflow Rate	42,500 SCFM
Altitude	0 FT
Outlet Velocity	731 fpm
Air Pressure Drop	0.33" WC
Entering Air Temp.	-10.0° F
Leaving Air Temp.	61.9° F
Steam Pressure	5 PSIG
Steam Temperature	227.1° F
Steam Load	3,451.6 lb/hr
Sensible Heat	3,315,003 Btuh

Damper Controls:

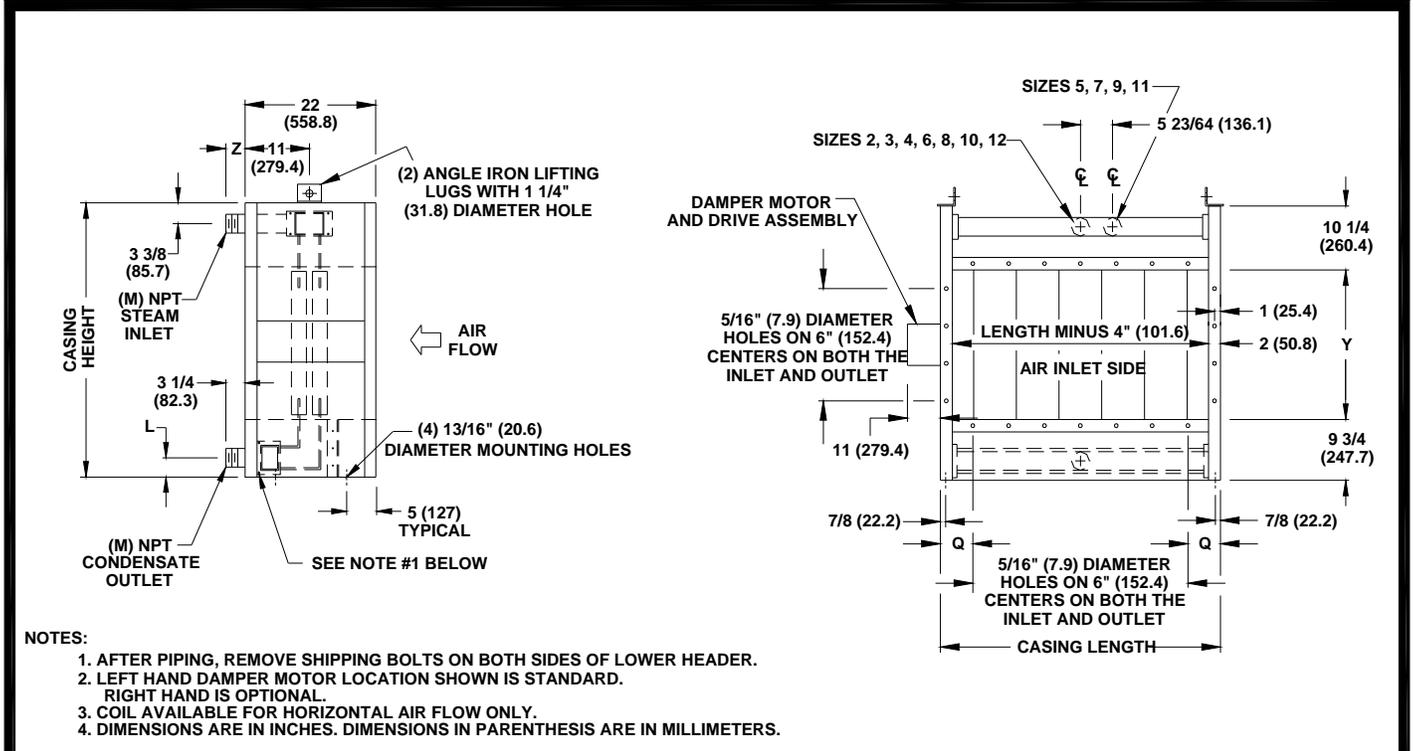
Controls by Others

Options:

Anti-Stratification Baffles

Coil Configured for Side Mounted Actuator By Others

3" Flexible Connector(s) with Threaded Fittings



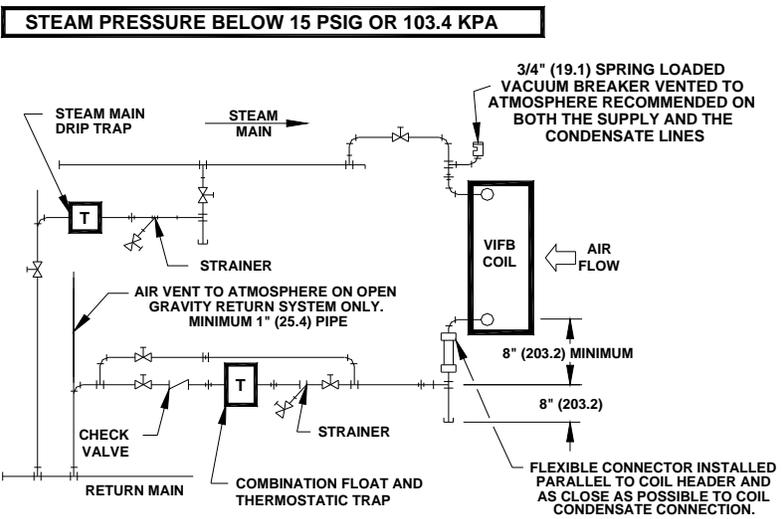
TWO ROW VIFB COIL FOR STEAM HEATING WITH SIDE MOUNTED ACTUATOR



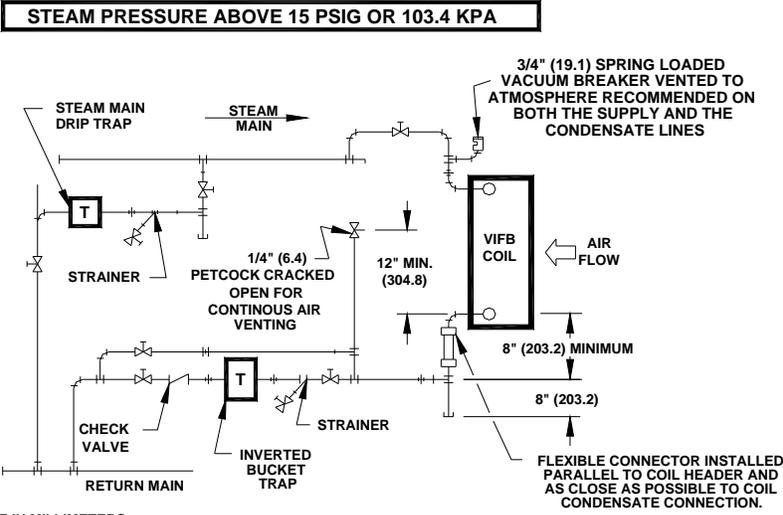
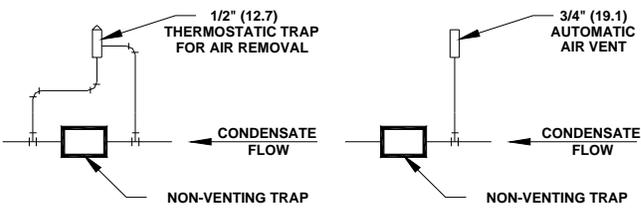
01/10/07

W08

Model:	VE-10T Steam, 2 Row Coil
Casing Height:	98 inches
Casing Length:	111.188 inches
L Dimension:	3.125 inches
M Dimension:	3 inches
Q Dimension:	4.594 inches
Y Dimension:	78 inches
Z Dimension:	5.25 inches
Unit Weight:	1581 pounds
Shipping Weight:	1591 pounds
Coil Tag:	
Project:	



Non-venting Traps
 (Steam Pressure Below 15 PSIG Or 103.4 KPa)



NOTE : DIMENSIONS ARE IN INCHES.
 DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

**STEAM PIPING DIAGRAM
 FOR
 VIFB COIL**



02/15/07

W12

I:\FO Dimensionals\Wing\VIFB Coils\W12

Model: VE-10T Steam, 2 Row Coil
 Coil Tag:
 Project:

12/01/2010



Mech.76
Job: CCAC - K. Leroy Irvis Science & Tech Ctr
EQ Number: 15044
Date: Nov 29, 2010
Rev.: 1

Evaporative Cooler

AIREX EVAPORATIVE SYSTEMS

SUBMITTAL DATA

PROJECT: TRANE CUSTOM - LEROY IRIS SCIENCE & TECH CENTER
ENGINEER: MARK PATRYCH -- 11/01/10
PHONE # : (479) 648-7469 (479) 648-7499 FAX

AIREX SPRAY NOZZLE AIR WASHERS

Evaporative Cooling:

Model # : TRANE/AIREX SP-250 SNT - Once thru Evap System
Evap Unit to Trane ERU-1 & ERU-2

C.F.M.: 25,250 |*| .25 INT. Static Pressure W.G.
* * * * *

Cabinet Construction Data:

Sump: 14 Ga St.Steel |*| Unit Sides & Top: 16 Ga.St.Steel.
* * * * *

Spray Header Solenoid ASCO Red Hat |*| Voltage: 24 Volt

Distribution Pad: 2" Glasdek |*| Type 6" half pvc cover

|*| Piping: Copper with distribution holes in the pipe

Once Thru Water Flow: 18 GPM |*| Drain & Overflow Conn: 1 1/2" MPT
* * * * *

Evap.Media: 12"Glasdek |*| Surface Area: 52.25 SQ.FT.

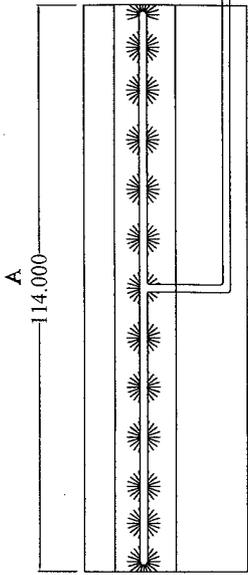
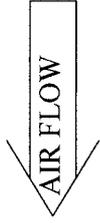
Face Velocity: 485 FPM |*| Efficiency: 90%
* * * * *

OTHER OPTIONS: Unit to be mounted and installed inside a Trane
Access Section with drain pan by Trane Custom. Unit will have a
sight glass metering valve and 24 volt header supply solenoid. T-
Stat and Timer Control of Solenoid is BY OTHERS.

BY: _____
Thomas Hobson Jr.

14 GA. STAINLESS STEEL SUMP
16 GA. STAINLESS STEEL CASING

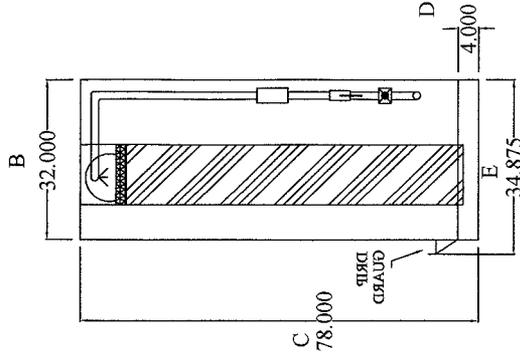
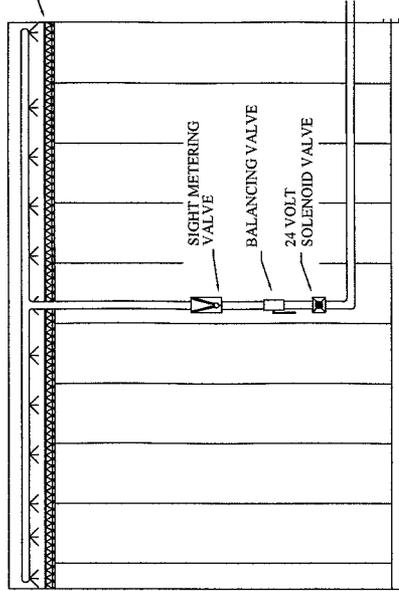
12/01/2010



12" GLASS DEK MEDIA

COPPER TOP DISTRIBUTION SYSTEMS W/ NOZZLES

2" DISTRIBUTION PAD



MODEL	A	B	C	D	E	F
SP-250 SNT	114	32	78	4	34.875	



MOUNTAIN STATES EQUIPMENT COMPANY
1975 S. NAVAJO STREET
DENVER, CO 80231-3845
PHONE: (303) 934-5351
FAX: (303) 922-5709

DESCRIPTION:
LEROY IRIS SCIENCE & TECHNOLOGY
TRANE/AIREX SP-250 SNT
25,200 CFM

Mech.

SCALE: 1/32
DWG BY: B MURRAY
DATE: 11/04/10



Humidifier Schedule

Unit No.	Humidifier tag	Humidification Source	Type	Air Flow (CFM)	Output Capacity	RH%	Steam Pressure
AHU-1	H-1	Boiler Steam	Centifeed-All Active	42,500	1431	76	10
AHU-2	H-2	Boiler Steam	Centifeed-All Active	23,500	796	76	10

Unit No.	Humidifier tag	Dispersion Method	Dispersion Tube Spacing (in)	Mounting Position of Disp. Tubes	Control	Size	Mfg.
AHU-1	H-1	Multiple Tube	6	Horizontal	Electric Modulating	72hx120w	Armstrong
AHU-2	H-2	Multiple Tube	7.75	Horizontal	Electric Modulating	72hx84w	Armstrong

Contract

Humidifier: H-1

Location/Description: K. Leroy Irvis Science Center - Pittsburgh, PA

Fixed % Outside Air Load Calculation

Outside Air

Temperature	Relative Humidity
-10.0 F	63.0 %RH

Desired Room

Temperature	Relative Humidity
72.0 F	45.0 %RH

Load Calculation Inputs

Air Flow	Outside Air Percentage	Altitude	Duct Temperature at Humidifier
42500.0 scfm	100.0 %	1224.0 ft	57.0 F

Calculated Values

Air Flow Humidified	Duct Relative Humidity	Required Humidifier Capacity
42500.0 scfm	76.0 %RH	1427.4 lbs/hr

Contract

Humidifier: H-2

Location/Description: K. Leroy Irvis Science Center - Pittsburgh, PA

Fixed % Outside Air Load Calculation

Outside Air

Temperature	Relative Humidity
44.6 F	5.0 %RH

Desired Room

Temperature	Relative Humidity
72.0 F	45.0 %RH

Load Calculation Inputs

Air Flow	Outside Air Percentage	Altitude	Duct Temperature at Humidifier
23500.0 scfm	100.0 %	1224.0 ft	57.0 F

Calculated Values

Air Flow Humidified	Duct Relative Humidity	Required Humidifier Capacity
23500.0 scfm	76.0 %RH	787.2 lbs/hr



Installation and Operation HumidiPack[®], HumidiPack CF, and HumidiPackPlus[™]

Complete Packaged Humidifier Systems



Table of Contents

Preliminary Procedures	2
Do's & Don'ts of Location and Installation	3
Installation	4
Typical Duct Installations	5
Installation Concepts	6
Auxiliary Controls	9
Troubleshooting Guide	11
Limited Warranty and Remedy	12

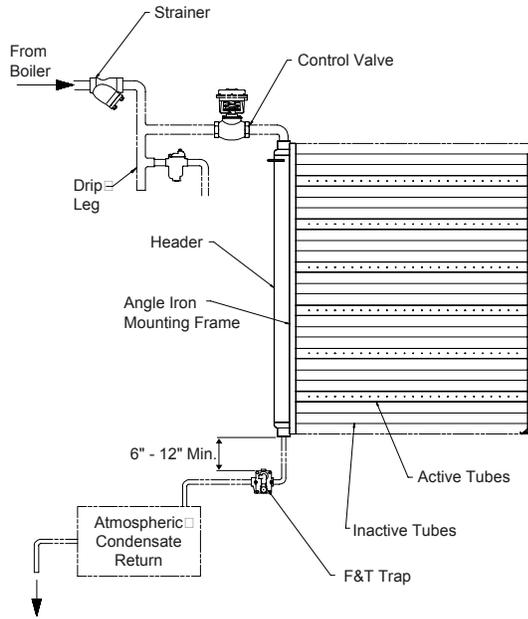


Figure 6-1. Header drain trap discharging to pumped return (HumidiPack shown)

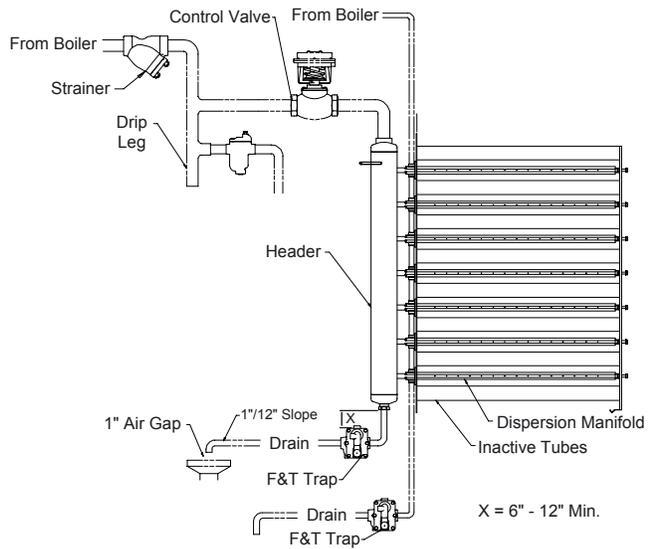


Figure 6-2. Drain traps discharging to floor drain. (HumidiPackPlus shown)

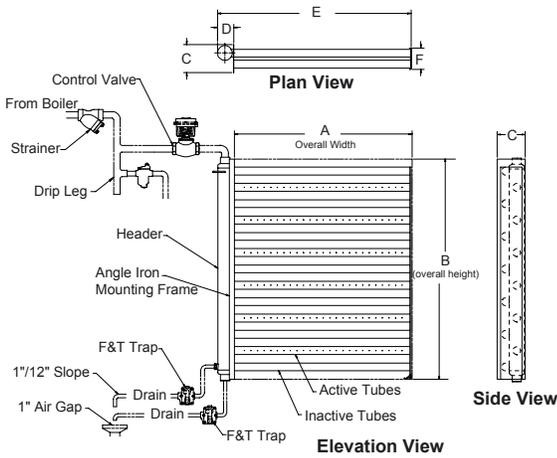


Figure 6-3. **HumidiPack CF.** Drain traps discharging to floor drain.

