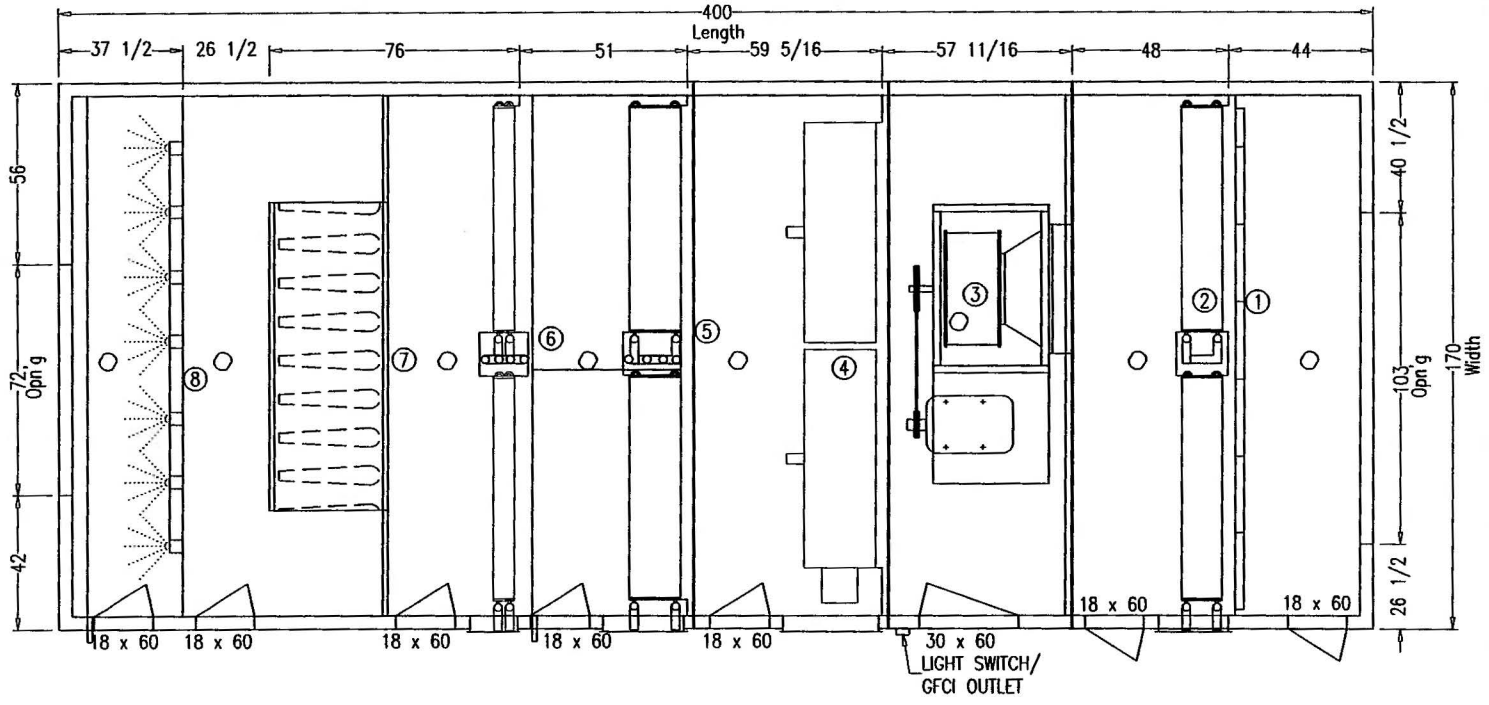


EQUIPMENT LIST

1. Filter Frames
   (18) 24 x 24 x 2
   (3) 12 x 24 x 2
2. Heat Recovery
   (4) 42 x 69
3. Supply Fan
   351 APF
4. Pre Heating Coils – VIFB
   (4) VA-6T
5. Cooling Coils
   (4) 42 x 69
6. Heating Coil
   (4) 42 x 69
7. Sound Attenuator
   96" W X 72" H X 36" D
8. Humidifier

#	Revision	Date	By
1	CHANGED CW STUB LOCATIONS	04/00	BR

UNIT CONSTRUCTION

TYPE:	INDOOR	MOUNTING:	PAD
BASE:	8 inch		
FLOOR:	14 ga		
INSUL/LINER:	4 inch — 20 ga		
CASING:	4 inch — 18 ga		
INSUL/LINER:	4 inch — 20 ga		
DOORS:	(see drawing)		
LIGHTING:	YES		
ISOLATION:	YES		

04 APR 00

S-1

Sales Order#: P5-D041C

Openings and Dimensions may vary from Contract Documents. Return of approved drawings constitutes acceptance of these variances

Drawn by: D. HURST	DWG #: 3139-3	Sales Office		JOB Number	PROJECT: UNIVERSITY OF KENTUCKY MECHANICAL ENGINEERING BUILDING
Approved by:	Unit Tag: AHU-3	LEXINGTON	Scale: None	EQ3139	Description: 34,800 CFM UNIT AHU-3
	Ship WT:		Date: 2-16-00		

TRANE™ Custom Air Handlers

TRANE Custom Air Handlers

9900 Aire Circle DR.
Fort Smith, AR 72916
Phone: 501-648-7400
Fax: 501-648-7499

CUSTOM AIR HANDLING UNIT SUBMITTAL

Project: U of K Mech. Engr. **Date:** April 5, 2000

Location: Lexington, KY **Prepared By:** Drue Scott
Barry Rowton

Revision:

Sales Office: TRANE - Lexington **Salesman:** Scott Sandberg

Internal Review By: ☐ □□□**date:** ☐ **date:**

TAGGING : AHU-1, AHU-2, AHU-3, and AHU-4

Response to Submittal Review Comments

1. Chilled water supply and return pipes will be isolated from the air stream via safing. Chilled water and hot water supply and return pipes will be stubbed out either the exterior wall or roof of the unit depending on coil location and configuration. Coils will be individually stubbed to the exterior and not headered together. See drawing number 3139-1, Sheet 1 & 2 (Page 1-3, 1-4). All piping dimensions are based on initial engineering calculations and final dimensions will be based on actual construction configuration.
2. Coil stub out locations are spotted for AHU 1 & 2, see drawing number 3139-1 (Page 1-3, 1-4).
3. Please reference letter submitted by Tom Erpenbeck, TRANE, Lexington.
4. Drawing corrected to show proper elevation view. See drawing number 3139-3 (Page 1-5).
5. Added note to "Unit Construction" sheet referencing exposed cut edges of galvanized steel (Page 1-2).

- **Approval Stamps**:

If above space is filled, please stamp on the 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.

Custom Air Handlers

U of K Mechanical Engineering
Custom Air Handling Units

SUBMITTAL

INDEX

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Air Handling Unit Schedule

Unit Tag	Total CFM	Fan Manufacturer And Type	Motor Manufacturer And Type	Energy Recovery Coils	Pre Heat Coils	CW Cooling Coils	Re-Heat Coils	Sound Attenuator Manufacturer And Type
AHU 1,2	38,100	Twin City APF-Plenum	Baldor - ODP	N/A	Trane NS Steam	Trane Type W	Trane Type WC	Vibro Acoustics RNM-LV-F1
AHU 3	34,800	Twin City APF-Plenum	Baldor - ODP	Trane type W	Wing VIFB	Trane Type W	Trane Type WC	Vibro Acoustics RNM-LV-F1
AHU 4	36,000	Twin City APF-Plenum	Baldor - ODP	N/A	Trane NS Steam	Trane Type W	Trane Type WC	Vibro Acoustics RNM-LV-F1

Unit Tag	Damper Manufacturer and Type	Filter Frames	Humidifier	Approximate Total Weight
AHU 1,2	Ruskin CD – 50	Farr Type 8 (filters by others)	Dri-Steem Maxi-Bank	42,500
AHU 3	N/A	Farr Type 8 (filters by others)	Dri-Steem Ultra-Sorb	29,500
AHU 4	Ruskin CD – 50	Farr Type 8 (filters by others)	Dri-Steem Maxi-Bank	39,000