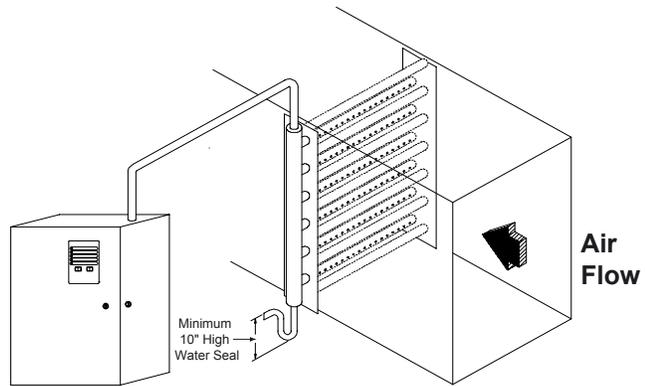


Figure 6-4. Condensate drained through piping loop seal. Make sure outlet of loop seal is below bottom of HumidiPack header.

NOTE: When installing HumidiPack for use with an electric or steam-to-steam humidifier, minimize the length of piping run from the humidifier to Humidi-Pack. Piping should not extend longer than 20 feet and should be a generous size (at least 2"). Consult factory if longer piping is necessary.

Slope piping back toward humidifier or toward a drainage point. Pipe a loop trap to an atmospheric drain at any low points in piping run. Install, at minimum, a 10" loop seal from the HumidiPack header drain connection.

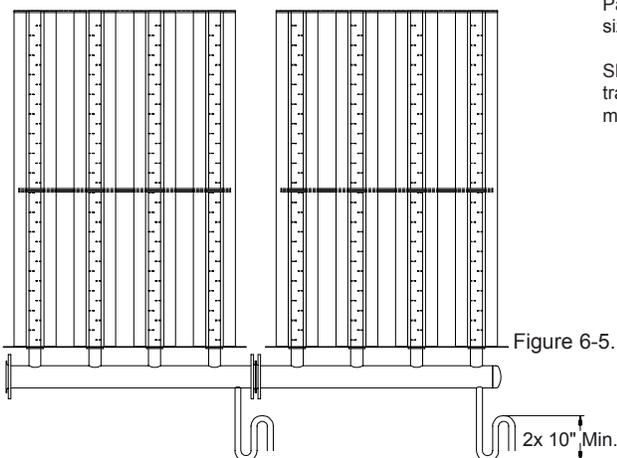


Figure 6-5. **Dual Panel Flanged HumidiPack System.** Both "P" traps drained to atmospheric drain.

Step 5: Supply Steam Piping

Supplying quality steam (not wet) to the HumidiPack/HumidiPackPlus is an important component for proper operation. Care must be taken that the main supply header is dripped sufficiently as well as the runout piping to the Armstrong ACV Control Valve and HumidiPack/HumidiPackPlus header. The entire system must be designed and hooked up to prevent accumulation of condensate at any point. The following recommendations will help to ensure this.

Use drip legs and traps at all low spots or natural drainage points such as: Ahead of risers; End of mains; Ahead of expansion joints or bends; Ahead of valves or regulators. Install drip legs and drain traps even where there are no natural drainage points (See Figures 7-1 thru 7-5).

On a supervised warm-up, make drip leg length at least 1½ times the diameter of the main, but never less than 10". Make drip legs on automatic warm-ups a minimum of 28" in length. For both methods, it is a good practice to use a drip leg the same diameter as the main up to 4" pipe size and at least ½ of the diameter of the main above that, but never less than 4". See Table 7-1.

Table 7-1. Recommended Steam Main and Branch Line Drip Leg Sizing

M Steam Main Size (in)	D Drip Leg Diameter (in)	H Drip Leg Length Minimum	
		Supervised Warm-Up (in)	Automatic Warm-Up (in)
1/2	1/2	10	28
3/4	3/4	10	28
1	1	10	28
2	2	10	28
3	3	10	28
4	4	10	28
6	4	10	28
8	4	12	28
10	6	15	28
12	6	18	28
14	8	21	28
16	8	24	28
18	10	27	28
20	10	30	30
24	12	36	36

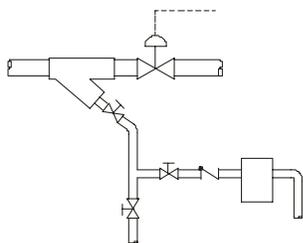


Figure 7-1. Trap draining strainer ahead of PRV.

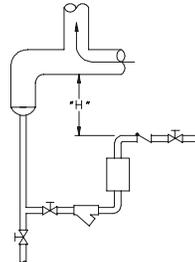


Figure 7-2. Trap draining drip leg at riser. Distance "H" in inches ÷ 28 = psi static head for forcing water through the trap.

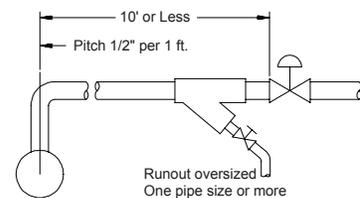


Figure 7-3. Piping for runout less than 10 ft. No trap required unless pitch back to supply header is less than ½" per ft.

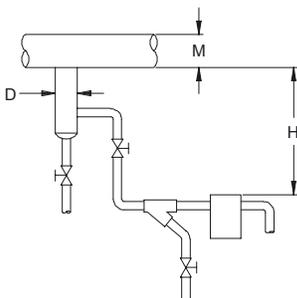


Figure 7-4. Trap draining drip leg on main.

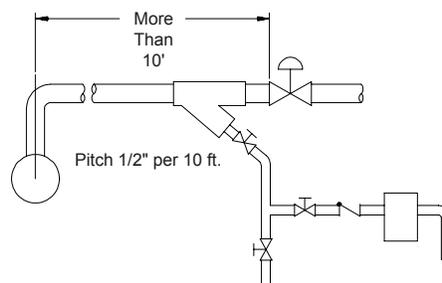


Figure 7-5. Piping for runout greater than 10'. Drip leg and trap required ahead of control valve. Strainer ahead of control valve can serve as drip leg if blowdown connection runs to an inverted bucket trap. This will also minimize the strainer cleaning problem. Trap should be equipped with an internal check valve or swing check installed ahead of the trap.



Damper Schedule

Unit No.	Qty.	Service	Damper WXH (in)	CFM	Velocity (FPM)	Blade Action	Torque (in-lbs)	Mfg.	Model	Actuators Provided?	Feature Codes
AHU-1	2	Fan Isolation	52x52	21,250	1,132	Opposed Blade	131	Ruskin	CD-50	No	FF LQ
AHU-2	1	Outside Air	89x32	23,500	1192	Opposed Blade	138	Ruskin	CD-50	No	FF RF
AHU-2	1	Return Air	89x32	23,500	1192	Opposed Blade	138	Ruskin	CD-50	No	FF
AHU-2	1	Exhaust Air	89x24	23,500	1588	Opposed Blade	104	Ruskin	CD-50	No	FF RF

Feature Code

FF	Front Flange
RF	Rear Flange
LQ	Locking Quadrant



3900 Dr. Greaves Rd. • Kansas City, MO 64030 • (816) 761-7476 • FAX (816) 765-8955

CD50 LOW LEAKAGE CONTROL DAMPER EXTRUDED ALUMINUM

STANDARD CONSTRUCTION

FRAME

5" x 1" x 6063T5 extruded aluminum hat channel with .125" minimum wall thickness (127 x 25 x 3.2). Low profile, 5" x 1/2" (127 x 13) top and bottom frames on dampers 12" (305) high and less. Mounting flanges on both sides of frame.

BLADES

6" (152) wide, 6063T5 heavy gage extruded aluminum, airfoil shape.

LINKAGE

Concealed in frame.

AXLES

1/2" (13) plated steel hex.

BEARINGS

Molded synthetic.

SEALS

Blade Edge – Extruded Ruskiprene (TPR) for -72°F to +275°F (-58°C to +135°C).
Jamb – Flexible metal compressible type.

CONTROL SHAFT

Removable, 1/2" (13) diameter shaft extends 6" (152) beyond frame.

FINISH

Mill.

MINIMUM SIZE

Single blade, parallel action – 6"w x 5"h (152 x 127).
Two blade, opposed action – 6"w x 9"h (152 x 229).

MAXIMUM SIZE

Single section – 60"w x 72"h (1524 x 1829).
Multiple section assembly – Unlimited size.
Dampers larger than the single section maximum are furnished in an assembly of 48" x 72" (1219 x 1829) or less equal sized individual sections. Tee flange option maximum 60" x 72" (1524 x 1829) on multiple sections.

FEATURES

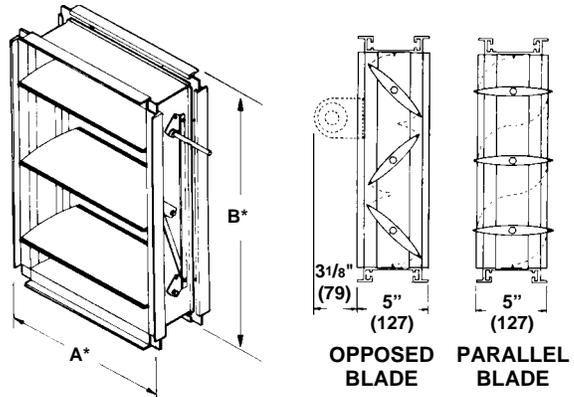
Ruskin's premier damper for medium pressure commercial and industrial HVAC systems offers the lowest leakage available with a standard, commercial built damper. The CD50 was the first AMCA-licensed low leakage damper and bears the AMCA Air Leakage Seal.

Linkage is concealed in the frame out of the airstream for low maintenance and reduced air turbulence. Hexagonal axles ensure a positive lock with blades. An easily replaceable, double-edge blade seal features an inflatable pocket that assists in blade seal.

NOTE: Dimensions shown in parenthesis () indicate millimeters.

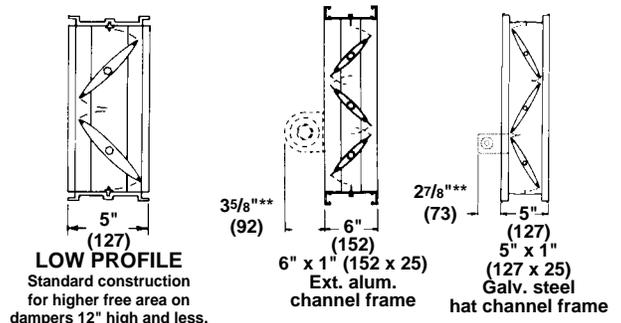
*Units furnished approximately 1/4" (6) smaller than given opening dimensions.

**Jackshaft standard on multiple section dampers.



Ruskin Company certifies that the CD50 shown here- in is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA International Certified Ratings Seal applies to Air Performance and Air Leakage.

FRAME CONSTRUCTION OPTIONS



VARIATIONS

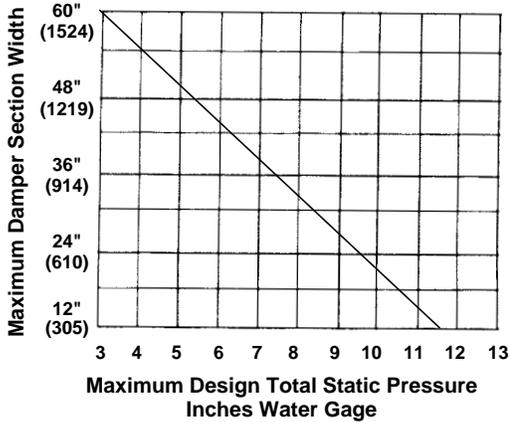
Variations to the CD50 basic design are available at additional cost. They include:

- Anodize and special finishes
- Pneumatic or electric actuators
- SP100 Switch Package
- Front or rear or flange frame
- 5" x 1" x 16 gage (127 x 25 x 1.6) galvanized steel hat channel frame
- 6" x 1" x 6063T5 (152 x 25 x 3.2) extruded aluminum hat channel frame
- Face and bypass mixing damper assemblies

QTY.	OPENING DIM.		FRAME STYLE			VARIATIONS
	A*	B*	STD.	Front Flange FF	Rear Flange RF	
JOB CONTRACTOR			LOCATION			

CD50 PERFORMANCE DATA

CD50 PRESSURE LIMITATIONS



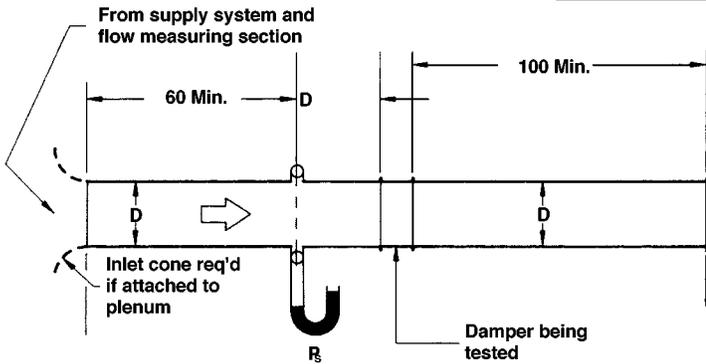
The CD50 may be used in systems with total pressures exceeding 3.5" by reducing damper section width as indicated. Example: Maximum design total pressure of 8.5" w.g. would require CD50 damper with maximum section width of 36" (914).

Pressure limitations shown above allow maximum blade deflection of 1/180 of span on 60" (1524) damper widths. Deflections in other damper widths (less than 48" [1219]) at higher pressures shown will result in blade deflection substantially less than 1/180 of span.



Ruskin Company certifies that the CD50 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA International Certified Ratings Seal applies to Air Performance and Air Leakage.

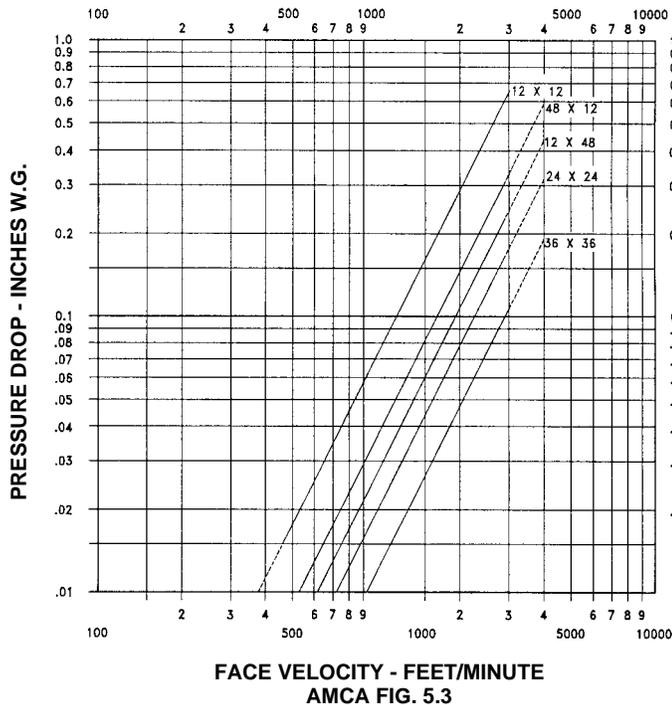
DAMPER WIDTH (INCHES)	1 IN. W.G.	4 IN. W.G.	8 IN. W.G.
12" (305)	I	I	I
24" (610)	I	I	I
36" (914)	I	I	I
48" (1219)	I	I	NA
60" (1524)	I	I	NA



AMCA STANDARD 500
FIGURE 5.3 DAMPER TEST SETUP WITH INLET AND OUTLET DUCTS

- | | |
|--------------------------|---------------------------|
| Class I = | Class II = |
| 4 CFM Sq. Ft. @ 1" w.g.; | 10 CFM Sq. Ft. @ 1" w.g.; |
| 8 CFM Sq. Ft. @ 4" w.g.; | 20 CFM Sq. Ft. @ 4" w.g.; |
| 11 CFM Sq. Ft. @ 8" w.g. | 28 CFM Sq. Ft. @ 8" w.g. |

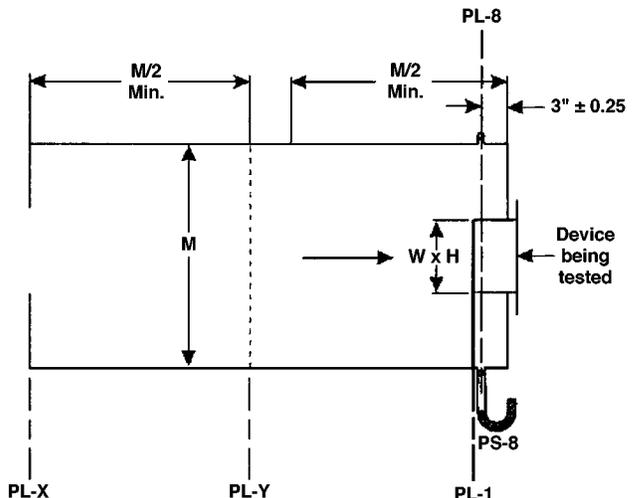
VELOCITY VS. PRESSURE DROP



CD50 sizes 12 x 12, 24 x 24, 48 x 12, 12 x 48, 36 x 36
(305 x 305, 610 x 610, 1219 x 305, 305 x 1219, 914 x 914)

All data corrected to represent standard air at a density of 0.075 lbs/ft³.

Leakage testing conducted in accordance with AMCA Standard 500-D-98. Torque applied holding damper closed, 5 in. lbs./sq. ft. on opposed blade dampers and 7 in. lbs./sq. ft. on parallel blade dampers. Air leakage is based on operation between 50°F to 104°F. All data corrected to represent standard air density 0.075 lbs/ft³.



ALTERNATE MOUNT B (LEAKAGE TEST ONLY)
FIGURE 5.5 TEST DEVICE SETUP WITH INLET CHAMBER

CD50 SUGGESTED SPECIFICATION

Furnish and install, at locations shown on plans, or in accordance with schedules, Low leakage dampers shall meet the following minimum construction standards: Frames shall be 5" x 1" x .125" (minimum thickness) 6063T5 extruded aluminum hat channel with hat mounting flanges on both sides of the frame. Each corner shall be reinforced with two die formed internal braces and machine staked for maximum rigidity. Blades shall be airfoil type extruded aluminum (maximum 6" depth) with integral structural reinforcing tube running full length of each blade.

Blade edge seals shall be extruded double edge design with inflatable pocket which enables air pressure from either direction to assist in blade to blade seal off. Blades seals shall be mechanically

locked in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade seals are not acceptable. Bearings shall be non-corrosive molded synthetic. Axles shall be hexagonal (round not acceptable) to provide positive locking connection to blades and linkage. Linkage shall be concealed in frame. Submittal must include leakage, maximum air flow and maximum pressure ratings based on AMCA Publication 500. Damper shall be tested and certified in accordance with AMCA 511 for Air Performance and Air Leakage. Damper widths from 12" to 60" wide shall not leak any greater than 8 cfm sq. ft. @ 4" w.g. Dampers shall be in all respects equivalent to Ruskin Model CD50.

CD50 PERFORMANCE DATA

The actual pressure drop through a damper is the result of many factors. The formula and area factor table below may be used to estimate pressure drop for a CD50 of a given size, with straight duct runs upstream and downstream, as in AMCA Figure 5.3.

CD50 FREE AREA

Height Dim. B	Dimension A – Width In Inches													
	8" (203)	12" (305)	16" (406)	20" (508)	24" (610)	28" (711)	32" (813)	36" (914)	40" (1016)	44" (1118)	48" (1219)	52" (1321)	56" (1422)	60" (1524)
8" (203)	0.18	0.32	0.45	0.59	0.72	0.86	0.99	1.13	1.27	1.40	1.54	1.67	1.81	1.94
10" (254)	0.24	0.42	0.59	0.77	0.95	1.12	1.30	1.48	1.66	1.83	2.01	2.19	2.36	2.54
12" (305)	0.31	0.55	0.78	1.01	1.24	1.48	1.71	1.94	2.17	2.41	2.64	2.87	3.10	3.34
14" (356)	0.35	0.61	0.87	1.13	1.39	1.66	1.92	2.18	2.44	2.70	2.96	3.22	3.48	3.74
16" (406)	0.41	0.71	1.01	1.31	1.62	1.92	2.22	2.52	2.83	3.13	3.43	3.73	4.04	4.34
18" (457)	0.48	0.83	1.20	1.56	1.91	2.27	2.63	2.99	3.35	3.70	4.06	4.42	4.78	5.14
20" (508)	0.56	0.97	1.38	1.80	2.21	2.62	3.04	3.45	3.87	4.28	4.69	5.11	5.52	5.93
24" (610)	0.69	1.20	1.71	2.22	2.73	3.24	3.75	4.26	4.77	5.28	5.80	6.31	6.82	7.33
28" (711)	0.82	1.43	2.03	2.64	3.25	3.86	4.47	5.07	5.68	6.29	6.90	7.51	8.11	8.72
32" (813)	0.97	1.69	2.41	3.12	3.84	4.56	5.28	6.00	6.72	7.44	8.16	8.88	9.60	10.32
36" (914)	1.10	1.91	2.73	3.55	4.36	5.18	6.00	6.81	7.63	8.45	9.26	10.00	10.89	11.71
40" (1016)	1.23	2.14	3.06	3.97	4.88	5.80	6.71	7.62	8.54	9.45	10.36	11.28	12.19	13.11
44" (1118)	1.36	2.37	3.38	4.39	5.40	6.41	7.42	8.43	9.45	10.46	11.47	12.48	13.49	14.50
48" (1219)	1.51	2.63	3.75	4.87	6.00	7.12	8.24	9.36	10.48	11.61	12.73	13.85	14.97	16.09
52" (1321)	1.64	2.86	4.08	5.30	6.52	7.73	8.95	10.17	11.39	12.61	13.83	15.05	16.27	17.49
56" (1422)	1.77	3.09	4.40	5.72	7.03	8.35	9.67	10.98	12.30	13.62	14.93	16.25	17.57	18.88
60" (1524)	1.92	3.35	4.77	6.20	7.63	9.06	10.48	11.91	13.34	14.77	16.19	17.62	19.05	20.48
64" (1626)	2.05	3.57	5.10	6.62	8.15	9.67	11.20	12.72	14.25	15.77	17.30	18.82	20.35	21.87
68" (1727)	2.18	3.80	5.42	7.05	8.67	10.29	11.91	13.53	15.16	16.78	18.40	20.02	21.64	23.27
72" (1829)	2.33	4.06	5.80	7.53	9.26	10.99	12.73	14.46	16.19	17.93	19.66	21.39	23.13	24.86

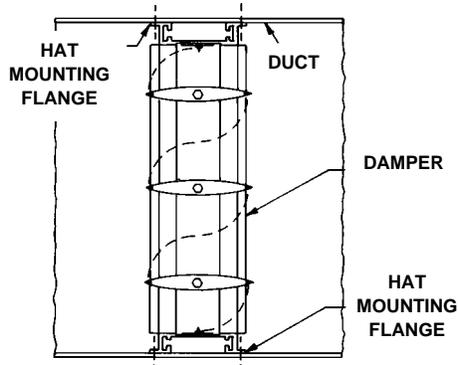
Formula

$$\Delta P = 2.18 \left[\frac{\text{CFM}}{\text{AREA FACTOR}} - \text{Vel.} \right]^2$$

4005

ΔP = Pressure drop in inches w.g.
 Vel. = Duct Velocity in feet per minute
 CFM = Duct area in sq. ft. x velocity in FPM

CD50 TYPICAL INSTALLATION



TYPICAL MODEL CD50 INSTALLATION

Two 1/2" hat mounting flanges are provided around damper perimeter for easy and economical installation. Damper may be quickly installed in ductwork by use of sheet metal screws. Dampers must be installed square and free from racking. Actuator must be installed on the linkage side of the damper. Opposed blade dampers must be operated from a power blade.

For complete assembly and installation instructions details refer to the Ruskin "Standard Multiple Section Control Damper Details" and "Induct Mount Control Dampers Installation Instructions."

BRACING OF MULTIPLE SECTION DAMPER ASSEMBLIES

The CD50 is intended to be self supporting only in its largest single section size. Multiple section damper assemblies may require bracing to support the weight of the assembly and to hold against the system pressure. Ruskin recommends appropriate bracing to support the damper horizontally at least once for every 8' of damper width and bracing of vertical assemblies and higher system pressures may require more bracing.

The CD50 is designed for installation with blades running horizontally. Installation with blades running vertically is not recommended. Contact Ruskin for vertical blade installations.

CD50 SOUND RATINGS

Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125	*
	6750	43	5063	37	3375	40	1688	15
24 x 24	4000	11	3000	10	2000	26	1000	*
	8000	32	6000	30	4000	38	2000	21
	12000	43	9000	42	6000	46	3000	31

NC = Noise criteria in Decibels is based on 10db room effect and 10db of room attenuation.

* = Less than 10 NC

See ASHRAE Handbook (1977 Fundamentals, Chapter 7) for explanation of NC Ratings.

RUSKIN®

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Kansas City, MO 64030
(816) 761-7476
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www.ruskin.com

12/01/2010



Mech.92
Job: CCAC - K. Leroy Irvis Science & Tech Ctr
EQ Number: 15044
Date: Nov 29, 2010
Rev.: 1

Blender Schedule

Unit No.	Qty.	Manufacturer	Model	Height	Width
AHU-2	1	Blender Products	AB60	60	10.75

Patrych, Mark

From: Mark Patrych [noreply@blenderproducts.com]
Sent: Monday, November 01, 2010 12:43 PM
To: Patrych, Mark
Subject: Blender Products Selection Software Form 11/01/10 12:42:45

The following Selection Software Calculation was requested: 11/01/10 12:42:45

By: Mark Patrych

Company: Trane

Phone/Fax: 479-648-7469 / 479-648-7498

Project:	CCAK. Leroy Irvis Science & Tech Ctr
Engineering Firm:	Civil & Evironmetal Consultants, Inc.
Project City & State:	Pittsburgh PA
Air Flow (ACFM):	23500
Plenum Width Wp (inside):	101
Plenum Height Hp (inside):	95
Max Number of Mixers:	2
Mixer to Plenum Area Ratio:	0.35
Air Density:	0.075

STATIC MIXER			AIR FLOW		PLENUM		MIXER at MAX	MIXER Ft2 AREA	PD in W.G.	MIXING DISTANCE		
QTY	MODEL		MAX cfm	MIN cfm	Wp in.	Hp in.				Dus in.	Dds in.	Total in.
	ABS/F	SIZE										
1	AB	60	23500	8280	101	95	1135	20.70	0.21	12	48	60
2	AB	44	23500	8900	101	95	1056	22.26	0.18	15	35	50

Downstream distance detailed above is an estimate. To determine the required downstream distance for a specific application, please contact us.

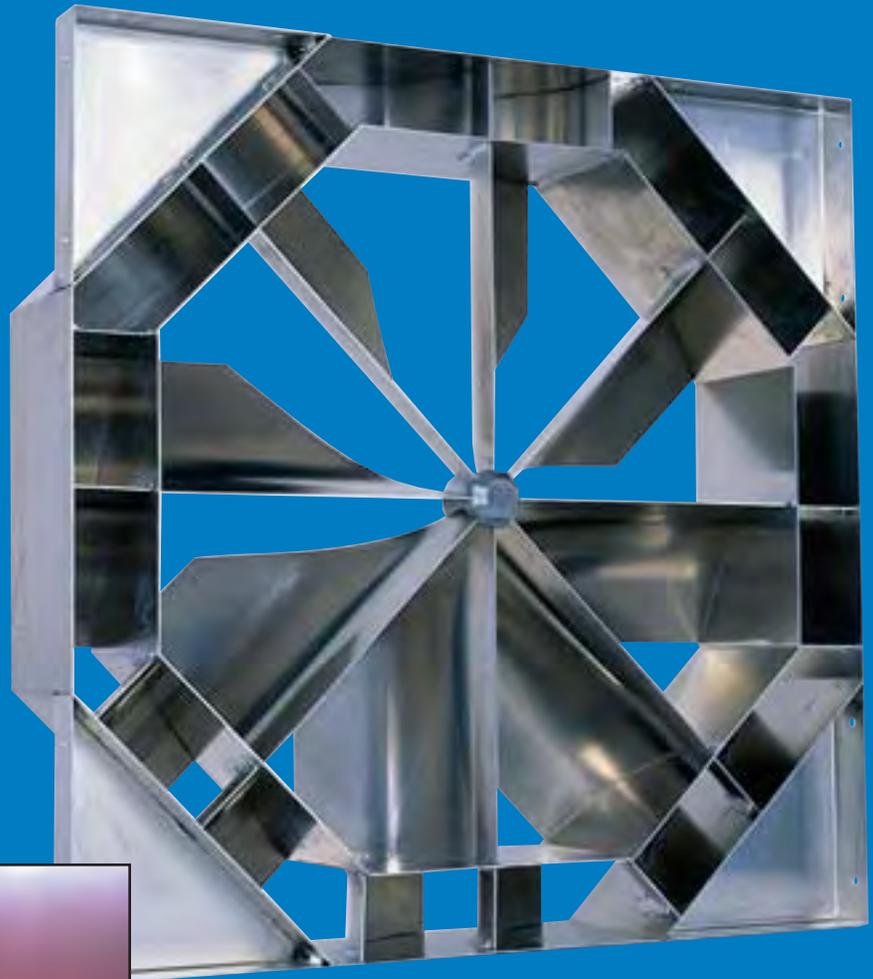
***** END OF REQUEST *****

SERIES IV AIR BLENDER®

Static Air Mixer Designed to Mix Stratified Air Streams

BENEFITS:

- Mix to Even Temperature and Consistency
- Improve Freeze Coil Protection
- Reduce sensor error
- Improve Outside Air Dilution
- Meet IAQ Requirements

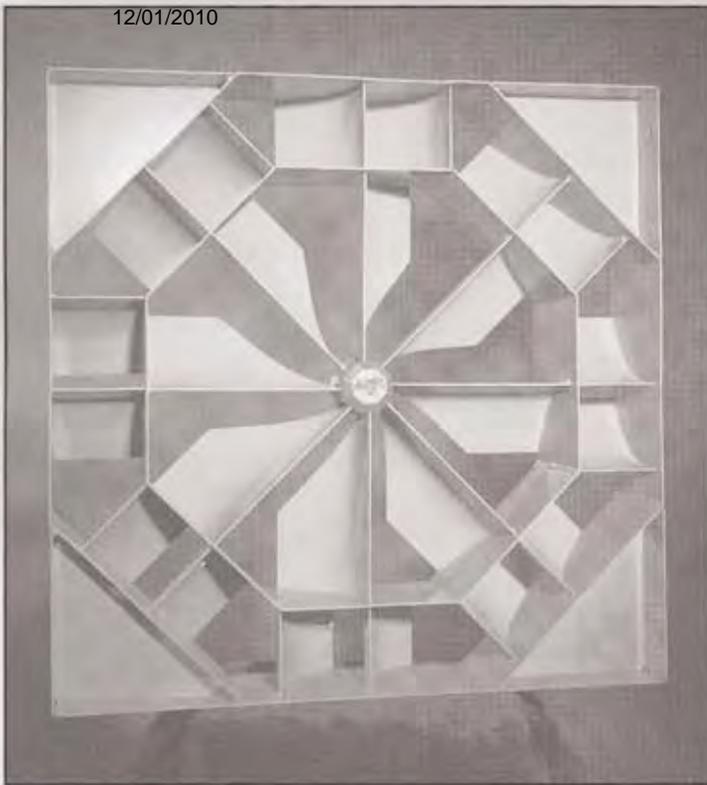


Blender Products, Inc.

Engineered Air Mixing Systems and Equipment

5010 Cook Street • Denver, Colorado 80216
Phone: 303.295.6111 • Fax: 303.296.1520
Toll-free: 800-523-5705
E-mail: INFO@airblender.com
Internet: www.airblender.com

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S-IV 11/01



SERIES IV

N

OW IN RESPONSE to the need for greater mixing and with the increased interest in good mixing for indoor air quality Blender Products announces the *Series IV AIR BLENDER*® static mixing device. The *Series IV* static mixing device is designed to meet the needs of today's HVAC mixing systems.

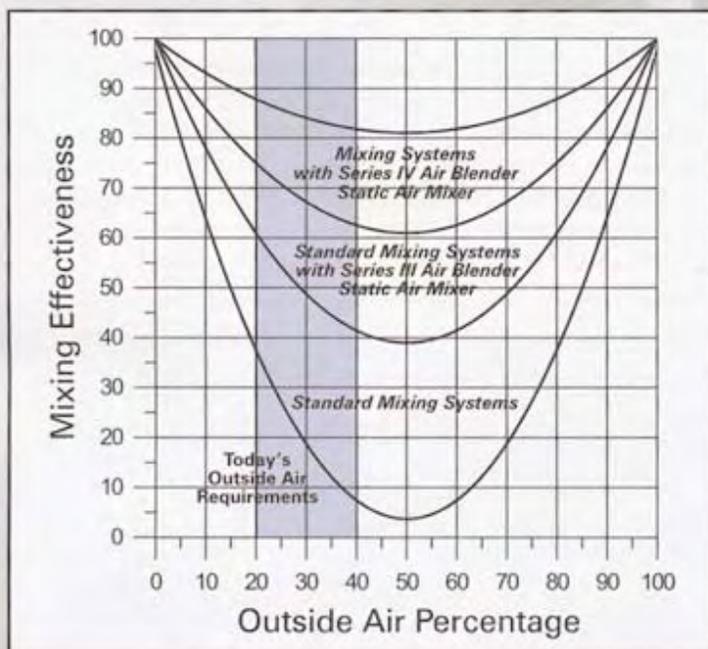
The *Series IV* has been redesigned to incorporate geometric, dynamic, and kinematic scaling, the same factors which govern the design of fans. By using proper scaling a designer can be assured that the performance of a smaller mixer is consistent with the full range of mixer sizes. No other static mixer manufactured in the HVAC industry can say this today.

The new model is also symmetrical in shape to provide the same performance for either orientation and to facilitate layout and installation. A new center was designed to provide greater strength and three methods of mounting the mixers are available.

However, the greatest features of the *Series IV* are not in the new design but in the application and performance characteristics.

A new selection procedure ensures that the mixer selected is the right unit for the job by accurately predicting the mixing effectiveness and pressure drop. Furthermore, when using the *Mixing Effectiveness Design Guide* the required mixing effectiveness can be determined to eliminate nuisance freeze stat trips, prevent possible frozen coils, reduce sensor error, and to enhance the mixing of outdoor air with the supply air stream to help meet IAQ requirements.

The performance of the new improved AIR BLENDER® Static mixing device provides by about 25% better mixing in most applications. This new level of performance allows more flexibility to reduce the mixing distance required downstream or to provide greater mixing at the same distance as before.



THE NEED FOR MIXING

Stratification in an air handling unit is the result of the momentum inherent in a stream of moving air. This stratification is apparent when two air streams of different temperatures are introduced into the same duct or plenum and the temperature across the duct or plenum varies. This situation occurs many times in the typical HVAC air handling system. The common places where this occurs is in the air handling unit mixing box and after face and bypass coil units.