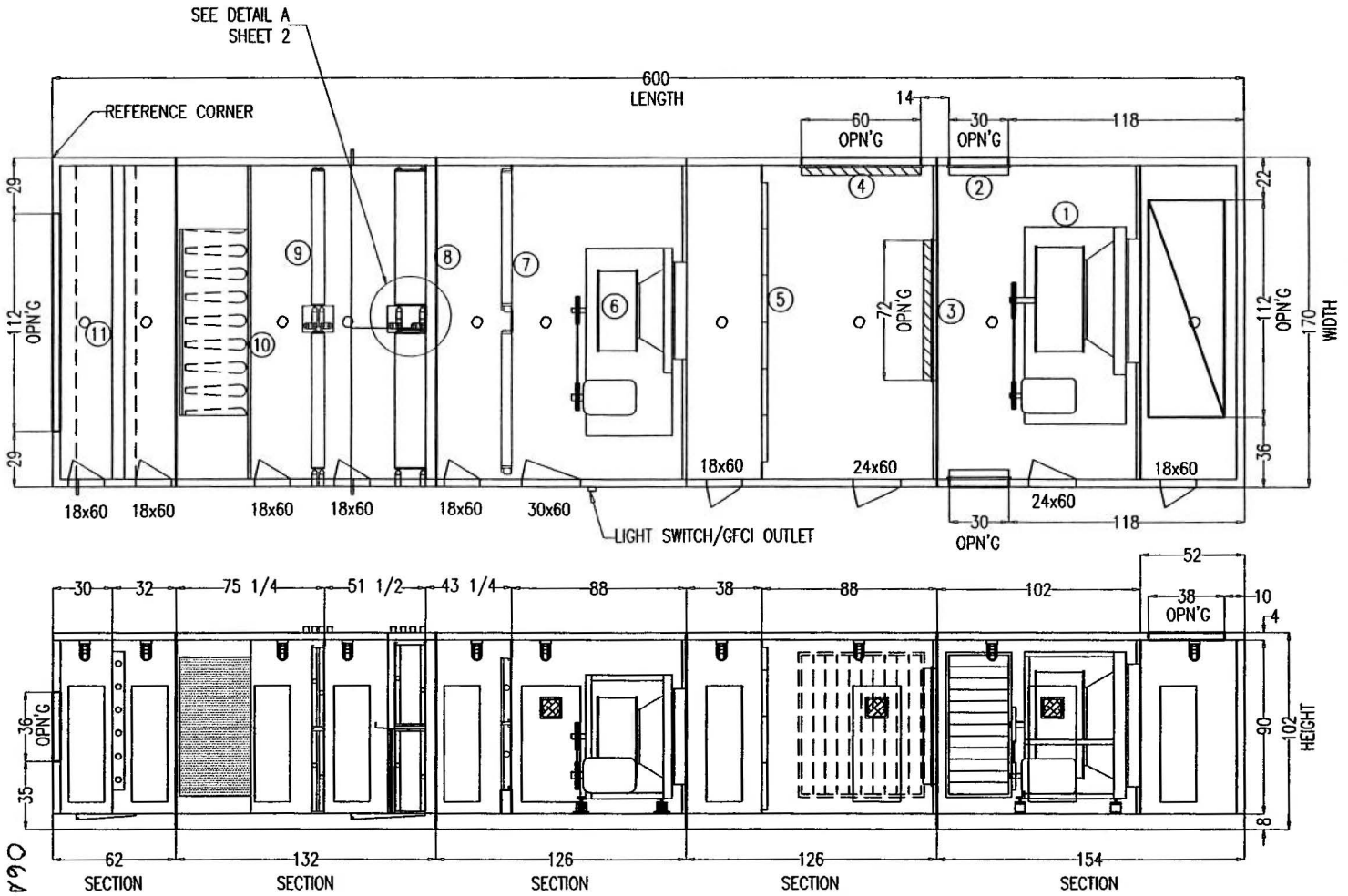
06 APR 00
1-1

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 4, 2000
Rev.:

UNIT CONSTRUCTION

BASE FRAME		– C8 x 11.5, steel beam perimeter with removable lifting lugs.
CABINET	▪ FLOOR	– Surface consists of caulked tack-weld 14 ga, galvanized steel solid floor sheets. – 20 ga, galvanized steel solid floor under-liner.
	▪ WALLS	– 4" H Panel type construction. – 18 ga, galvanized steel solid exterior. – 20 ga, galvanized steel solid inner liner.
	▪ ROOF	– 18 ga, galvanized steel solid roof. – 20 ga. galvanized solid steel inner liner.
	* NOTE *	– All exposed edges of cut galvanized will be coated with cold galvanizing compound
INSULATION		– 4 x 1.5 lbs. - cft., fiberglass insulation installed in walls and roof. – Maximum flame spread = 25 / smoke developed = 50 in compliance with NFPA90A. – 4in., 0.75 lbs. - cft., fiberglass insulation in base.
EXTERIOR PAINT		– None required, galvanized steel exterior
ACCESS DOORS		– Double wall galvanized steel similar to wall panels, 2in. x 3 lb. insulation, continuous stainless steel hinge, standard Ventlok #260 handles, Santoprene gaskets. All doors downstream of cooling coils are double thermal break. – 9"x9" Viewports provided in fan sections and upstream of filters.
DRAIN PAN		– 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.
FAN ASSEMBLY		– – All fan assemblies complete with OSHA belt guard, Wheel Guard, Inertia Base and Inlet Vanes. Supply Fans have Thrust Restraints
ELECTRICAL		– Unit provided with vapor proof service light in each section, one exterior switch with pilot light, and one convenience outlet



EQUIPMENT LIST

1. RETURN FAN
   551 APF
2. RELIEF AIR DAMPER
   (2) 30 x 72
3. RETURN AIR DAMPER
   (1) 72 x 60
4. OUTSIDE AIR DAMPER
   (1) 60 x 72
5. FILTER FRAMES
   (18) 24 x 24
   (6) 12 x 24
6. SUPPLY FAN
   441 APF
7. STEAM PRE-HEAT COIL
   (4) 33 x 69
8. CHILLED WATER COIL
   (4) 42 x 69
9. HOT WATER RE-HEAT COIL
   (4) 42 x 69
10. SOUND ATTENUATOR
    96" W X 72" H X 36" D
11. HUMIDIFIER

#	Revision	Date	By:
1	CHANGED CW STUB LOCATIONS	04/00	BR

UNIT CONSTRUCTION

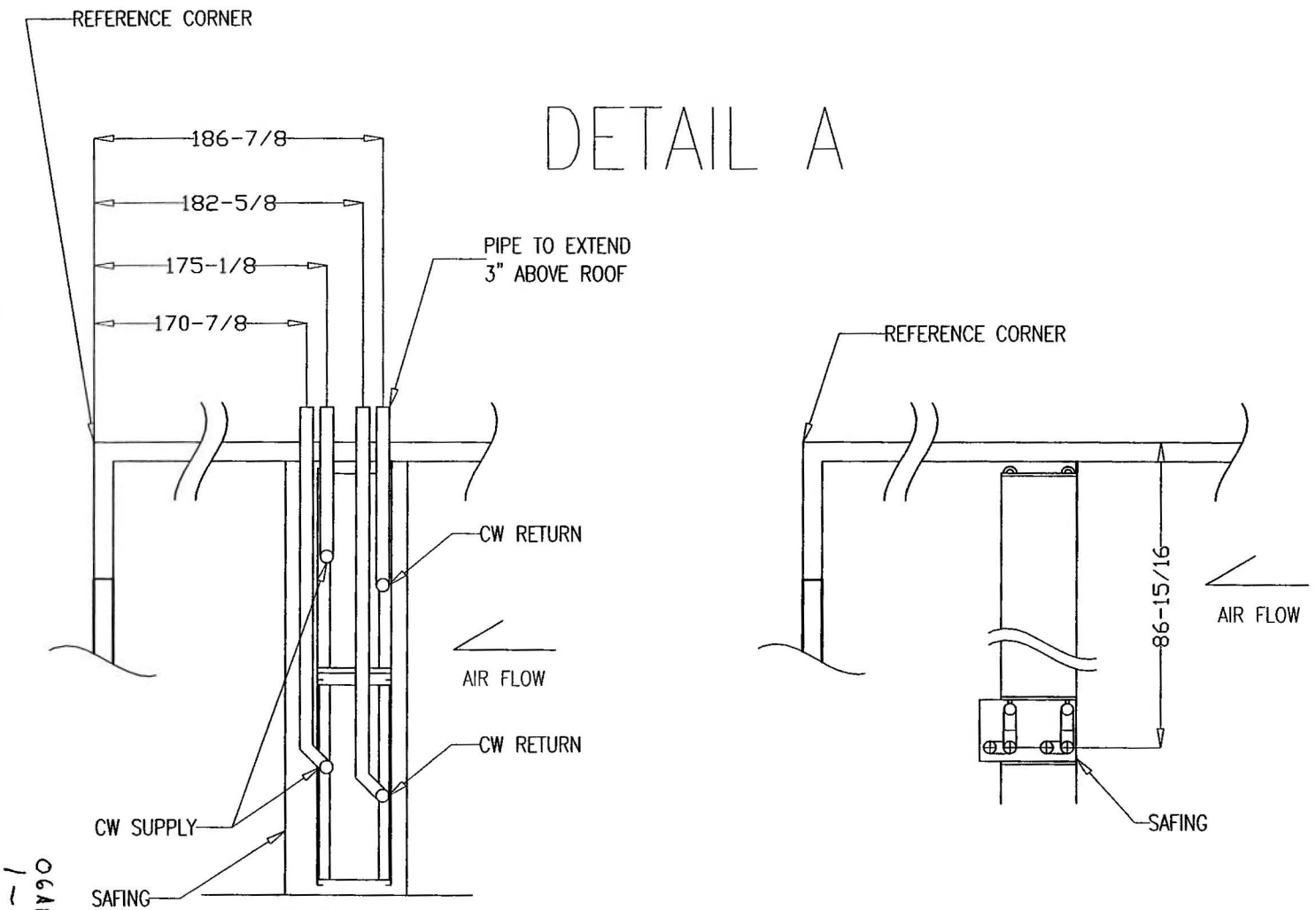
TYPE:	INDOOR	MOUNTING:	PAD
BASE:	8 inch		
FLOOR:	14 ga		
INSUL/LINER:	4 inch — 20 ga		
CASING:	4 inch — 18 ga		
INSUL/LINER:	4 inch — 20 ga		
DOORS:	(see drawing)		
LIGHTING:	YES		
ISOLATION:	YES		