TEMPERATURE CONCERNS

During the winter months, stratification results in a variety of problems. The most widely recognized problems are frozen coils and low temperature limit controller (freezestat) trips. In many cases, air handling units are unable to operate when the outside air temperature falls below 25°–30° F. Unfortunately, the solution to this problem has often been to close outside air dampers. Other problems associated with winter stratification are poor mixed air temperature control, and excessive energy use due to heating and cooling the mixed air.

Stratification has traditionally been thought to be limited to winter time, but it does exist during summer months as well, although the effects are different. During the winter months, stratification can result in damage to the system (frozen coils), inability to operate (nuisance Freezestat trips), and inefficient system operation (control sensor error). During the summer months, the effects of stratification are usually poor mixed air temperature control and increased energy usage.

INDOOR AIR QUALITY CONCERNS

The importance of stratification has also increased as a result of the new concerns over Indoor Air Quality. IAQ standards such as ASHRAE Standard 62 require more outside air than previously required in systems. As the amount of outside air is increased, the amount of mixing which must take place between the two air streams increases. In systems with inadequate mixing, systems may be unable to operate during the winter months due to freezestat trips. In other systems, the control systems may be unable to properly control the amount of outside air or the cooling or heating required to maintain comfort in the building.

Perhaps the biggest effect stratification has upon the system is the resulting uncertainty of how well the outside air

is distributed throughout the building. Without good mixing of the recirculated and outside air, it is difficult to ensure that all areas of a building are receiving the correct amount of outside air and it may be necessary to bring in additional outside air to meet the required minimum ventilation rates dictated by ASHRAE 62-89.

MASKING THE PROBLEMS VERSUS TREATING THE CAUSE

Many solutions have been proposed for the stratification found in HVAC systems. For winter stratification, many people decide to use some type of antifreeze solution to prevent frozen coils. While this solution does prevent frozen coils, it does not address the question of control inaccuracy, coil efficiency, or outside air distribution throughout the return air stream. Other people have used very small dampers and high velocity jets to mix the air streams. This solution may provide mixing, but there is no way to predict how much mixing will be achieved and the small dampers may not provide the correct control for the system or may increase the pressure drop of the mixing box to unacceptable levels. Other people suggest the use of baffles to help mix. This method may provide mixing, but there is no way to know how much mixing will be achieved or the pressure requirements of the arrangement. In addition, the rapid changes in velocity will result in uneven velocity profiles and will affect the performance of any components located downstream of the baffle plates. Recently, heat recovery has been proposed as a solution to stratification. Like the other methods, this solution can help prevent frozen coils, but it does not address such issues as outside air distribution. The chart below summarizes the various approaches to solving stratification problems and their affect on several different aspects of stratification.

The SERIES IV AIR BLENDER® static air mixer and its related mixing systems address all of the areas affected by stratification and mixing. The mixing provided by the static mixer helps eliminate the freeze potential and control inaccuracies created by stratification and will help insure that the outside air is thoroughly distributed throughout the supply air stream. When installed correctly, the velocity profile downstream of the mixer will have a minimal effect upon the components located downstream of the mixer, and the pressure drop will be a known, predictable amount. Best of all, the AIR BLENDER® static mixer can be included in the original equipment design, eliminating costly modifications and complaints after system startup.

METHOD	FREEZE PROTECTION	SENSOR ERROR AND CONTROL ACCURACY	VELOCITY PROFILE	PRESSURE DROP	MIXING EFFECTIVENESS	DAMPER CONTROL
Glycol	Known	No Effect	No Effect	No Effect	No Effect	No Effect
Baffles	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Dampers	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Heat Recovery	Known	Known	No Effect	Known	No Effect	No Effect
Averaging Bulb T-Stat	No Effect	Known	No Effect	No Effect	No Effect	Unknown
Series IV	Known	Known	Known	Known	Known	No Effect

12/01/2010



Mech.97
Job: CCAC - K. Leroy Irvis Science & Tech Ctr
EQ Number: 15044
Date: Nov 29, 2010
Rev.: 1

U-V Lights

AHU-1 & AHU-2

Ultraviolet Disinfection

For HVAC Mold, Bacteria & Odor Control

Performance Specification

Independent Testing – For complete safety, UVGI fixtures shall have been tested, Listed and labeled as UL/C-UL under Category Code ABQK (Accessories, Air Duct Mounted), UL Standards: 153, 1598 & 1995 respectively, no exceptions.

Irradiation - Lamps and fixtures are to be installed in sufficient quantity and in such a manner so as to provide an equal distribution of UVC energy. When installed, the UVC energy produced shall be of the lowest possible reflected and shadowed losses. Note: the applied energy and its distribution shall be verified using third party algorithms and that verification shall be included with the submittal.

Intensity - The minimal UVC energy striking a surface shall be sufficient to continuously destroy a monolayer of mold and bacteria as typically found in HVAC systems in less than six hours. The third party mathematical modeling shall include the destruction time for at least four of the most common HVAC molds.

Lamps - Each lamp shall contain no more than 8 milligrams of mercury consistent with current environmental practices while producing the specified output at 500 fpm in temperatures of 55-135° F. Useful lamp life shall be 9000 hours with no more than a 20% output loss at the end of one year of continuous use. They shall be constructed with UVC proof metal bases and shall not produce ozone.

Fixtures – Fixtures shall be mounted in horizontal rows consisting of a single factory supplied track to provide proper fixture support requirements. Fixtures shall be equipped with UL approved fixture-to-fixture mechanical and electrical connections that facilitate proper installation and coupling to A/C power from one end. Fixtures shall meet the “UL” drip proof design and be constructed of 304 stainless steel. Each fixture shall be equipped with an electrical interlock, which will not allow the fixture to energize unless it’s properly installed to its factory supplied track as shown on the plans. Fixtures shall be capable of being mounted anywhere in the system and/or as shown on the plans. When used for surface irradiation, the fixture assembly shall be designed and installed such that the sum of the lamp arc lengths in a row shall be equal to a minimum of 90% of the surfaces width.

Installation – Fixture rows shall be electrically terminated to factory supplied Hard Wire Boxes to meet UL, NEC and local codes. Fixtures shall be mounted to irradiate the intended surface(s) as well as all of the available line of sight airstream by proper placement and incident angle reflection. Proper fixture placement shall be consistent with the third party Irradiation and Intensity calculations provided in the submittal if such placement is absent on the plans.

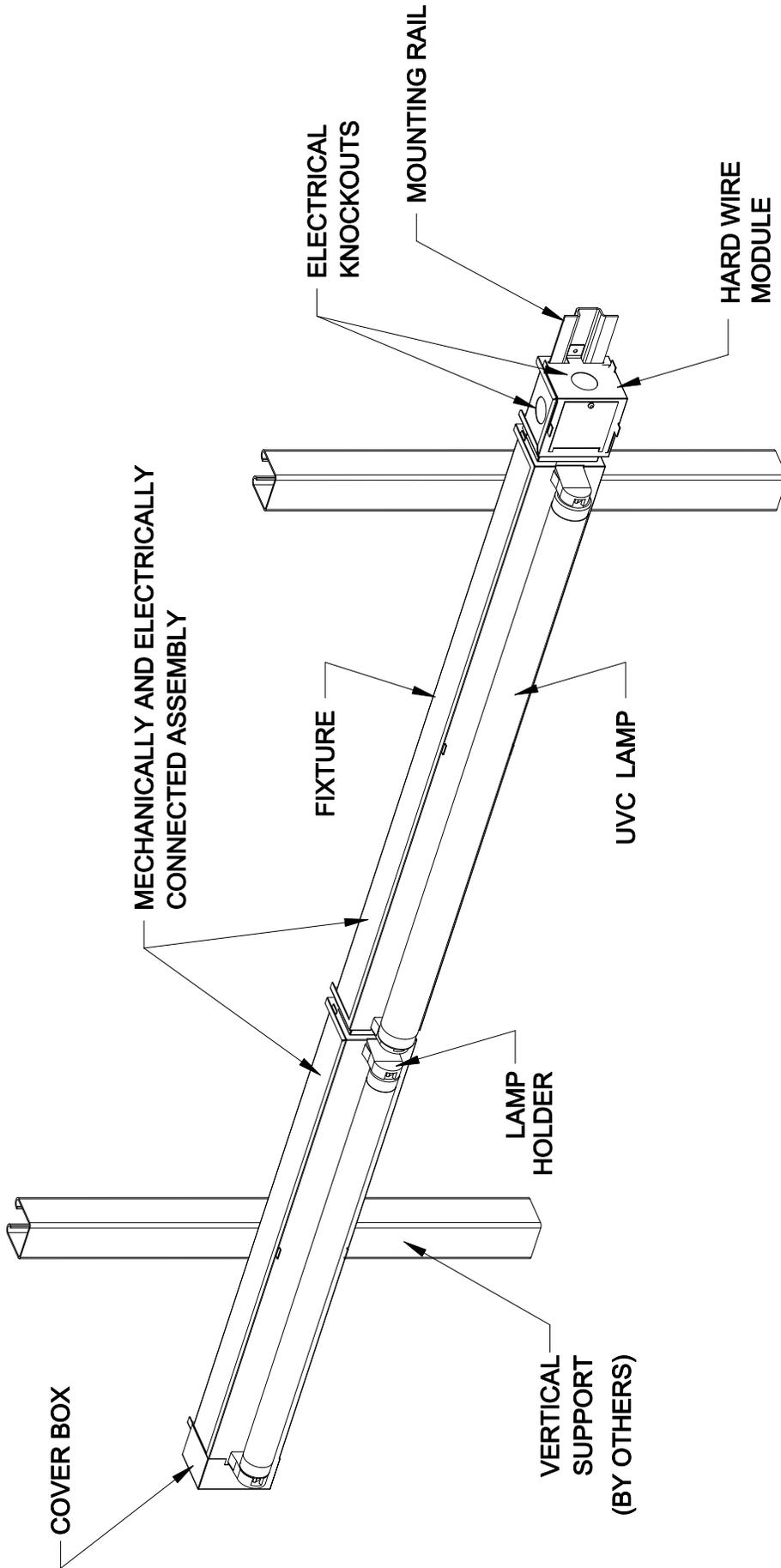
Safety - All access panels and doors to the UVC assembly and/or within view of the fixtures must include mechanical interlock switches to assure that the UVC assembly will be de-energized when any of these accesses are opened.

Energy Efficiency - Power supplies shall be of the high efficiency electronic type, matched to the lamp and designed to maximize UVC photon production, radiance and reliability. They shall be UL Listed and labeled for use in air-streams of 55-135° F. They shall be capable of producing the specified output and organism destruction as specified under Irradiation and Intensity at no more than 13Watts of power consumption for each square foot of treated, cross sectional plane.

Portal – (Optional) Each UVGI lamp system access shall be equipped with a glass portal to facilitate the viewing of the lamp assembly without the possibility of exceeding the Minimal Erythral Dose.

REV	ECO. NO.	DESCRIPTION	BY	DATE
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12/01/2010



DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DECIMALS ANGLES ±1/32 .XX ±.03 ±1° .XXX ±.015		TITLE V-MOD TRACK MOUNT INSTALLATION	
DRAWN	PROVOST	DATE	11-19-02
CHK		DATE	
ENR		DATE	
SCALE: N/A		SHEET	1 OF 3
SIZE		C	
REV		V-MOD ASSEMBLY 00	

ALTRU...V
UltraViolet Devices, Inc.
 Valencia, California, U.S.A.

This drawing contains proprietary information of UltraViolet Devices, Inc. By accepting this drawing the recipient agrees that this drawing will not be used, reproduced, or otherwise disseminated without the express written permission of UltraViolet Devices, Inc. It is understood that no right is conveyed to reproduce or to have reproduced any item herein disclosed without express permission from UltraViolet Devices, Inc.

Application:

The **V-Mod**'s flexible design allows for ease of installation in almost any system, large or small. **V-Mod** fixtures plug one into the other in series, in any orientation, which eliminates individual wiring to each fixture. The nominal lengths (18", 24" & 36") can accommodate almost any installation. The V-Mod functions as either a "side access" featuring system or in a traditional "built-up bank" arrangement. This is made possible through the use of an exclusive stainless steel channel "mounting rail" and fixture design. The combination becomes an optional sliding mechanism when needed. The V-Mod may be installed to irradiate coils and drain pans where they degrade organic and microbial build-up to save significant energy and maintenance costs. They are also used in return and supply ducts, mixed air plenums, to irradiate filters, and in exhaust systems. Once installed, the fixture position can be permanently fixed or left to slide out of the plenum through an access panel. The V-Mod comes with a UL/C-UL Listed hardwire module of NEC conformity and a mounting rail.

Specifications

Electrical Rating

Note: Minimum 15 Amp circuit recommended for up to 15 modules.

Power Rating: 120VAC, 60Hz.

18" Unit (Part #17-1001)

Lamp: 25W Germicidal UV (Part #09-6005)

Input Power: .5 Amp

24" Unit (Part #17-1011)

Lamp: 20W Germicidal UV (Part #07-1005)

Input Power: .5 Amp

36" Unit (Part #17-1021)

Lamp: 30W Germicidal UV (Part #D07-3601-64)

Input Power: 0.7 Amp

Note:

Please refer to Page 7 for actual unit dimensions, it is important to verify that features installed will fit properly within the duct walls. Consult your Distributor or Representative for proper sizing of systems.

Temperature Ratings:

Ambient Temperature Range: 55° F to 135° F

Relative Humidity:

Up to 95% RH, non condensing

Dimensions: (Refer to drawing on last page of manual)

Approvals:

Underwriters Laboratories: File no.E212213, Vol. 1, Sec. 3.

The health aspects associated with the use of this product and its ability to aid in disinfection of environmental air have not been investigated by UL.



Installation

When installing this product...

1. Verify that the proper fixtures are available.
2. Read the instructions carefully. Failure to follow them could cause damage to the product or create a hazardous condition.
3. Check the rating given in the instructions and on the product to make sure the product is suitable for you application.
4. Installer should be a trained and an experienced technician.
5. After installation is complete, check product operation as provided in the instructions.
6. If HVAC system has been in use prior to installation, cleaning of debris and build-up on coils and HVAC
7. system surfaces is recommended.

Warning

The electrical supply circuit connected to this UV appliance must be routed through an electrical interlock switch placed on the HVAC system duct access panels and doors to prevent accidental UV exposure when servicing the air ducts or equipment.

Caution

Personal Injury Hazard

Power supply can cause electrical shock.

Disconnect power supply before beginning installation. Do not open modular units; there are no user serviceable components inside.

Warning

UV Light Hazard.

Harmful to skin and eyes.

Can cause temporary or permanent loss of vision.

Never look at the lamps while illuminated.

Only view illumination by way of inspection view ports if the accessory is installed.

To prevent exposure to ultraviolet light, be sure the ultraviolet air treatment system is disconnected before servicing any part of the HVAC system or removing any access panel.

Caution

Equipment Damage Hazard.

Ultraviolet light can cause color shift or surface degradation and sometimes structural degradation of non-metallic components. Select mounting location that prevents exposure to plastic flexible duct components, polyurethane foam insulation material, rubber hoses, wire insulation, etc. If mounting options are limited, items above should be protected with ultraviolet resistant material such as aluminum foil, aluminum duct tape or metallic shields.

Mounting Rail Installation

The individual modules are designed to function when installed on the mounting rail, **Part #17-4022**. Modules will not operate as designed unless properly installed on mounting rail.

1. It is important that lamp fixtures closely match the coil width to provide maximum effectiveness covering the full width of the coil fins provided the best protection.
2. Be sure the proper fixtures are available. Be sure the total width of the fixtures and Hard Wire Module will fit within the duct or enclosure width (Consult your distributor for proper sizing).
3. Determine length and number of rails required.
4. Rails are to be mounted in a horizontal orientation.
5. At least two vertical supports are required and each end of the rail can overhang by no more than 20", **Figure 1**.
6. Supports structure should be fabricated from corrosion resistant materials galvanized, stainless or painted steel and aluminum.
7. A sheet metal screw or other fastener should be installed at the far end of the rail to serve as the stop, **Figure 2**.

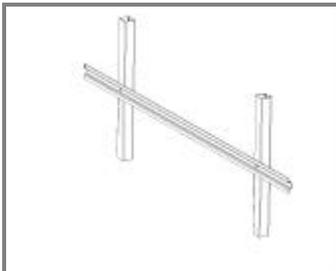


Figure 1

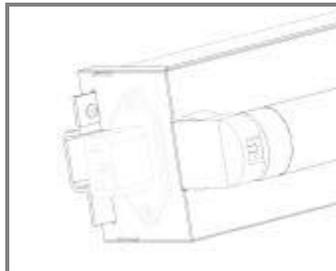


Figure 2

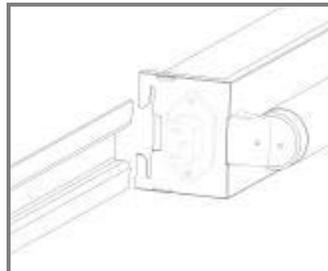


Figure 3

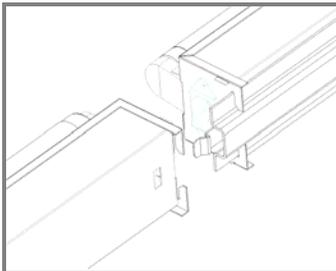


Figure 4

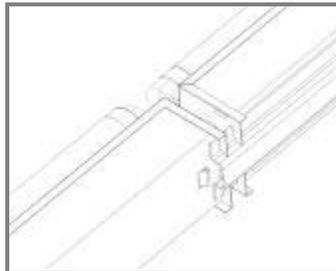


Figure 5

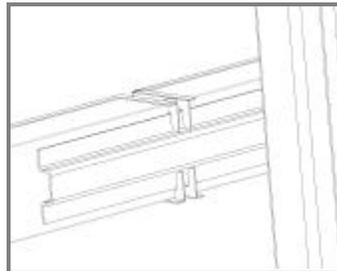


Figure 6

Module Installation

1. Align first module with rail and slide module onto rail, with the "plug" end of the module pointed toward the far end of the rail, **Figure 3**.
2. Install the second and subsequent modules in the same manner, ensuring that the module plugs insert and connect with the module sockets, and the locking tang is protruding through the latch opening, **Figures 4, 5, 6**.
3. Connection can be tested by pulling on the nearest module and verifying that all the modules move together.