06APR00
1-3

Sales Order#: P5-D041A, B	*Openings and Dimensions may vary from Contract Documents.*		*Return of approved drawings constitutes acceptance of these variances*			
Drawn by: D. HURST	DWG #: 3139-1	Sales Office		JOB Number	PROJECT:	UNIVERSITY OF KENTUCKY MECHANICAL ENGINEERING BUILDING
Approved by:	Unit Tag: AHU-1, 2	LEXINGTON	Scale: None	EQ3139	Description:	38,100 CFM UNIT AHU-1, 2
	Ship WT:		Date: 2-16-00			

TRANE™ Custom Air Handlers

DETAIL A



ELEVATION VIEW

PLAN VIEW

06APR00
1-4

EQUIPMENT LIST

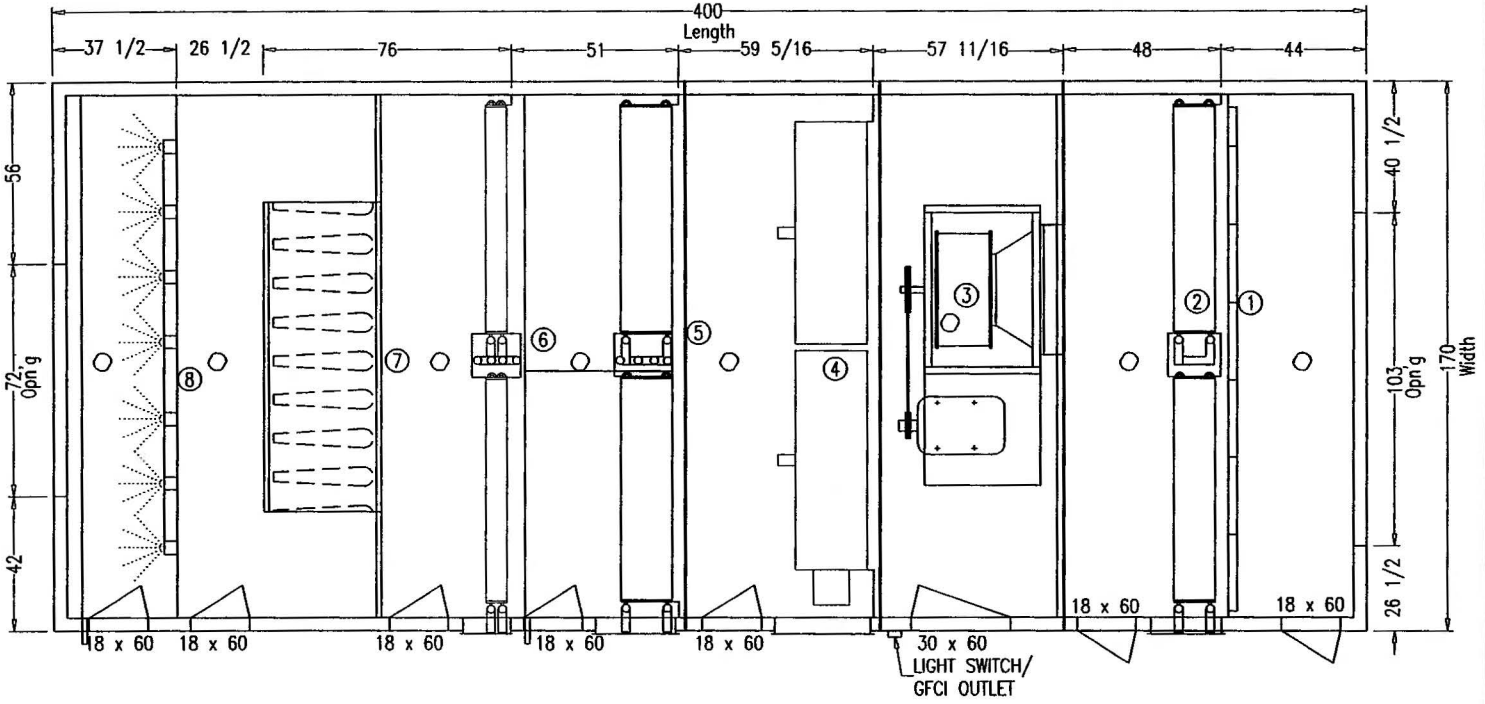
#	Revision	Date	By:
1	CHANGED CW STUB LOCATIONS	04/00	BR

UNIT CONSTRUCTION

TYPE:	INDOOR	MOUNTING:	PAD
BASE:	8 inch		
FLOOR:	14 ga		
INSUL/LINER:	4 inch — 20 ga		
CASING:	4 inch — 18 ga		
INSUL/LINER:	4 inch — 20 ga		
DOORS:	(see drawing)		
LIGHTING:	YES		
ISOLATION:	YES		

Sales Order#:	P5-D041A, B	*Openings and Dimensions may vary from Contract Documents.*		*Return of approved drawings constitutes acceptance of these variances*			
Drawn by:	D. HURST	DWG #:	3139-1	Sales Office		JOB Number	PROJECT: UNIVERSITY OF KENTUCKY MECHANICAL ENGINEERING BUILDING
Approved by:		Unit Tag:	AHU-1, 2	LEXINGTON	Scale: None	EQ3139	Description: 38,100 CFM UNIT AHU-1, 2
		Ship WT:			Date: 2-16-00		

TRANE™ Custom Air Handlers



EQUIPMENT LIST

1. Filter Frames
   (18) 24 x 24 x 2
   (3) 12 x 24 x 2
2. Heat Recovery
   (4) 42 x 69
3. Supply Fan
   351 APF
4. Pre Heating Coils – VIFB
   (4) VA-6T
5. Cooling Coils
   (4) 42 x 69
6. Heating Coil
   (4) 42 x 69
7. Sound Attenuator
   96" W X 72" H X 36" D
8. Humidifier

#	Revision	Date	By
1	CHANGED CW STUB LOCATIONS	04/00	BR

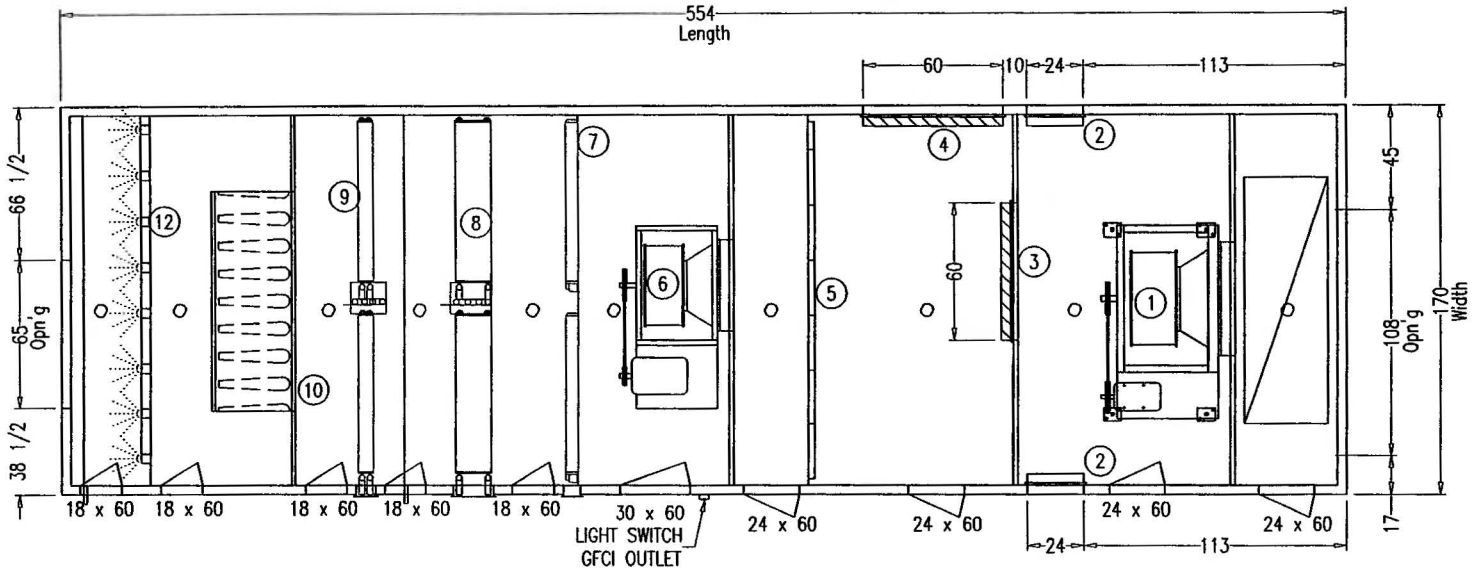
UNIT CONSTRUCTION

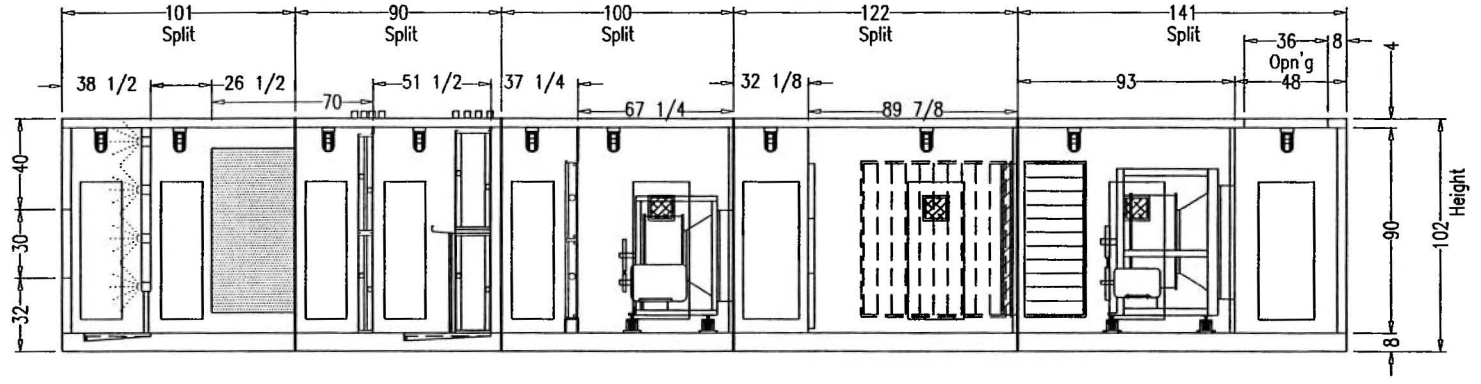
TYPE:	INDOOR	MOUNTING:	PAD
BASE:	8 inch		
FLOOR:	14 ga		
INSUL/LINER:	4 inch — 20 ga		
CASING:	4 inch — 18 ga		
INSUL/LINER:	4 inch — 20 ga		
DOORS:	(see drawing)		
LIGHTING:	YES		
ISOLATION:	YES		

06 APR 00

Sales Order#: P5-D041C	Openings and Dimensions may vary from Contract Documents. Return of approved drawings constitutes acceptance of these variances					
Drawn by: D. HURST	DWG #: 3139-3	Sales Office		JOB Number	PROJECT:	UNIVERSITY OF KENTUCKY MECHANICAL ENGINEERING BUILDING
Approved by:	Unit Tag: AHU-3		Scale: None	EQ3139	Description:	34,800 CFM UNIT AHU-3
	Ship WT:	LEXINGTON	Date: 2-16-00			

TRANE™ Custom Air Handlers





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1-6

EQUIPMENT LIST

1. Return Fan
   441 APF w/15HP Motor
2. Exhaust Air Damper
   (2) 24 x 66
3. Return Air Damper
   60 x 66
4. Outside Air Damper
   60 x 66
5. FILTER FRAMES
   (18) 24 x 24 x 2
   (3) 12 x 24 x 2
   Supply Fan
6. 351 APF w/50HP Motor
   Steam Heating Coil
   (4) 33 x 69
7. Cooling Coil
   (4) 42 x 69
8. Heating Coil
   (4) 42 x 69
9. Sound Attenuator
   96" W X 72" H X 36" D
10. Humidifier

#	Revision	Date	By:
1	CHANGED CW/HW STUB LOCATIONS	04/00	BR

UNIT CONSTRUCTION

TYPE:	INDOOR	MOUNTING:	PAD
BASE:	8 inch		
FLOOR:	14 ga		
INSUL/LINER:	4 inch — 20 ga		
CASING:	4 inch — 18 ga		
INSUL/LINER:	4 inch — 20 ga		
DOORS:	(see drawing)		
LIGHTING:	NO		
ISOLATION:	YES		

Sales Order#: P5 D041D

Openings and Dimensions may vary from Contract Documents. *Return of approved drawings constitutes acceptance of these variances*

Drawn by: G. EDMONDS	DWG #: 3139-4	Sales Office		JOB Number	PROJECT: UNIVERSITY OF KETUCKY MEB MECHANICAL ENGINEERING BUILDING
Approved by:	Unit Tag: AHU-4		Scale: None	EQ3139	Description: 36,000 CFM UNIT AHU-4
	Ship WT:	LEXINGTON	Date: 2-16-00		

TRANE™ Custom Air Handlers

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Fan Schedule

Unit No.	Fan Tag	Service	Total CFM	Fan TSP	Elevation	RPM	BHP	MHP	AMCA Class	Manufacturer & Model	Fan Type	Size
AHU-1,2	RF-1,2	RETURN	38100	2.00	0	552	17.4	20	I	Twin City APF	Plenum	551
AHU-1,2	SF-1, 2	SUPPLY	38100	6.57	0	1166	55.8	60	III	Twin City APF	Plenum	441
AHU-3	SF-3	SUPPLY	34800	7.81	0	1186	60.0	75	III	Twin City APF	Plenum	441
AHU-4	RF-4	RETURN	36000	2.00	0	537	16.3	20	I	Twin City APF	Plenum	551
AHU-4	SF-4	SUPPLY	36000	6.41	0	1129	51.1	60	II	Twin City APF	Plenum	441

Unit No.	Fan Tag	Motor Manufacturer	Volts/PH/HZ	Motor Enclosure	Nema Frame Size	Motor Efficiency	Bearings	Extra Belts	Extra Sheaves	Feature Codes
AHU-1,2	RF-1,2	Baldor	208 volts, 3 phase, 60 Hz.	ODP	256T	Premium	40K	Yes	No	IV IS UB IB OG CP
AHU-1,2	SF-1, 2	Baldor	208 volts, 3 phase, 60 Hz.	ODP	364T	Premium	40K	Yes	No	IV IS UB IB TR OG CP
AHU-3	SF-3	Baldor	208 volts, 3 phase, 60 Hz.	ODP	365T	Premium	40K	Yes	No	IV IS UB IB TR OG CP
AHU-4	RF-4	Baldor	208 volts, 3 phase, 60 Hz.	ODP	256T	Premium	40K	Yes	No	IV IS UB IB OG CP
AHU-4	SF-4	Baldor	208 volts, 3 phase, 60 Hz.	ODP	364T	Premium	40K	Yes	No	IV IS UB IB TR OG CP

Feature Codes

IV	Inlet Vanes
IS	Inlet Screen
UB	Unitary Base
IB	Inertia Base
TR	Thrust Restraints
OG	OSHA Drive Guard
CP	Constant Pitch

06AM00
2-1

AIR FLOW ENGINEERING DATA

AHU-1 & AHU-2

Supply Air: 38,100 CFM at 6.57" TSP

{0 ft. Alt. (.075 lbs./ft³.)}

STATIC PRESSURE ANALYSIS

0.15" Damper 1,270 FPM
0.25" 30/30 pleated pre-filter - Clean – 453 FPM
0.30" 65% efficient rigid filters – Clean – 453 FPM
0.10" Inlet Screen
0.11" Pre-Heat Coil – 602 FPM
0.83" CW Coil – 473 FPM
0.08" Re-Heat Coil – 473 FPM
0.25" Sound Attenuator - 500 FPM
4.50" External Static Pressure
6.57" TOTAL DESIGN STATIC PRESSURE

AHU-1 & AHU-2

Return Air: 38,100 CFM at 2.0" TSP

{0 ft. Alt. (.075 lbs./ft³.)}

STATIC PRESSURE ANALYSIS

1.75" External Static Pressure
0.10" Inlet Screen
0.15" Exhaust Damper – 1,270 FPM
2.00" TOTAL DESIGN STATIC PRESSURE

AHU-3

Supply Air: 34,800 CFM at 7.81" TSP

{0 ft. Alt. (.075 lbs./ft³.)}

STATIC PRESSURE ANALYSIS

0.25" 30/30 pleated pre-filter – Clean – 483 FPM
0.32" 65% efficient bag filters – Clean – 483 FPM
0.51" Energy Recovery Coil – 432 FPM
0.15" Inlet Screen
0.47" Wing Coil – 813 FPM
0.91" CW Coil – 432 FPM
0.06" Re-Heat Coil – 432 FPM
0.24" Sound Attenuator – 794 FPM
4.90" External Static Pressure
7.81" TOTAL DESIGN STATIC PRESSURE

AHU-4

Supply Air: 36,000 CFM at 6.41" TSP

{0 ft. Alt. (.075 lbs./ft³.)}

STATIC PRESSURE ANALYSIS

0.15" Damper 1,370 FPM
0.21" 30/30 pleated pre-filter - Clean – 463 FPM
0.28" 65% efficient rigid filters – Clean – 463 FPM
0.16" Inlet Screen
0.09" Pre-Heat Coil –
0.73" CW Coil – 498 FPM
0.07" Re-Heat Coil -
0.22" Sound Attenuator – 694 FPM
4.50" External Static Pressure
6.41" TOTAL DESIGN STATIC PRESSURE

AHU-4

Return Air: 36,000 CFM at 2.0" TSP

{0 ft. Alt. (.075 lbs./ft³.)}

STATIC PRESSURE ANALYSIS

1.70" External Static Pressure
0.12" Inlet Screen
0.18" Exhaust Damper
2.00" TOTAL DESIGN STATIC PRESSURE

Twin City Fan & Blower
A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

April 04, 2000
Page: 1

amca CERTIFIED RATINGS SOUND AND AIR PERFORMANCE
AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

Specification
Type: APF
Plenum Fan, BIA Design - Belt drive

The fans shall be of the centrifugal plenum (plug) type, as manufactured by Twin City Fan & Blower, Type APF, designed without a scroll type housing. Fans shall incorporate a non-overloading type backward inclined airfoil blade wheel, heavy-gauge reinforced steel inlet plate, structural steel frame, and shaft and bearings in AMCA Arrangement 3 configuration.