Hard Wire Module Installation

⚠ Warning

The electrical supply circuit connected to this UV appliance must be routed through electrical interlocks placed on the HVAC system duct access panels and doors to prevent accidental UV exposure when accessing the air ducts. Any access that allows direct viewing of lit lamps must be interlocked.

Note: It is recommended that power be supplied to modules continuously to provide maximum germicidal and fungicidal effects. Continuous operation also promotes prolonged lamp life.

1. Each module/rail assembly requires termination with a Hard Wire Module (**Part #17-4018**). The Hard Wire Module is used to connect facility power to the module assembly.
2. The Hard Wire Module was designed for hardware connection to 120V/60Hz circuit and will accept standard conduit fittings.
3. Electrical installation should be conducted by professional support personnel and in accordance with NEC regulations, and local building codes.
4. The Hard Wire Module is installed on the rail in the same manner as each individual module, **Figures 7, 8**.
5. With the Hard Wire Module connected to the final module, use a self-drilling sheet metal screw through the tab on the box, into the rail, securing the Hard Wire Module to the rail.
6. Depending on orientation, one of three punch outs in the Hard Wire Module can be removed and a conduit connector attached.
7. Remove the Hard Wire Module cover to provide access and wire unit to facility power.
8. A Caution/Safety warning label is provided with each lamp fixture. It must be affixed to any access panel or door to warn personnel that UV equipment is installed.

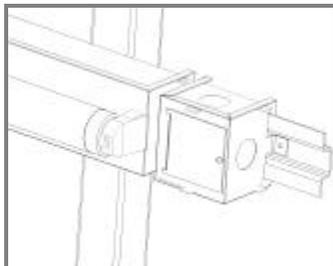


Figure 7

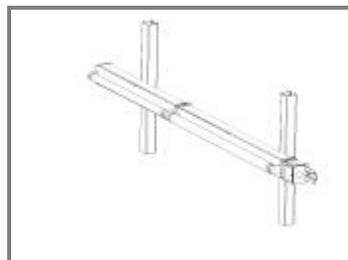


Figure 8

View Port Installation (Optional)

It is recommended that a view port be installed to allow inspection and verification that all lamps are operating. A UV safe port is available as an accessory and can be readily installed in duct or enclosure wall. Refer to installation instructions packed with the view port. It is important that lamp fixtures closely match the coil width to provide maximum effectiveness covering the full width of the coil fins provided the best protection.

Safety Switch

A UV fixture interlocking safety switch must be installed on all access panels and doors within sight of the UV fixtures to prevent accidental exposure to UV. A 120/240V safety switch is available as an accessory and can be readily installed during installation. Refer to installation instructions packed with the safety switch.

**WARNING****UVC Light Hazard****Harmful to skin and eyes.**

Can cause temporary or permanent loss of vision.

Never look at the lamps while illuminated.

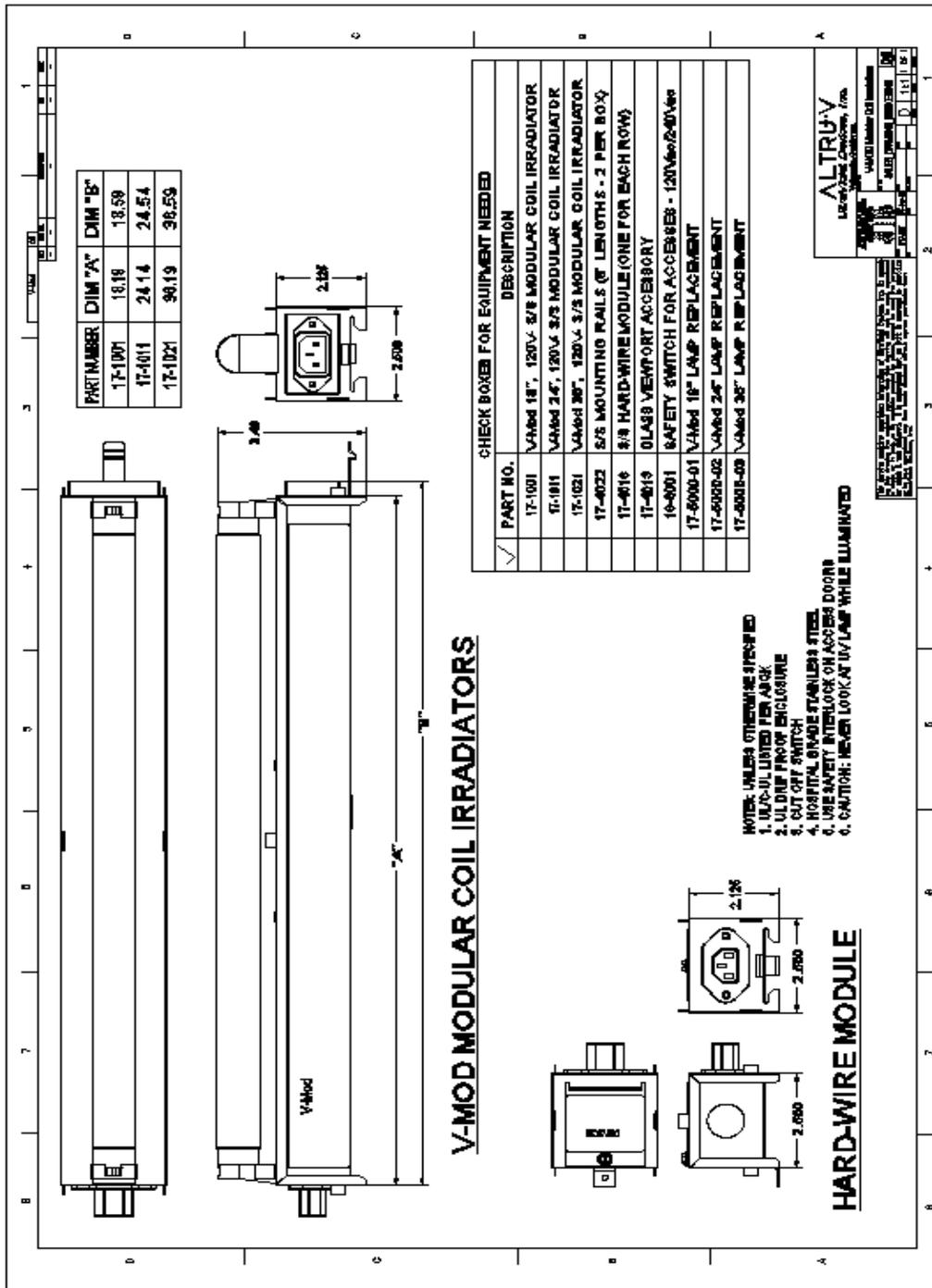
Only view illumination by way of inspection view ports if this accessory is installed. To prevent exposure to ultraviolet disconnect power to the system before servicing any part of the HVAC system.

Lamp Replacement

NOTE: While UV lamp continue to illuminate past the recommended time period for replacement, UV intensity decreases over time.

1. Before handling lamps, allow them to cool off for at least 5 minutes after turning power off.
2. Wearing soft gloves and using two hands, grasp body of lamp firmly at each end.
3. Rotate lamp 90 degrees in either direction.
4. Move lamp away from module to clear the lamp holders.
5. Reverse process to install replacement lamp.
6. Wipe down lamp with clean cloth and alcohol. Avoid touching lamp as fingerprints cause glass soiling and can degrade the lamp performance.

Accessories	
17-4022	Mounting Rail Accessory
17-4018	Junction Box Accessory
17-4013	Glass View Assembly
18-6001	Safety Switch for Accesses – 120/240V
Table 1. Replacing Your Lamp(s).	
Module Part #	Replacement Part #
18” 17-1001	09-6005
24” 17-1011	07-1005
36” 17-1021	D07-3601-64



Equipment Warranty

UltraViolet Devices, Inc. (UVDI), warrants to original Buyer for one year from the date of original installation, or eighteen (18) months from date of shipment, whichever comes first, that its goods are free from defect in material and workmanship under normal use and service. **UVDI's** obligation under this warranty shall be limited to the repair or replacement of those goods which prove defective, provided that such products are installed, maintained, and operated for the purpose and in the manner intended and for which **UVDI** instructs or recommends. Neither **UVDI** nor its dealers shall be liable for any special or consequential damages directly or indirectly arising from the design, construction, installation, servicing, or operation of the goods. **THIS IS UVDI'S SOLE WARRANTY. NEITHER UVDI NOR ITS DEALERS MAKE ANY OTHER WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED UVDI'S AFFORESTATED OBLIGATIONS ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS WARRANTY.**

UVDI AND ITS DEALERS' LIABILITY UNDER THIS WARRANTY SHALL IN NO EVENT EXCEED THE COST OF THE GOODS SOLD UNDER THIS CONTRACT OF SALE. UVDI neither assumes, nor authorizes any person to assume for it, any obligation in connection with the goods. This warranty shall not apply to any goods (a) which have been subjected to misuse, tampering, negligence, or accidents; or (b) the serial numbers of which have been altered, defaced, or removed; or (c) which have been used in a manner contrary to **UVDI's** instructions or recommendations. Buyer shall not return to **UVDI** any allegedly defective goods without **UVDI's** prior written authorization. This warranty may not be assigned or transferred.



Manufactured by:



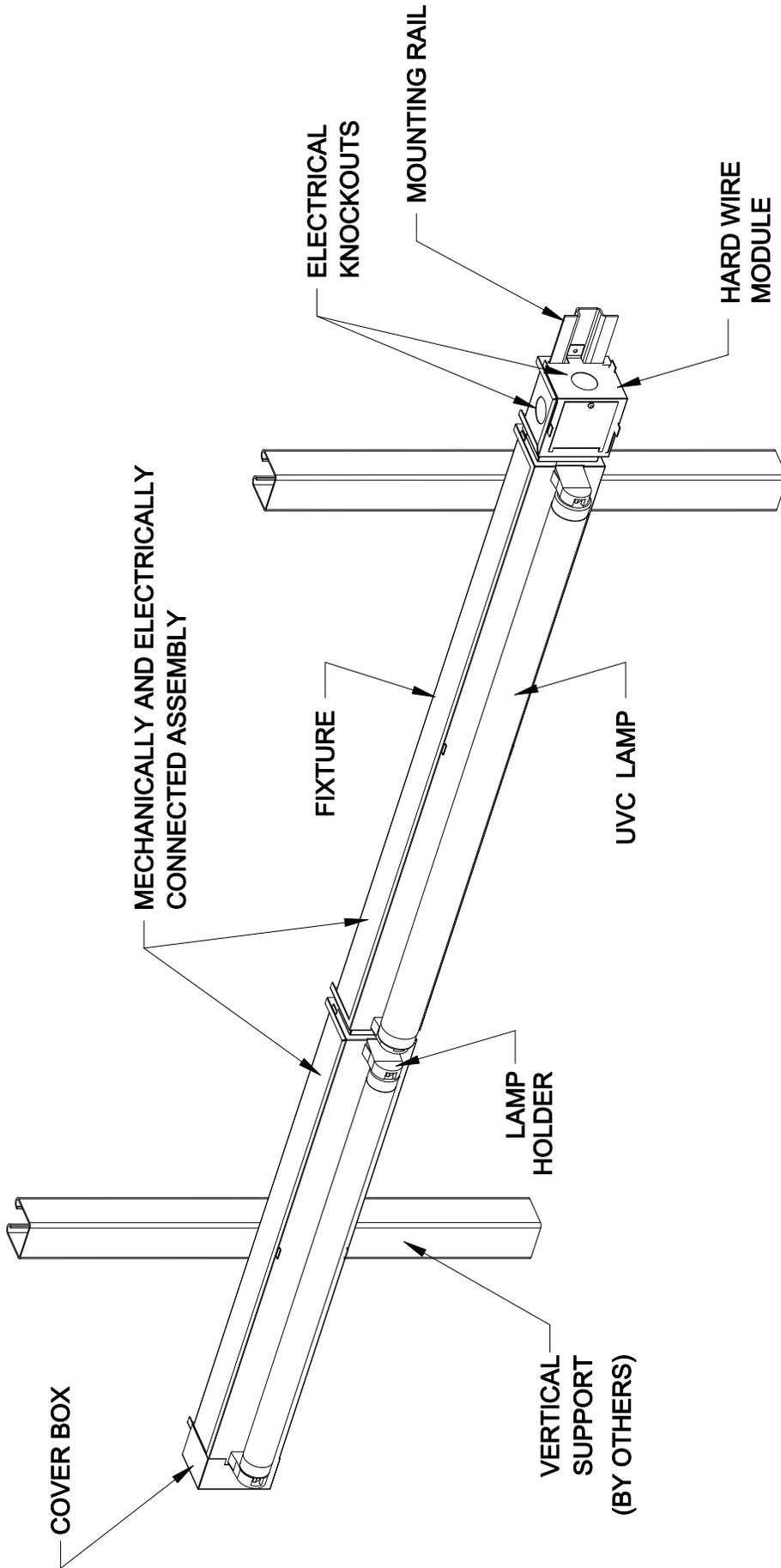
26145 Technology Drive
Valencia, CA 91355
(877) PUREUVC
(661) 257-4698 fax

www.uvdi.com & www.altruv.com

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REV	ECO. NO.	DESCRIPTION	BY	DATE
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12/01/2010



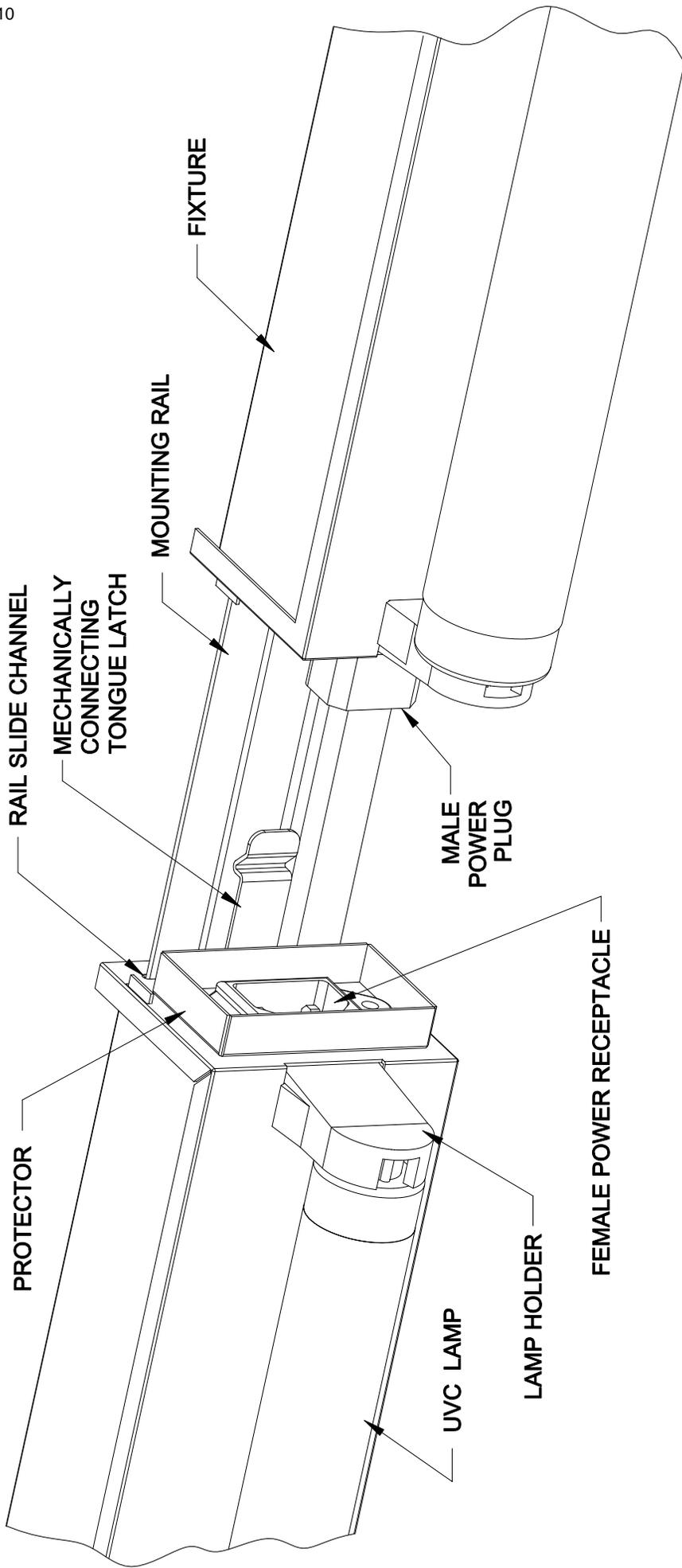
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DECIMALS ANGLES ±1/32 .XX ±.03 ±1° .XXX ±.015		TITLE V-MOD TRACK MOUNT INSTALLATION	
DRAWN	PROVOST	DATE	11-19-02
CHK		DATE	
ENR		DATE	
SCALE: N/A		SHEET	1 OF 3
SIZE		C	
REV		V-MOD ASSEMBLY 00	

ALTRU...V
UltraViolet Devices, Inc.
 Valencia, California

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REV	ECO NO.	DESCRIPTION	BY	DATE
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12/01/2010