Fan performance shall be based on tests conducted in accordance with AMCA Standard test code for air moving devices and shall be licensed to bear the AMCA Certified Rating Seal for Air and Sound. Fans shall have a sharply rising pressure charcteristic extending through the operating range and continuing to rise beyond the efficiency peak to ensure quiet and stable operation. Fans shall have non-overloading design with self-limiting horsepower characteristics and shall reach a peak in the normal selection area. All fans shall be capable of operating over the minimum pressure limits, as specified in AMCA's Standard 2408-69. All fans prior to shipment shall be completely assembled and test run at their operating speed or at the maximum RPM for the particular fan's construction class. The fans are to be balanced and records maintained of the readings in the axial, vertical and horizontal direction on each of the fan's bearings. A written copy of this record shall be available upon request.

FRAME AND INLET PLATE - Inlet plates shall be of heavy-gauge reinforced steel construction. The inlet plate incorporates a removable spun inlet cone designed for smooth airflow into the accompanying inlet retaining ring of the fan wheel. A square, formed lip shall surround the unit, suitable for attachment of a boot connector, or an optional round inlet collar can be provided.

FAN WHEELS - Fan wheels shall have a spun non-tapered style blade retaining ring on the inlet side to allow higher efficiencies over the performance range of the fan. Sizes 251 and larger shall have nine die-formed hollow airfoil blades continuously welded around all edges. Smaller sizes shall have nine solid airfoil-shaped aluminum extruded blades.

All wheels shall be statically and dynamically balanced on precision electronic balancers to a level of G6.3 (per ANSI 2-19) or better.

FAN SHAFTS - All belt driven sizes shall have shafts of solid AISI C-1040 or C-1045 hot rolled steel accurately turned, ground, polished, and ring-gauged for accuracy. All shafts must be dial indicated for straightness after the keyways are cut and straightened as required.

Shafts shall have first critical speeds at least 1.35 times the maximum speeds of the fan.

BEARINGS - All belt driven fans shall have heavy-duty, grease-lubricated, precision anti-friction ball or roller, self-aligning, pillow block type bearings. Bearings shall be selected for minimum average bearing life (AFBMA L-50) in excess of 200,000 hours when operating at maximum cataloged class conditions. All bearings shall be equipped with regreasable zerk fittings and, where necessary, extended lube lines for easy access for relubrication.

VARIABLE INLET VANES - When specified, the variable inlet vanes shall be internal "nested" type. Each assembly to have eleven vane blades on sizes 251 and larger, and
eight vane blades on sizes 161 through 221.

Twin City Fan & Blower
A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

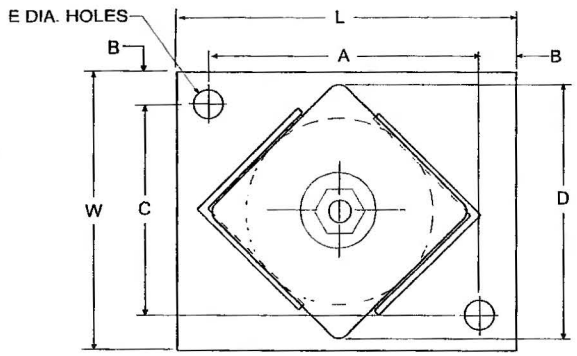
Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

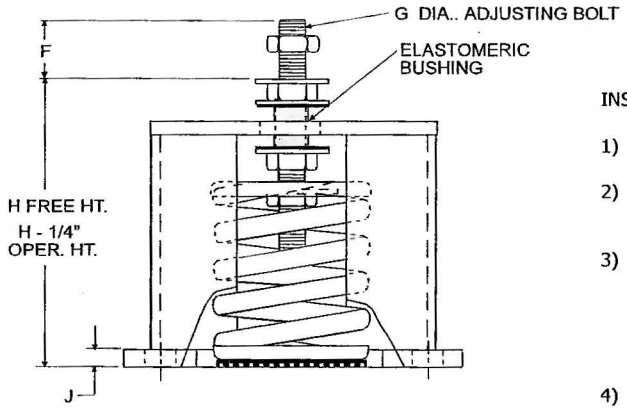
Specification (continued)

Each vane assembly shall be complete with quadrant and handle, suitable for manual or automatic operation.

Construction shall be heavy-gauge and shall be of the cantilever design. Vanes are lubricated for life with a high quality moisture-resistant lubricant.

PAINTING - Each fan component shall be thoroughly degreased before the application of a rust-preventive blue primer. After complete assembly, a finished coat shall be applied to the complete assembly. Aluminum components shall be unpainted.





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.

INSTALLATION INSTRUCTIONS

1) Bolt isolator baseplates to frame in AHU housing making certain correct isolator designationis in proper location.
2) Remove jam nut on top of adjusting stud. Place fan base on isolators with blocking shim in place. Check that 1¼" shim for SWSR-2 has hole in line with hole in fan base. Bolt through fan base and shim but leave ? " of bolt projecting above fan base.
3) The spring in the isolator housing is deflected approximately ¼" due to fan weight. Turn external adjusting nut CCW. Start at one isolator and make only 2 or 3 turns. Move to the next isolator and repeat adjustment. Continue this operation until base raises off 1" shim approximately 1/32". Do not adjust isolators once they rise off shim. Continue adjusting other isolators until all are off shims. Top cup may be run down adjusting stud prior to this step ? " to ½".
4) Tighten shipping bolt clamping shim between fan base and isolator housing. Replace jam nut on isolator adjusting bolt and tighten.
5) Contractor to remove shipping bolt and discard bolt and shim after equipment has been installed.

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

AMBER/BOOTH COMPANY

HOUSTON, TEXAS

SCALE	NONE	DWG. NO.	REV.
DATE	1-19-87	A-SR-1102	3

06 APR 00
2 - 6

Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

April 04, 2000
Page: 1

Plenum Fan, BIA Design

Fan Description

Tag	AHU 1,2 return fan
Type	APF
Size	551
Width	SWSI
Class	I
Wheel diameter (in.)	55.12
Drive method	60 Hz belt drive
Percentage width	100%
Percentage diameter	100%

Modifiers

Fan Performance

CFM	38,100
SP (in.wg)	2
RPM	552
Tip Speed (fpm)	7,966
Oper. BHP	17.4
Standard BHP	17.4
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	735
Static Efficiency	68.74
Mechanical Efficiency	68.74

Sound

Sound Power Levels in dB re. 10^{-12} Watts:

Octave Bands	1	2	3	4	5	6	7	8	LWA
Level at Inlet	91	99	90	82	81	74	69	66	88
Level at Outlet	94	92	88	85	82	77	71	66	87

Definitions:

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

1. Twin City Fan and Blower certifies that the model APF is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.
2. Performance shown is for Installation Type A: Free inlet, Free outlet.
3. Power rating (BHP) does not include belt drive losses.
4. Performance ratings do not include the effects of appurtenances in the airstream.
5. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
6. Values shown are for inlet Lwi and LwiA, and outlet Lwo and LwoA sound power levels for Installation Type A: Free inlet, Free outlet.
7. Ratings do not include the effects of duct end correction.