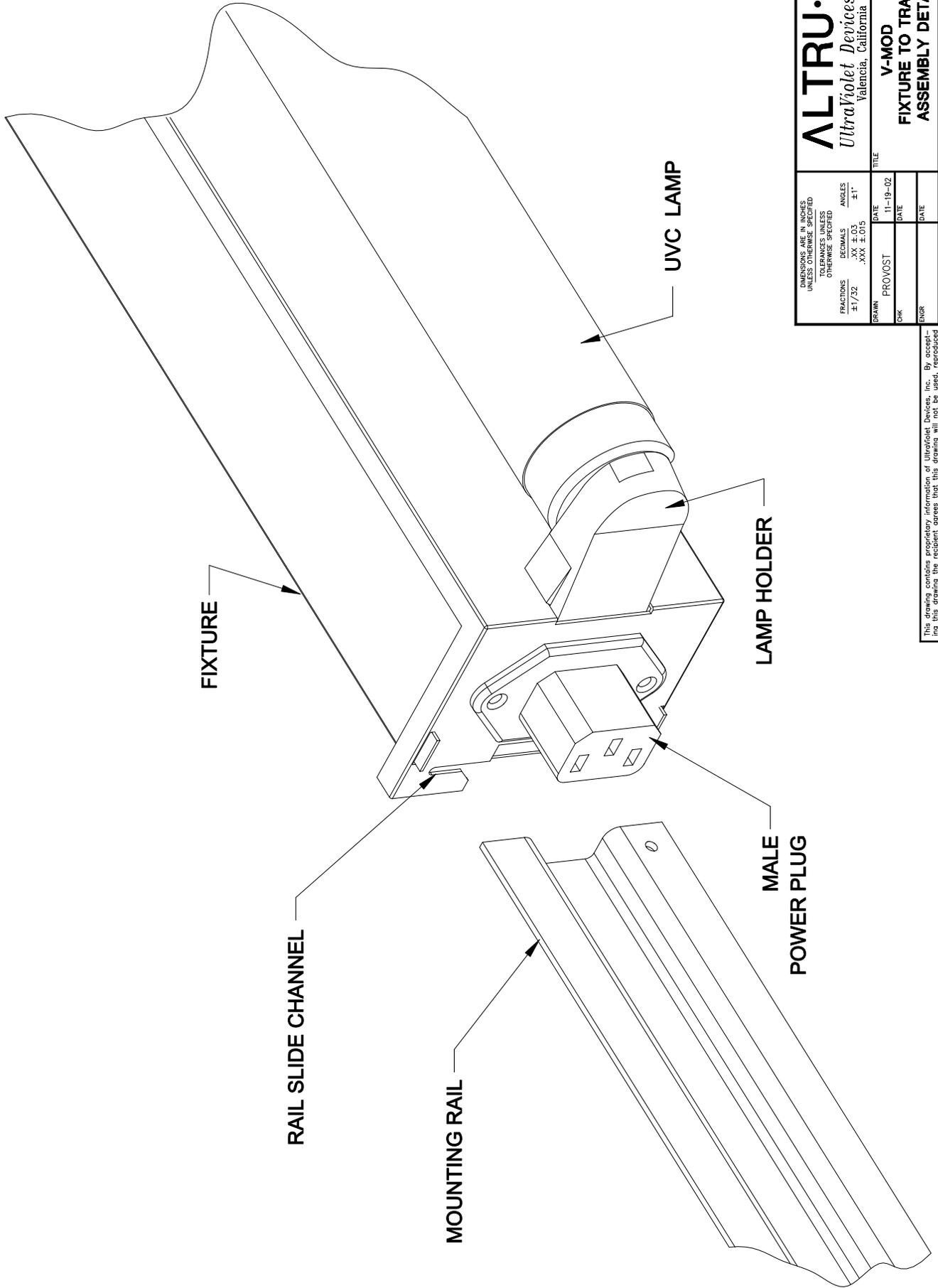


DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ±1/32 DECIMALS .XX ±.03 ANGLES ±1° .XXX ±.015		ALTRU...V <i>UltraViolet Devices, Inc.</i> Valencia, California	
DRAWN CHK ENR	PROVOST DATE 11-19-02 DATE DATE	TITLE V-MOD MECHANICAL & ELECTRICAL CONNECTION DETAIL	SHEET 3 OF 3
SCALE: N/A	SIZE C	DWG NO. V-MOD ASSEMBLY	REV 00

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REV ECO. NO. DESCRIPTION BY DATE

12/01/2010



ALTRU...V <i>UltraViolet Devices, Inc.</i> Valencia, California		Mech. 109	
DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ±1/32 DECIMALS .XX ±.03 ANGLES ±1° .XXX ±.015	DRAWN PROVOST	DATE 11-19-02	TITLE V-MOD FIXTURE TO TRACK ASSEMBLY DETAIL
SCALE: N/A	SHEET 2 OF 3	SIZE C	REV V-MOD ASSEMBLY 00

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Pre-Filter Schedule

Unit No.	Filter Type	NFPA Class	CFM	Face Velocity (FPM)	Filter Qty & Size	Fastener Type	Frame Type	Manufacturer	Filter Model	Gauge	Access	No. of Sets
AHU-1	Pleated Filters	U.L. Class 2	42500	425	(25) 24x24	VP-2	N/A	AAF	2" 30%	N/A	Upstream	2
AHU-2	Pleated Filters	U.L. Class 2	23500	490	(12) 24x24	VP-2	N/A	AAF	2" 30%	N/A	Upstream	2
ERU-1	Pleated Filters	U.L. Class 2	25250	526	(12) 24x24	C-70	Galv. Type8	AAF	2" 30%	Dwyer Magnehelic 2001	Upstream	2
ERU-2	Pleated Filters	U.L. Class 2	25250	526	(12) 24x24	C-70	Galv. Type8	AAF	2" 30%	Dwyer Magnehelic 2001	Upstream	2

Final Filter Schedule

Unit No.	Filter Type	NFPA Class	CFM	Face Velocity (FPM)	Filter Qty & Size	Fastener Type	Frame Type	Manufacturer	Filter Model	Gauge	Access	No. of Sets
AHU-1	Pleated Filters	U.L. Class 2	42500	425	(25) 24x24 (0) 24x12	C-80	Galv. Type8	AAF	12" 80-85%	Dwyer Magnehelic 2003	Upstream	2
AHU-2	Pleated Filters	U.L. Class 2	23500	490	(12) 24x24 (0) 24x12	C-80	Galv. Type8	AAF	12" 80-85%	Dwyer Magnehelic 2003	Upstream	2



AmericanAirFilter®

PerfectPleat® M8
PerfectPleat®

*1" and 2" Extended Surface,
Pleated Filter with
Process-Controlled Quality*

With DuraFlex® Media

AmericanAirFilter®

PerfectPleat® M8 -MERV 8 PerfectPleat® -MERV 7

Extended Surface, Pleated Filter with Process-Controlled Quality

- **Mechanical efficiency** — does not rely on electret charge technology
- **Form and fit unlike any other pleat available today**
- **Self-supporting DuraFlex® media made from virgin fiber; no wire support needed**
- **Consistent media with controlled fiber size and blend**
- **High capacity model, PerfectPleat M8, available for applications where higher efficiencies, airflow, and longer life are important**
- **Available in 1", 2" and 4" models**
- **Patented media, filter design, and manufacturing process. Patents covered under one or more of the following US 6398839 B2; US 6254653 B1; US 6159318; US 6165242; US 6387140 B1 (1" model only)**

The Air Filtration Leader

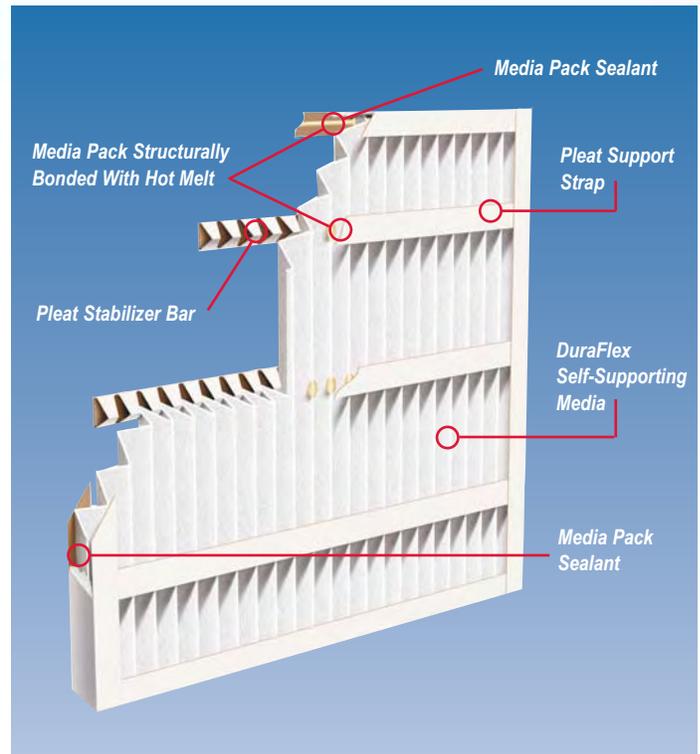
AAF International, one of the world's largest manufacturers of air filtration products, is known for technical innovation and excellence. Designed, developed, and patented by AAF, the PerfectPleat is a product with form and fit unlike any other pleated filter in the marketplace today. In addition, the PerfectPleat has the filtering efficiency you need and expect.

Superior Design and Construction

Drawing on years of experience in manufacturing quality air filters, AAF has created a state-of-the-art process for producing pleated filters. The extremely high quality of these filters is a result of three unique innovations: a new, automated manufacturing process; a unique, self-supporting media; and a filter construction that provides incredible strength without wire support.

Since their introduction, pleated filters have become a larger and more important segment of the filtration marketplace. However, conventional design and process are not conducive to the manufacture of consistently pleated media packs or finished filters. Inconsistency in pleat arrangement, variations in media, improper bonding of media to frame, along with antiquated manufacturing techniques, have a negative impact on efficiency, resistance, durability, and strength. The automated and controlled process AAF has developed for the PerfectPleat eliminates these inconsistencies and irregularities. Our automated manufacturing process offers consistency unmatched by conventionally manufactured pleats.

* See brochure AFP-1-206 for 4" model.



PerfectPleat 2" Construction

DuraFlex® Media - Patented Media Design

Uniform size virgin fibers are assembled in closely controlled blends to create a media that is both self-supporting and remarkably consistent in performance. When pleated, DuraFlex will hold its shape without the wire support characteristic of conventional pleated filters. That means no potential for the formation of rust and safer handling - no nicks or cuts for the installer or handler.

With the superior resiliency of DuraFlex media and no need for wire support, the PerfectPleat can sustain significant abuse and maintain its shape and pleat spacing. The absence of the wire also makes the filter totally incinerable, which simplifies disposal. The PerfectPleat meets or exceeds all current expectations for service life.



As a result of its unique design, PerfectPleat can withstand significant damage.



DuraFlex media has "memory" which allows PerfectPleat to remain functional, even when the frame has been compromised.

Increasing Efficiency — Throughout Life of the Filter

PerfectPleat is designed to consistently increase its efficiency throughout the service life of the filter. Competitive pleated panel filters, manufactured using an electret charge to obtain the MERV 8 rating, perform with declining efficiency over time. PerfectPleat M8 and PerfectPleat have initial MERV 8 and MERV 7 ratings respectively, but the efficiency increases significantly when dust loading begins.

Applications

PerfectPleat's self-supporting characteristics allow a pleating pattern that promotes airflow and maximizes dust holding capacity (DHC). The PerfectPleat M8 is ideal for applications where pleated filters are currently in use and higher efficiencies are required or desired. PerfectPleat is best suited for standard capacity pleated filter applications. Heavy Duty (HD) PerfectPleat is available for applications where extremely low temperature and high airflow are present. See Brochure AFP-1-201. Every PerfectPleat offers superior durability and performance when properly installed and maintained.



Environmentally Responsible Air Filtration Solutions

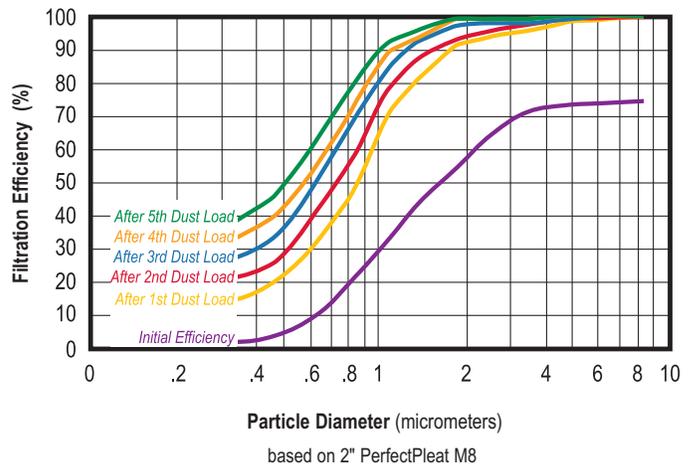
AAF International is committed to operating with a goal of sustainability. We have implemented several initiatives to work and manufacture in an environmentally responsible manner and contribute more to protecting our planet by using fewer natural resources and reducing our carbon footprint. AAF's PerfectPleat product design minimizes base raw material consumption and meets our "Green" product development standards. The PerfectPleat product line is totally incinerable and the absence of support wire simplifies disposal. Used during construction, PerfectPleat M8 may contribute to LEED® certification points under IEQ categories.

2" PerfectPleat — Heavy Duty Frame

The perimeter frame of the PerfectPleat M8 and PerfectPleat is constructed from the highest wet-strength 28 pt. beverage carrier board available, securely bonded to the media pack. The 28 pt. thickness improves filter strength and helps resist damage.

Uniquely designed pleat stabilizers are bonded to the media on the air leaving side to ensure uniform pleat spacing and provide additional strength. On the air-entering side, support straps add to the PerfectPleat's rigidity. The support straps and pleat stabilizers ensure integrity against turbulent airflow and provide excellent lateral stability for installation in side-access systems.

Particle Size Efficiency Curves



1" PerfectPleat — Strength and Durability

The 1" PerfectPleat M8 and PerfectPleat have the same durability and performance as the 2" models. Both are made using DuraFlex media encased in a 28 pt. beverage carrier board frame. PerfectPleat 1" models feature a perimeter frame, with three supporting straps on the air entering and air leaving sides of the filter. Both models resist crushing and abuse and can be used in any application where 1" filters are currently in place. PerfectPleat M8 is rated MERV 8 and PerfectPleat rates MERV 7.



PerfectPleat M8, 1" thick, air leaving side. A blue stripe designates PerfectPleat M8 media.

AmericanAirFilter®

PerfectPleat® M8 -MERV 8

PerfectPleat® -MERV 7

Product Information Standard Sizes

Nominal Sizes (Inches) (W x H x D)	Actual Sizes (Inches) (W x H x D)	Rated Airflow Capacity (SCFM)			Pleats Per Filter			
		300 FPM	500 FPM	625 FPM	PerfectPleat M8 1"	PerfectPleat 1"	PerfectPleat M8 2"	PerfectPleat 2"
10 x 10 x 1	9½ x 9½ x ¾	200	350		11	11		
10 x 20 x 1	9½ x 19½ x ¾	400	700		11	11		
12 x 12 x 1	11½ x 11½ x ¾	300	500		14	14		
12 x 20 x 1	11½ x 19½ x ¾	500	850		14	14		
12 x 24 x 1	11¾ x 23¾ x ¾	600	1000		14	14		
14 x 20 x 1	13½ x 19½ x ¾	600	1000		16	16		
14 x 25 x 1	13½ x 24½ x ¾	750	1200		16	16		
15 x 20 x 1	14½ x 19½ x ¾	650	1050		17	17		
16 x 16 x 1	15½ x 15½ x ¾	550	900		19	19		
16 x 20 x 1	15½ x 19½ x ¾	650	1100		19	19		
16 x 25 x 1	15½ x 24½ x ¾	850	1400		19	19		
18 x 20 x 1	17½ x 19½ x ¾	750	1250		21	21		
18 x 24 x 1	17¾ x 23¾ x ¾	900	1500		21	21		
18 x 25 x 1	17½ x 24½ x ¾	950	1550		21	21		
20 x 20 x 1	19½ x 19½ x ¾	850	1400		24	24		
20 x 25 x 1	19½ x 24½ x ¾	1050	1750		24	24		
24 x 24 x 1	23¾ x 23¾ x ¾	1200	2000		29	29		
25 x 25 x 1	24½ x 24½ x ¾	1300	2200		30	30		
10 x 20 x 2	9½ x 19½ x 1¾	400	700	850			11	8
12 x 20 x 2	11½ x 19½ x 1¾	500	850	1050			14	10
12 x 24 x 2	11¾ x 23¾ x 1¾	600	1000	1250			14	10
14 x 25 x 2	13½ x 24½ x 1¾	750	1200	1500			16	11
15 x 20 x 2	14½ x 19½ x 1¾	650	1050	1300			17	12
15 x 25 x 2	14½ x 24½ x 1¾	800	1300	1650			17	12
16 x 16 x 2	15½ x 15½ x 1¾	550	900	1100			19	13
16 x 20 x 2	15½ x 19½ x 1¾	650	1100	1400			19	13
16 x 24 x 2	15¾ x 23¾ x 1¾	800	1350	1650			19	13
16 x 25 x 2	15½ x 24½ x 1¾	850	1400	1750			19	13
18 x 25 x 2	17½ x 24½ x 1¾	950	1550	1950			21	15
18 x 24 x 2	17¾ x 23¾ x 1¾	900	1500	1900			21	15
20 x 20 x 2	19½ x 19½ x 1¾	850	1400	1750			24	17
20 x 24 x 2	19¾ x 23¾ x 1¾	1000	1650	2100			24	17
20 x 25 x 2	19½ x 24½ x 1¾	1050	1750	2150			24	17
24 x 24 x 2	23¾ x 23¾ x 1¾	1200	2000	2500			29	20
25 x 25 x 2	24½ x 24½ x 1¾	1300	2150	2700			30	21

PerfectPleat and PerfectPleat M8 filters are classified UL Class 2. Testing was performed according to UL Standard 900 and CAN 4-S111.