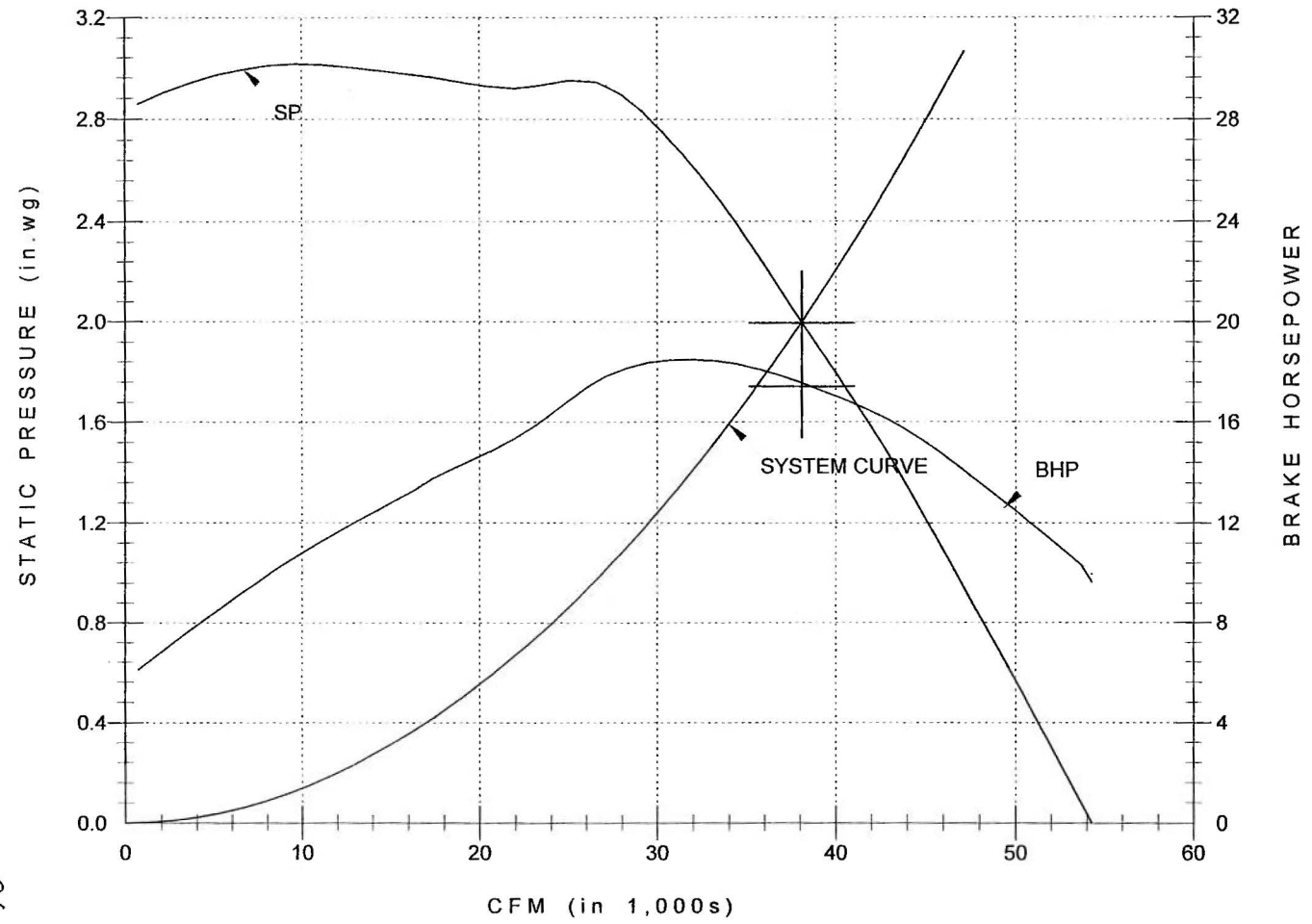
06 APR 00

2-7

Customer: U of K / Mech Eng	Fan Tag: AHU 1,2 return fan	CFM: 38,100
Job ID: EQ-3139	Model: 551 APF	SP: 2
		RPM: 552
		BHP: 17.42
		Outlet Velocity: N/A
		Density: 0.075

88

TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Octave	Level
1	91
2	99
3	90
4	82
5	81
6	74
7	69
8	66

in db re 10^{-12} watts

4/4/00 10:28

06 APR 00
2 - 8

Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

April 04, 2000
Page: 1

Plenum Fan, BIA Design

Fan Description

Tag	AHU 1,2 supply fan
Type	APF
Size	441
Width	SWSI
Class	II
Wheel diameter (in.)	44.09
Drive method	60 Hz belt drive
Percentage width	100%
Percentage diameter	100%

Modifiers

Fan Performance

CFM	38,100
SP (in.wg)	6.57
RPM	1166
Tip Speed (fpm)	13,459
Oper. BHP	55.8
Standard BHP	55.8
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	1194
Static Efficiency	70.48
Mechanical Efficiency	70.48

Sound

Sound Power Levels in dB re. 10^{-12} Watts:

Octave Bands	1	2	3	4	5	6	7	8	LWA
Level at Inlet	91	104	100	89	88	88	85	78	96
Level at Outlet	100	106	103	97	94	90	87	82	100

Definitions:

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

1. Twin City Fan and Blower certifies that the model APF is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.
2. Performance shown is for Installation Type A: Free inlet, Free outlet.
3. Power rating (BHP) does not include belt drive losses.
4. Performance ratings do not include the effects of appurtenances in the airstream.
5. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
6. Values shown are for inlet Lwi and LwiA, and outlet Lwo and LwoA sound power levels for Installation Type A: Free inlet, Free outlet.
7. Ratings do not include the effects of duct end correction.

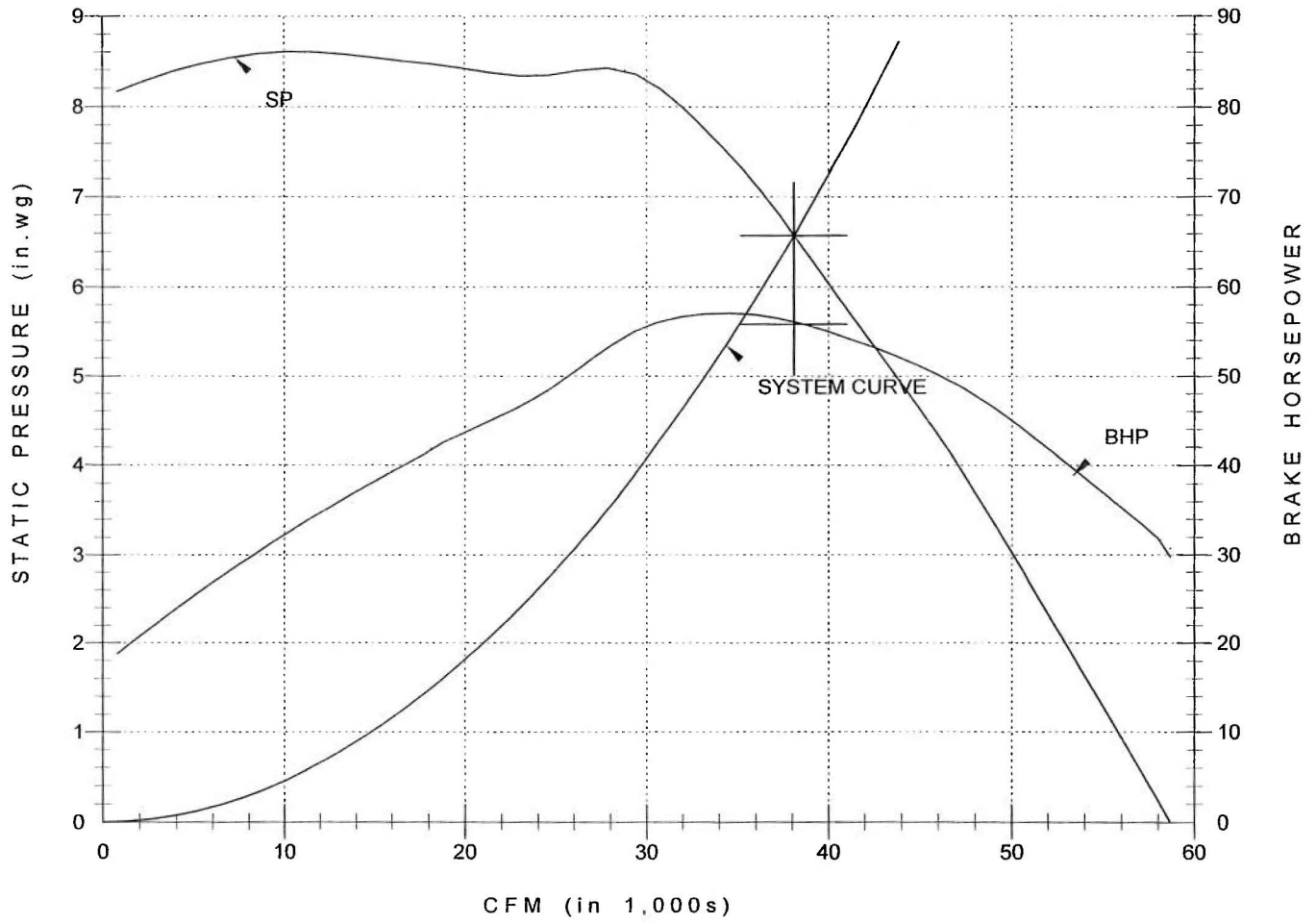
06 APR00

2-9

Customer: U of K / Mech Eng	Fan Tag: AHU 1,2 supply fan	CFM: 38,100
Job ID: EQ-3139	Model: 441 APF	SP: 6.57
		RPM: 1166
		BHP: 55.82
		Outlet Velocity: ..... N/A
		Density: 0.075

96

TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Octave	Level
1	91
2	104
3	100
4	89
5	88
6	88
7	85
8	78

in db re 10^{-12} watts

4/4/00 10:31

06 APR 00
2-10

Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

April 04, 2000
Page: 1

Plenum Fan, BIA Design

Fan Description

Tag	AHU 3 supply fan
Type	APF
Size	441
Width	SWSI
Class	II
Wheel diameter (in.)	44.09
Drive method	60 Hz belt drive
Percentage width	100%
Percentage diameter	100%

Modifiers

Fan Performance

CFM	34,800
SP (in.wg)	7.81
RPM	1186
Tip Speed (fpm)	13,690
Oper. BHP	60
Standard BHP	60
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	1194
Static Efficiency	71.20
Mechanical Efficiency	71.20

Sound

Sound Power Levels in dB re. 10^{-12} Watts:

Octave Bands	1	2	3	4	5	6	7	8	LWA
Level at Inlet	91	102	98	88	86	84	80	76	94
Level at Outlet	100	104	102	95	92	88	84	80	99

Definitions:

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

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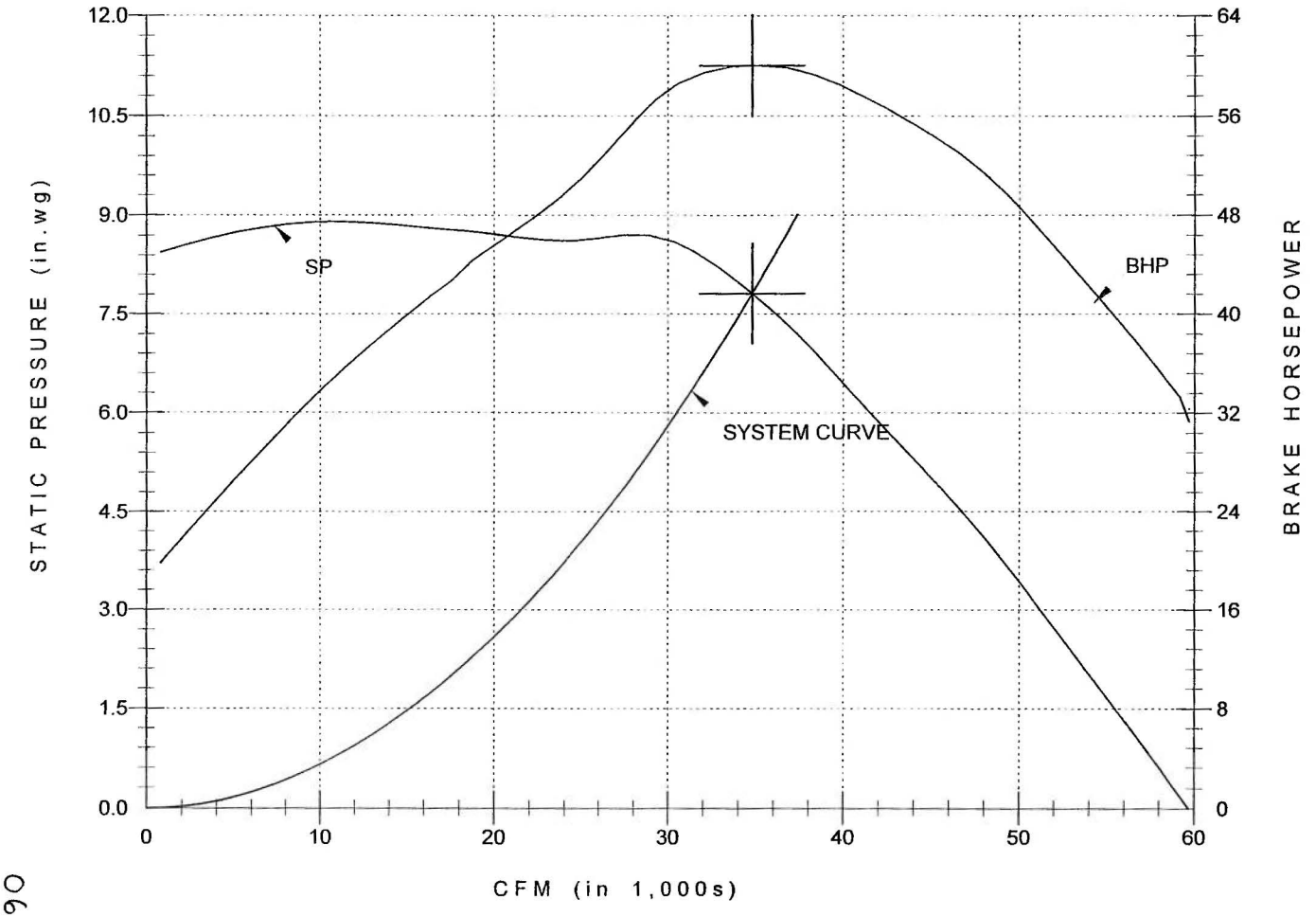
3. Power rating (BHP) does not include belt drive losses.
4. Performance ratings do not include the effects of appurtenances in the airstream.
5. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
6. Values shown are for inlet Lwi and LwiA, and outlet Lwo and LwoA sound power levels for Installation Type A: Free inlet, Free outlet.
7. Ratings do not include the effects of duct end correction.

06APR00

Customer: U of K / Mech Eng	Fan Tag: AHU 3 supply fan	CFM: 34,800
Job ID: EQ-3139	Model: 441 APF	SP: 7.81
		RPM: 1186
		BHP: 60.00
		Outlet Velocity: ..... N/A
		Density: 0.075

94

TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Octave	Level
1	91
2	102
3	98
4	88
5	86
6	84
7	80
8	76

in db re 10^{-12} watts

4/4/00 10:33

06 APR 00
2-12

Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

April 04, 2000
Page: 1

Plenum Fan, BIA Design

Fan Description

Tag	AHU 4 return fan
Type	APF
Size	551
Width	SWSI
Class	I
Wheel diameter (in.)	55.12
Drive method	60 Hz belt drive
Percentage width	100%
Percentage diameter	100%

Modifiers

Fan Performance

CFM	36,000
SP (in.wg)	2
RPM	537
Tip Speed (fpm)	7,749
Oper. BHP	16.3
Standard BHP	16.3
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	735
Static Efficiency	69.48
Mechanical Efficiency	69.48

Sound

Sound Power Levels in dB re. 10^{-12} Watts:

Octave Bands	1	2	3	4	5	6	7	8	LWA
Level at Inlet	91	99	88	82	80	73	68	65	87
Level at Outlet	93	91	87	84	81	76	70	65	86

Definitions:

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

1. Twin City Fan and Blower certifies that the model APF is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.
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4. Performance ratings do not include the effects of appurtenances in the airstream.
5. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
6. Values shown are for inlet Lwi and LwiA, and outlet Lwo and LwoA sound power levels for Installation Type A: Free inlet, Free outlet.
7. Ratings do not include the effects of duct end correction.

06 MR00
2-13

Customer: U of K / Mech Eng	Fan Tag: AHU 4 return fan	CFM: 36,000
Job ID: EQ-3139	Model: 551 APF	SP: 2
		RPM: 537
		BHP: 16.29
		Outlet Velocity: ..... N/A
		Density: 0.075

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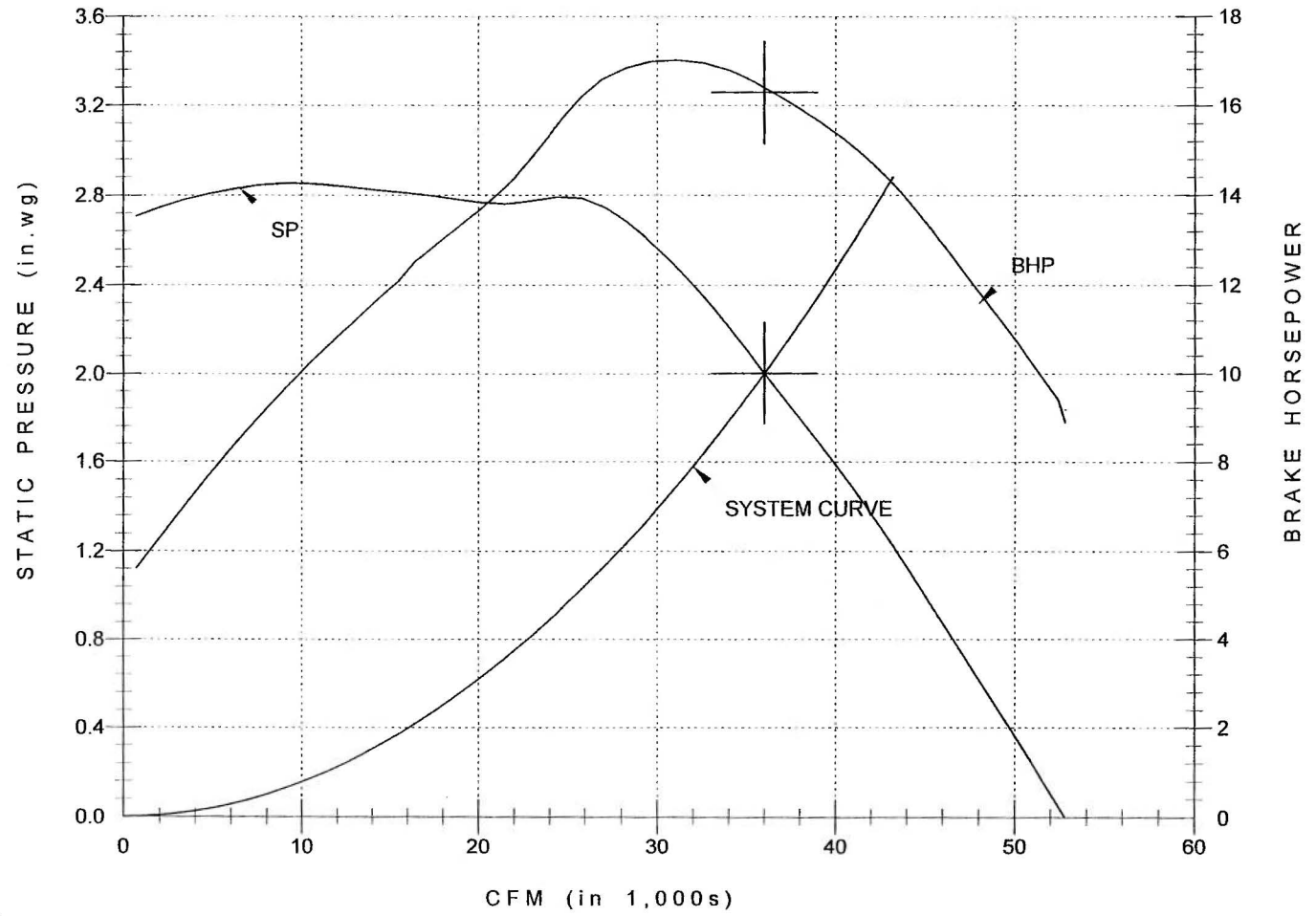
TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Octave	Level
1	91
2	99
3	88
4	82
5	80
6	73
7	68
8	65