Performance Data

Filter	Pleats Per Lineal Foot	Rated Initial Resistance (in. w.g.)			Recommended Final Resistance (in. w.g.)	ASHRAE 52.2 MERV	Continuous Operating Temperature Limits	
		300 FPM	500 FPM	625 FPM			°F	°C
PerfectPleat M8 2"	15.0	.16	.33	.43	1.0	8	170°	77°
PerfectPleat 2"	10.0	.14	.30	.45	1.0	7	170°	77°
PerfectPleat M8 1"	15.0	.31	.62	----	1.0	8	170°	77°
PerfectPleat 1"	15.0	.20	.48	----	1.0	7	170°	77°



10300 Ormsby Park Place Suite 600
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www.aafintl.com
Customer Service 888.AAF.2003
Fax 888.223.6500



AAF has a policy of continuous product research and improvement and reserves the right to change design and specifications without notice.

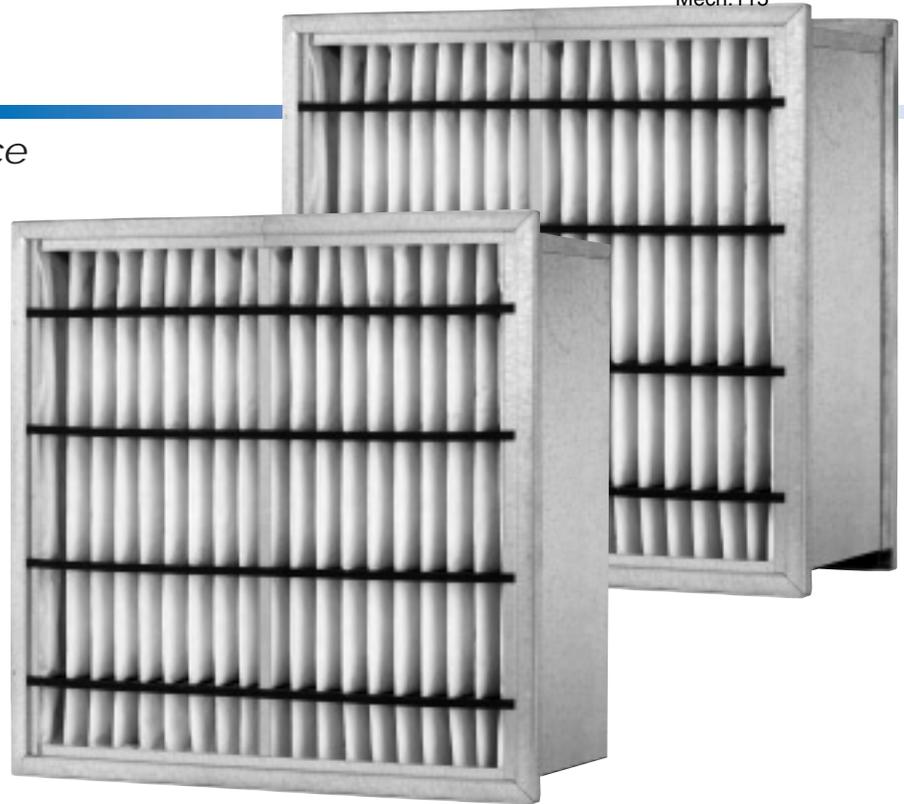
ISO Certified 9001:2000

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RigiFil® II

*Extended-Surface
Rigid Air Filter
with Synthetic
Media*



- **Redesigned for improved performance and durability**
- **Layered synthetic media with plastic pleat spacers on both sides**
- **Heavy-duty expanded metal media support grid**
- **Ideal for VAV systems**

EXCELLENT PERFORMANCE

Redesigned for improved strength and durability, the new RigiFil® II is ideal for Variable Air Volume (VAV) systems. It provides a high level of filtration efficiency in those applications where cleaner air is required. With metal cell sides and a layered synthetic media pack, the RigiFil II offers superior dust holding, moisture resistance, and overall performance. Color-coded media designates each efficiency: yellow (90-95%), pink (80-85%), green (60-65%), and white (45-50%). Both single and double-header models are available.

STURDY CONSTRUCTION AND DEPENDABILITY

The RigiFil II, with its galvanized steel cell sides and plastic pleat spacers on the air-entering and air-leaving sides, withstands the most demanding applications. The pleat spacers and expanded metal support grid maintain the shape of the synthetic media pack and ensure that both the efficiency and dust-holding capacity are maximized.

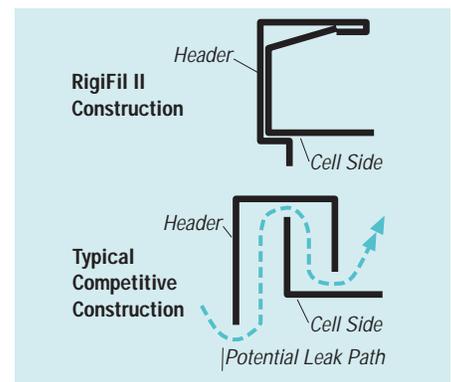
RigiFil II's rigid construction with supported pleat media pack maintains a compact unitized structure under variable air velocities and repeated fan shutdowns. The interlocked header and cell sides, along with entire length of each side, provide maximum sealing. Competitive filters are designed with loose fitting headers that allow greater potential for bypass leakage.

OPEN HEADER DESIGN

AAF's unique open-header design creates a built-in handle that makes carrying and installing RigiFil II easy. As an added safety measure, we roll the edges of the header to eliminate sharp edges that can make handling competitors' products hazardous.

LAYERED SYNTHETIC MEDIA PACK

The layered media used in the RigiFil II is a meltblown synthetic protected by a scrim on the air-leaving side. Layering the media provides both a high-efficiency final filter layer that effectively filters fine particulate and an integral lofted prefilter layer that captures larger particulate. Meltblown synthetic media is stronger than fiberglass, non-shedding, and is water-resistant.



SELECTION GUIDE AND PERFORMANCE DATA

All Metal - Class 2 Synthetic

Part Number	Description	Nominal Size (In.)	Actual Size (In.)	Airflow (CFM)	*Resistance (In. W.G.)		Media Area (Ft. Sq.)
					Initial	Final	
3011087-001	RigiFil II DH 90-95%	24x24x12	23.38x23.38x11.50	2000	.56	1.5	62
3011087-004	RigiFil II DH 90-95%	24x12x12	23.38x11.38x11.50	1000	.56	1.5	31
3011087-002	RigiFil II DH 90-95%	24x20x12	23.38x19.38x11.50	1660	.56	1.5	52
3011087-003	RigiFil II DH 90-95%	20x20x12	19.38x19.38x11.50	1400	.56	1.5	41
3011079-001	RigiFil II SH 90-95%	24x24x12	23.38x23.38x11.50	2000	.56	1.5	62
3011079-004	RigiFil II SH 90-95%	24x12x12	23.38x11.38x11.50	1000	.56	1.5	31
3011079-002	RigiFil II SH 90-95%	24x20x12	23.38x19.38x11.50	1660	.56	1.5	52
3011079-003	RigiFil II SH 90-95%	20x20x12	19.38x19.38x11.50	1400	.56	1.5	41
3011087-005	RigiFil II DH 80-85%	24x24x12	23.38x23.38x11.50	2000	.36	1.5	62
3011087-008	RigiFil II DH 80-85%	24x12x12	23.38x11.38x11.50	1000	.36	1.5	31
3011087-006	RigiFil II DH 80-85%	24x20x12	23.38x19.38x11.50	1660	.36	1.5	52
3011087-007	RigiFil II DH 80-85%	20x20x12	19.38x19.38x11.50	1400	.36	1.5	41
3011079-005	RigiFil II SH 80-85%	24x24x12	23.38x23.38x11.50	2000	.36	1.5	62
3011079-008	RigiFil II SH 80-85%	24x12x12	23.38x11.38x11.50	1000	.36	1.5	31
3011079-006	RigiFil II SH 80-85%	24x20x12	23.38x19.38x11.50	1660	.36	1.5	52
3011079-007	RigiFil II SH 80-85%	20x20x12	19.38x19.38x11.50	1400	.36	1.5	41
3011087-009	RigiFil II DH 60-65%	24x24x12	23.38x23.38x11.50	2000	.25	1.5	62
3011087-012	RigiFil II DH 60-65%	24x12x12	23.38x11.38x11.50	1000	.25	1.5	31
3011087-010	RigiFil II DH 60-65%	24x20x12	23.38x19.38x11.50	1660	.25	1.5	52
3011087-011	RigiFil II DH 60-65%	20x20x12	19.38x19.38x11.50	1400	.25	1.5	41
3011079-009	RigiFil II SH 60-65%	24x24x12	23.38x23.38x11.50	2000	.25	1.5	62
3011079-012	RigiFil II SH 60-65%	24x12x12	23.38x11.38x11.50	1000	.25	1.5	31
3011079-010	RigiFil II SH 60-65%	24x20x12	23.38x19.38x11.50	1660	.25	1.5	52
3011079-011	RigiFil II SH 60-65%	20x20x12	19.38x19.38x11.50	1400	.25	1.5	41
3011087-013	RigiFil II DH 45-50%	24x24x12	23.38x23.38x11.50	2000	.23	1.5	62
3011087-016	RigiFil II DH 45-50%	24x12x12	23.38x11.38x11.50	1000	.23	1.5	31
3011087-014	RigiFil II DH 45-50%	24x20x12	23.38x19.38x11.50	1660	.23	1.5	52
3011087-015	RigiFil II DH 45-50%	20x20x12	19.38x19.38x11.50	1400	.23	1.5	41
3011079-013	RigiFil II SH 45-50%	24x24x12	23.38x23.38x11.50	2000	.23	1.5	62
3011079-016	RigiFil II SH 45-50%	24x12x12	23.38x11.38x11.50	1000	.23	1.5	31
3011079-014	RigiFil II SH 45-50%	24x20x12	23.38x19.38x11.50	1660	.23	1.5	52
3011079-015	RigiFil II SH 45-50%	20x20x12	19.38x19.38x11.50	1400	.23	1.5	41

NOTES

All listed efficiencies are averages according to ASHRAE 52.1.
 All performance data is based on ASHRAE 52.1 test method. Performance tolerances conform to section 7.4 of ARI Standard 850-78.
 Rated UL and cUL Class 2.
 Temperature limitation is 200°F (93°C) continuous, and 220°F (107°C) intermittent.
 Actual depth of 12" filter is 11.50" (292mm).
 Headers are 13/16" (21mm).
 Width and height dimensions are interchangeable.

*Maximum recommended final resistance in system design may indicate a lower change-out point.

EFFICIENCY

90-95% (Yellow), 80-85% (Pink), 60-65% (Green), 45-50% (White)

AAF International has a policy of continuous product research and improvement, and reserves the right to change design and specifications without notice.

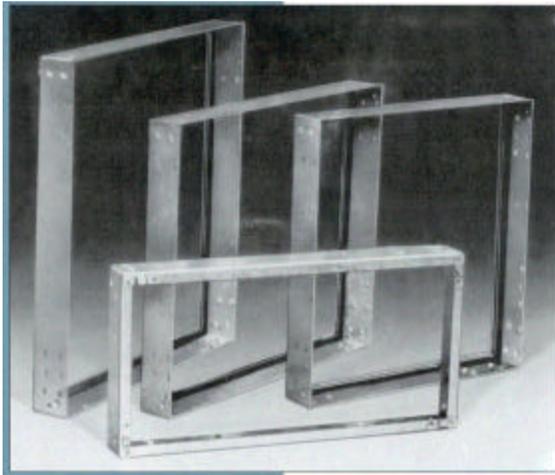
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 Call Customer Service
888.AAF.2003



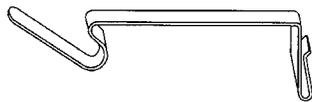
FILTER FRAMES and FASTENERS



Specifications:

Type 8 Universal Holding Frames

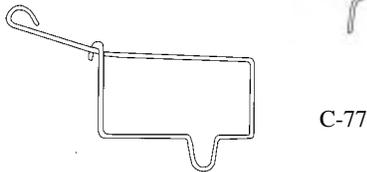
Universal holding frames shall be constructed of not less than 16-gauge galvanized steel. They shall be equipped with polyurethane foam gaskets, fasteners, and filter centering dimples. The four sealing flange corners shall be flush mitered and secured in order to form a uniform sealing and gasketing surface. The in line depth shall not be less than 2.69" in order to effect adequate bearing surface for built-up filter banks. Filter fasteners shall be capable of being installed without the requirements of tools, nuts, or bolts. The holding frames shall be universal in that they shall be designed to accommodate standard size filters. Frames shall be equal to Farr Type 8.



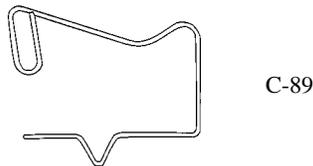
C-79 Series



C-80



C-77



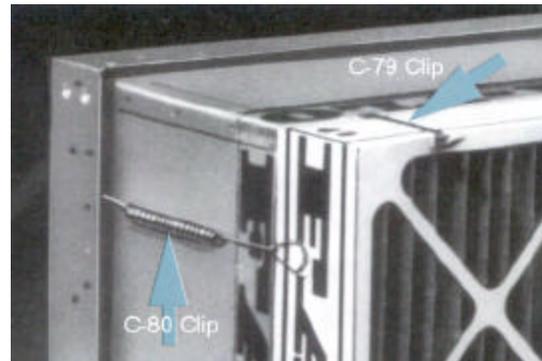
C-89



C-70

Fasteners:

2" Pre-filter -	C-70
4" Pre-filter	C-77
2" Pre-filter on 12" cartridge	VP-2
4" Pre-filter on 12" cartridge	VP-4
2" Pre-filter with bag filter	C-70
4" Pre-filter with bag filter	C-89
12" cartridge	C-80
6" cartridge	C-90



Pre-filter is clipped to 12" cartridge filter with the C-79 clip.

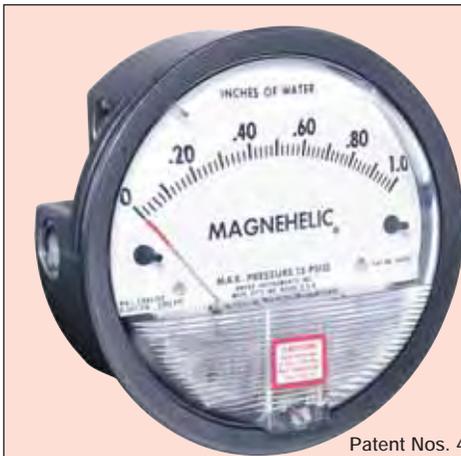
12/01/2010

Series
2000

Magnehelic® Differential Pressure Gages

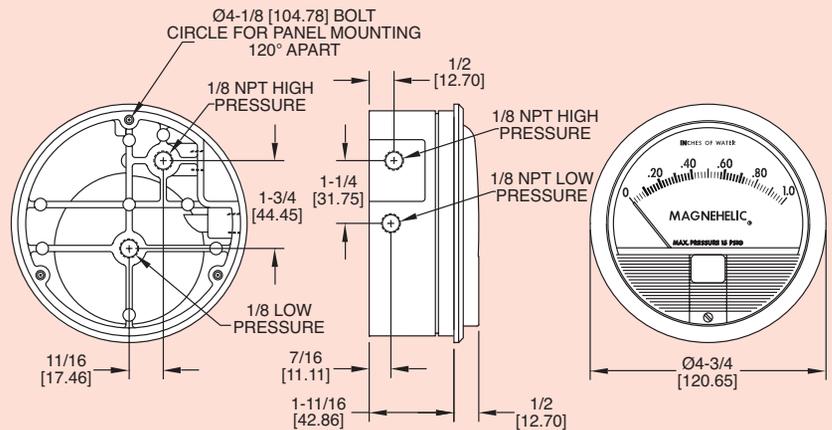
Mech.118

Indicate Positive, Negative or Differential, Accurate within 2%



Patent Nos. 4,030,365
5,012,678

Standard Magnehelic® Pressure Gage has a large, easy-to-read 4" dial.



Dimensions, Standard Series 2000 Magnehelic® Pressure Gages.
(Slightly different on medium and high pressure models)

Select the Dwyer® Magnehelic® gage for high accuracy – guaranteed within 2% of full scale – and for the wide choice of 81 models available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic® gage movement, it quickly indicates low air or non-corrosive gas pressures – either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

The Magnehelic® gage is the industry standard to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

Note: May be used with Hydrogen. When ordering a Buna-N diaphragm pressures must be less than 35 psi.

MOUNTING. A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. With the optional A-610



Flush ...Surface...or Pipe Mounted

Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1/4" - 2" pipe. Although calibrated for vertical position, many ranges above 1" may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4% hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument.

VENT VALVES

In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

HIGH AND MEDIUM PRESSURE MODELS

Installation is similar to standard gages except that a 4 13/16" hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available for all models. Because of larger case, the medium pressure and high pressure models will not fit in a portable case size. Installation of the A-321 safety relief valve on standard Magnehelic® gages often provides adequate protection against infrequent overpressure.



SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)

Wetted Materials: Consult factory.

Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.

Accuracy: ±2% of full scale (±3% on -0, -100 Pa, -125 Pa, 10MM and ±4% on -00, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).

Pressure Limits: -20" Hg. to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).

Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only.

Temperature Limits: 20 to 140°F.* (-6.67 to 60°C).

Size: 4" (101.6 mm) Diameter dial face.

Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.

Process Connections: 1/8" female NPT duplicate high and low pressure taps - one pair side and one pair back.

Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).

Standard Accessories: Two 1/8" NPT plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapter and three flush mounting adapters with screws. (Mounting and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)

*Low temperature models available as special option.

†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

OPTIONS AND ACCESSORIES

Transparent Overlays

Furnished in red and green to highlight and emphasize critical pressures.



Adjustable Signal Flag

Integral with plastic gage cover. Available for most models except those with medium or high pressure construction. Can be ordered with gage or separate.



LED Setpoint Indicator

Bright red LED on right of scale shows when setpoint is reached. Field adjustable from gage face, unit operates on 12-24 VDC. Requires MP or HP style cover and bezel.

Portable Units

Combine carrying case with any Magnehelic® gage of standard range, except high pressure connection. Includes 9 ft. (2.7 m) of 3/8" I.D. rubber tubing, standhang bracket and terminal tube with holder.



Air Filter Gage Accessory Package

Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft. (1.5 m) lengths of 1/2" aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves.



Quality design and construction features

Bezel provides flange for flush mounting in panel.

Clear plastic face is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision litho-printed scale is accurate and easy to read.

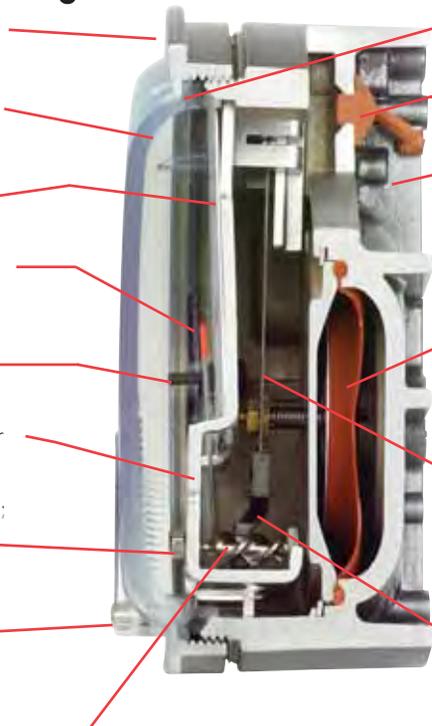
Red tipped pointer of heat treated aluminum tubing is easy to see. It is rigidly mounted on the helix shaft.

Pointer stops of molded rubber prevent pointer over-travel without damage.

“Wishbone” assembly provides mounting for helix, helix bearings and pointer shaft.

Jeweled bearings are shock-resistant mounted; provide virtually friction-free motion for helix. Motion damped with high viscosity silicone fluid.

Zero adjustment screw is conveniently located in the plastic cover, and is accessible without removing cover. O-ring seal provides pressure tightness.



O-ring seal for cover assures pressure integrity of case.

Blowout plug of silicone rubber protects against overpressure on 15 psig rated models. Opens at approximately 25 psig.

Die cast aluminum case is precision made and iridite-dipped to withstand 168 hour salt spray corrosion test. Exterior finished in baked dark gray hammerloid. One case size is used for all standard pressure options, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded O-ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Calibrated range spring is flat spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.

Samarium Cobalt magnet mounted at one end of range spring rotates helix without mechanical linkages.

Helix is precision made from an alloy of high magnetic permeability. Mounted in jeweled bearings, it turns freely, following the magnetic field to move the pointer across the scale.

SERIES 2000 MAGNEHELIC® GAGE — MODELS AND RANGES

The models below will fulfill most requirements. Page V also shows examples of special models built for OEM customers. For special scales furnished in ounces per square inch, inches of mercury, metric units, etc., contact the factory.

Dual Scale English/Metric Models		
Model Number	Range, In. W.C.	Range, Pa or kPa
2000-0D	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa

Model Number	Range Inches of Water	Model Number	Range Zero Center Inches of Water	Dual Scale Air Velocity Units		Model Number	Range, CM of Water	Model Number	Range, Pascals
				Model Number	Range in W.C. Velocity, F.P.M.				
2000-00N†••	.05-0-.2	2300-0†•	.25-0-.25	2000-00AV†••	0-.25/300-2000	2000-15CM	0-15	Zero Center Ranges	
2000-00†••	0-.25	2301	.5-0-.5	2000-00V†••	0-.50/500-2800	2000-20CM	0-20	2300-60PA	30-0-30
2000-01•	0-.50	2302	1-0-1	2001AV	0-1.0/500-4000	2000-25CM	0-25	2300-100PA	50-0-50
2001	0-1.0	2304	2-0-2	2002AV	0-2.0/1000-5600	2000-50CM	0-50	2300-120PA	60-0-60
2002	0-2.0	2310	5-0-5	2010AV	0-10/2000-12500	2000-80CM	0-80	2300-250PA	125-0-125
2003	0-3.0	2320	10-0-10	For use with pitot tube.		2000-100CM	0-100	2300-500PA	250-0-250
2004	0-4.0	2330	15-0-15			2000-150CM	0-150		
2005	0-5.0					2000-200CM	0-200		
2006	0-6.0	Model Number	Range PSI	Model Number	Range MM of Water	2000-250CM	0-250		
2008	0-8.0					2000-300CM	0-300		
2010	0-10	2201	0-1	2000-6MM†••	0-6	Zero Center Ranges		Model Number	Range, Kilopascals
2015	0-15	2202	0-2	2000-10MM†••	0-10	2300-4CM	2-0-2	2000-1KPA	0-1
2020	0-20	2203	0-3	2000-25MM†••	0-25	2300-10CM	5-0-5	2000-1.5KPA	0-1.5
2025	0-25	2204	0-4	2000-50MM†••	0-50	2300-30CM	15-0-15	2000-2KPA	0-2
2030	0-30	2205	0-5	2000-80MM†••	0-80			2000-3KPA	0-3
2040	0-40	2210*	0-10	2000-100MM†••	0-100			2000-4KPA	0-4
2050	0-50	2215*	0-15	Zero Center Ranges				2000-5KPA	0-5
2060	0-60	2220*	0-20					2000-8KPA	0-8
2080	0-80	2230**	0-30					2000-10KPA	0-10
2100	0-100			2300-20MM†	10-0-10	Model Number	Range, Pascals	2000-15KPA	0-15
2150	0-150							2000-20KPA	0-20
Accessories				Options — To order, add suffix: I.E. 2001-ASF		2000-60PA†••	0-60	2000-25KPA	0-25
A-299, Surface Mounting Bracket				ASF (Adjustable Signal Flag)		2000-100PA†••	0-100	2000-30KPA	0-30
A-300, Flat Flush Mounting Bracket				HP (High Pressure Option)		2000-125PA†••	0-125	2000-4KPA	0-4
A-310A, 3-Way Vent Valve				LT (Low Temperatures to -20°F)		2000-250PA	0-250	2000-5KPA	0-5
A-321, Safety Relief Valve				MP (Med. Pressure Option)		2000-300PA	0-300	2000-8KPA	0-8
A-432, Portable Kit				SP (Setpoint Indicator)		2000-500PA	0-500	2000-10KPA	0-10
A-605, Air Filter Kit						2000-750PA	0-750	2000-15KPA	0-15
A-610, Pipe Mount Kit								2000-20KPA	0-20
								2000-25KPA	0-25
								2000-30KPA	0-30
								Zero Center Ranges	
								2300-1KPA	.5-0-.5
								2300-3KPA	1.5-0-1.5

Scale Overlays — Red, Green, Mirrored or Combination, Specify Locations

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%. •• Accuracy +/-4%



COOK



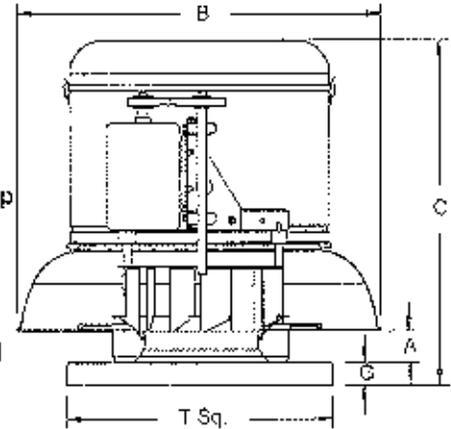
MARK: ROOF FAN ADD#4
PROJECT: CCAC K LEROY IRVIS
DATE: 7/6/2011

ACE-B

Downblast Centrifugal
Exhaust Ventilator
Roof Mounted/Belt Drive

STANDARD CONSTRUCTION FEATURES:

All aluminum housing - Backward inclined all aluminum wheel - Two piece top cap with stainless steel quick release latches - Welded curb cap corners - Birdscreen - Vibration isolators - Lifting Lugs - Permanently lubricated ball bearing motors - Oil and heat resistant, static conducting belts - Adjustable pitch drives through 5 hp motor - Corrosion resistant fasteners - Regreasable bearings in a cast iron pillow block housing, rated at 200,000 hours average life - All fans factory adjusted to specified fan RPM - Transit tested packaging - Standard motors ship factory installed.



Performance

Qty	Catalog Number	Flow (CFM)	SP (inwc)	Fan RPM	Power (HP)
1	195C5B	2400	.375	675	.262

Altitude (ft): 0 Temperature (F): 70

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	Mounted
1/2	1725	115/1/60	ODP -SE	Yes

Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
68	69	67	62	59	53	48	45	64	53	6.5

Accessories:

- STD DISCONNECT PREWIRED
- BD-24 DAMPER
- ROOF CURB RCG 28-12H

Dimensions (inches)

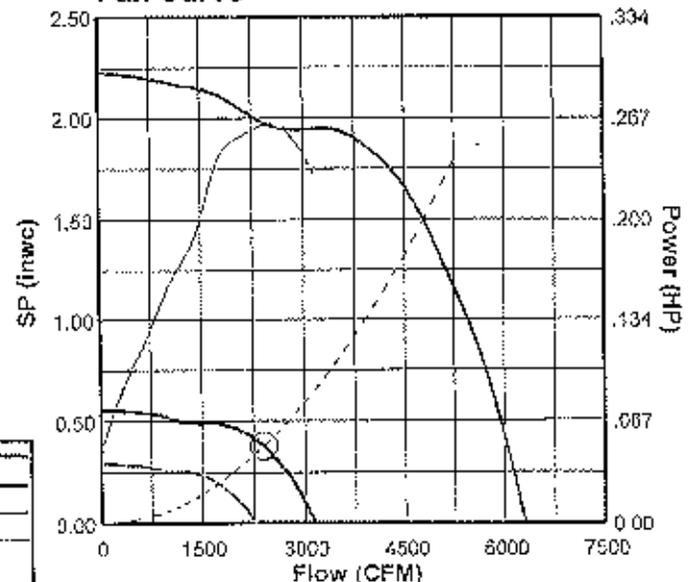
A	4-7/16
B	37-11/16
C	35
G	3
T Sq.	30
Roof Open.Sq.*	25-1/2

NOTE: Accessories may affect dimensions shown.

Shipping Weight(lbs)*** 176

*Roof opening size for curbs supplied by Cook only.
***Includes fan, motor & accessories.

Fan Curve



Fan Curve Legend

CFM vs SP (675)	—
MaxRPM(1348)	—
MinRPM(490)	—
CFM vs HP	—
Point of Operation	○
System Curve	- - -



COOK



MARK: ROOF FAN ADD#4
PROJECT: CCAC K LEROY IRVIS
DATE: 7/6/2011

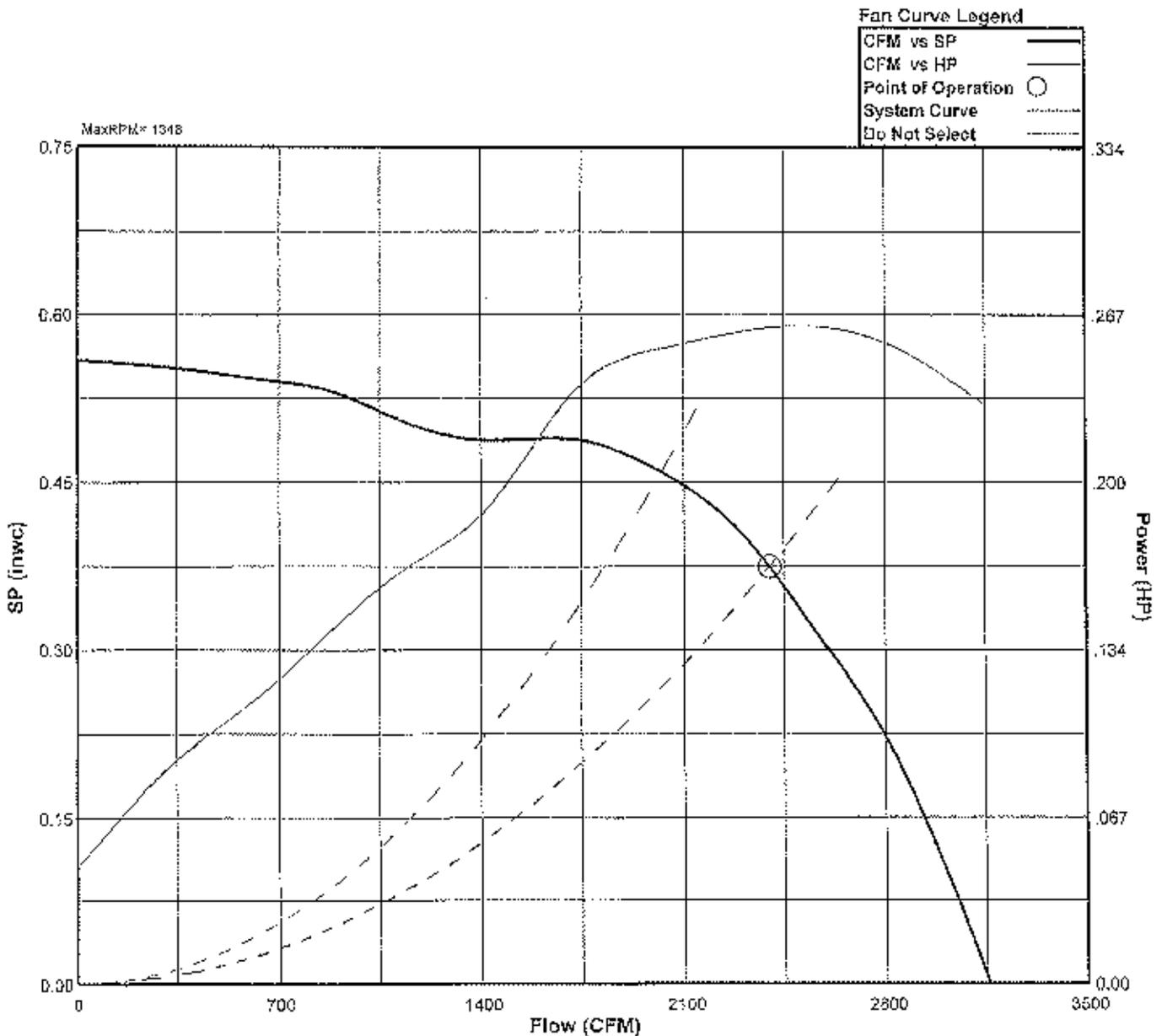
ACE-B

Performance

Catalog Number	Flow (CFM)	SP (inwc)	Fan RPM	Power (HP)	OVEL (fpm)	TSPD (fpm)	TEMP (°F)	ALT (ft)
195C5B	2400	.375	675	.262	964	3415	70	0

Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
68	69	67	62	59	53	48	45	64	53	6.5





COOK

PROJECT: CCAC K LEROY IRVIS

DATE: 7/6/2011

BD

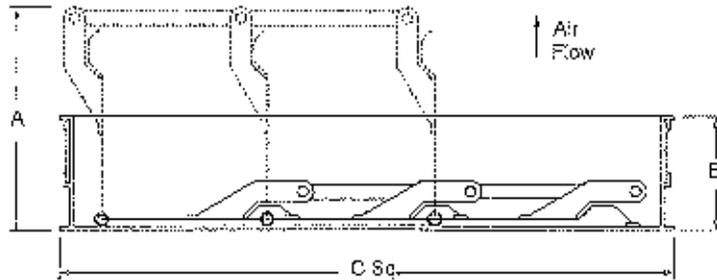
Gravity Backdraft Damper

STANDARD CONSTRUCTION FEATURES:

.02 Aluminum blades - .06 aluminum frame -
Aluminum hinge pins - Nylon bushings.

Note:

Sizes 36 thru 60 are shipped as 2 panels.
Sizes 66 and 78 are shipped as 6 panels.
These may require assembly.



Dimensions (inches)

Mark	Qty	Description	A Max.	B	C Sq.	# Panels
EF1	1	BD-18 DAMPER	5-3/16	1-7/8	17-3/4	1
ROOF FAN ADD#4	1	BD-24 DAMPER	5-3/16	1-7/8	23-3/4	1



COOK

PROJECT: CCAC K LEROY IRVIS

DATE: 7/6/2011

RCG

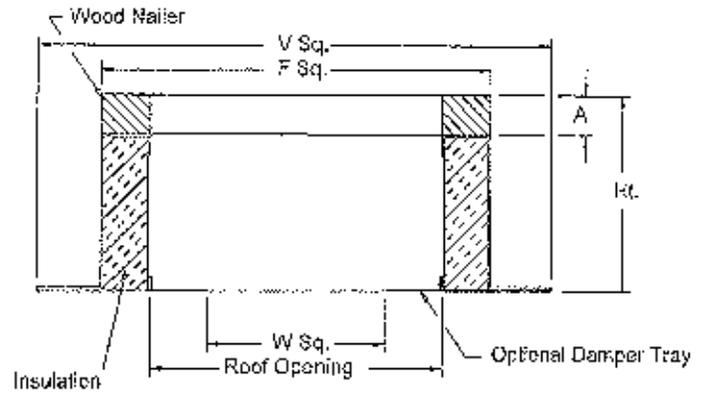
Galvanized Steel Roof Curb

STANDARD CONSTRUCTION FEATURES:

18 gauge galvanized steel - 1-1/2",
3 lbs. density thermal and acoustical
insulation - Continuously welded corners -
Wood nailer.

Options:(As noted below*)

- 1) No wood nailer (deduct 1-1/2" for actual height).
- 2) Damper tray.



Dimensions (inches)

Mark	Qty	Description	Ht	Options*	A	F Sq.	V Sq.	W Sq.	Roof Opening
ROOF FAN ADD#4	1	RCG 28	12	-	1-1/2	28-1/2	32-1/2	21-3/4	25-1/2