in db re 10^{-12} watts

4/4/00 10:41

06 APR 00
2-14

Twin City Fan & Blower

A Twin City Fan Company

5959 Trenton Lane · Minneapolis, MN 55442-3238
Phone (612) 551-7600 · Fax (612) 551-7601

Customer: U of K / Mech Eng
Job Name:
Job ID: EQ-3139

April 04, 2000
Page: 1

Plenum Fan, BIA Design

Fan Description

Tag	AHU 4 supply fan
Type	APF
Size	441
Width	SWSI
Class	II
Wheel diameter (in.)	44.09
Drive method	60 Hz belt drive
Percentage width	100%
Percentage diameter	100%

Modifiers

Fan Performance

CFM	36,000
SP (in.wg)	6.41
RPM	1129
Tip Speed (fpm)	13,032
Oper. BHP	51.1
Standard BHP	51.1
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	1194
Static Efficiency	70.96
Mechanical Efficiency	70.96

Sound

Sound Power Levels in dB re. 10^{-12} Watts:

Octave Bands	1	2	3	4	5	6	7	8	LWA
Level at Inlet	90	103	98	88	87	86	83	76	95
Level at Outlet	99	105	102	96	93	89	85	80	99

Definitions:

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

1. Twin City Fan and Blower certifies that the model APF is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.
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6. Values shown are for inlet Lwi and LwiA, and outlet Lwo and LwoA sound power levels for Installation Type A: Free inlet, Free outlet.
7. Ratings do not include the effects of duct end correction.

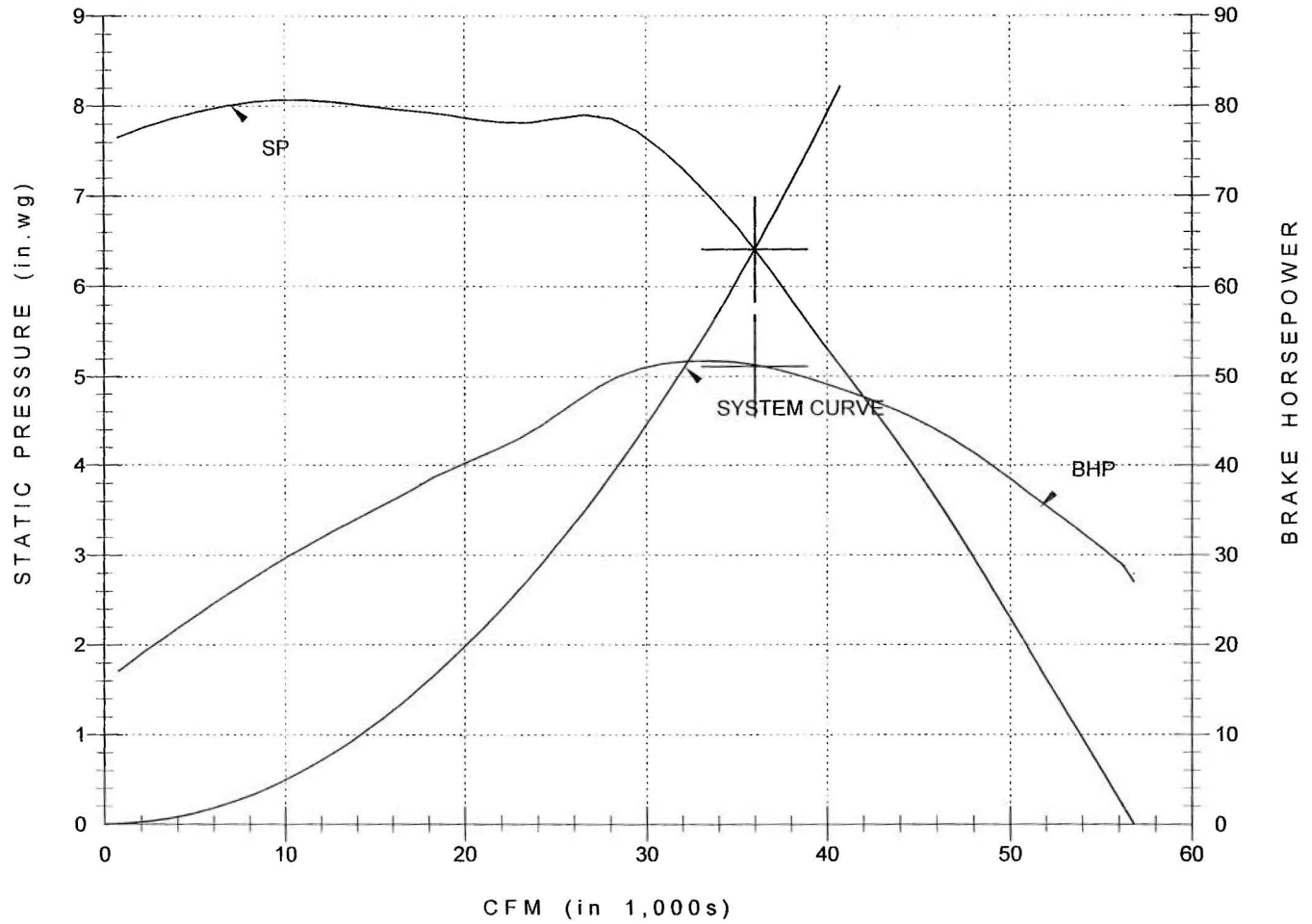
06APR00

2-15

Customer: U of K / Mech Eng	Fan Tag: AHU 4 supply fan	CFM: 36,000
Job ID: EQ-3139	Model: 441 APF	SP: 6.41
		RPM: 1129
		BHP: 51.12
		Outlet Velocity: N/A
		Density: 0.075

95

TWIN CITY FAN AND BLOWER PERFORMANCE CURVE



Sound Power Octave	Level
1	90
2	103
3	98
4	88
5	87
6	86
7	83
8	76

in db re 10^{-12} watts

4/4/00 10:43

06 MAR 00
2-16

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Pre-Heat Coil Schedule

Unit No.	Coil Tag	Air Flow (CFM)	Face Velocity (FPM)	No. Coils	Size H x L Each	Rows	Fins per ft.	Model	* Handing
AHU-1,2	PHC-1, 2	38100	603	4	33x69	1	44	NS	Right
AHU-4	PHC-4	36000	569	4	33x69	1	43	NS	Right

Unit No.	Coil Tag	Ent. Air Temp	Leaving Air Temp.	Capacity	Steam Pressure (PSI)	Flow Rate (lbs. / hr)	Air Pressure Drop (in. H^2O)	Altitude (Ft)
AHU-1,2	PHC-1	40	70	1239.6	2	1281.8	0.11	0
AHU-4	PHC-4	40	70	1171.4	2	1211.3	0.09	0

Unit No.	Fin Material	Tube Material	Casing Material	Coating
AHU-1,2	Aluminum .0075	1 OD Copper, .031 wall, copper headers	Galvanized	None
AHU-4	Aluminum .0075	1 OD Copper, .031 wall, copper headers	Galvanized	None

* Handing is facing the coil, air blowing in face

Unit No.	Coil Tag	Manufacturer	No. Coils	Model	CFM	Rows	FPI	Outlet Velocity (FPM)	Air Pressure Drop (in. H_2O)	Entering Air Temp	Leaving Air Temp
AHU-3	PCH-3	Wing	4	VA-6T	34800	2	12	814	0.47	-10	68

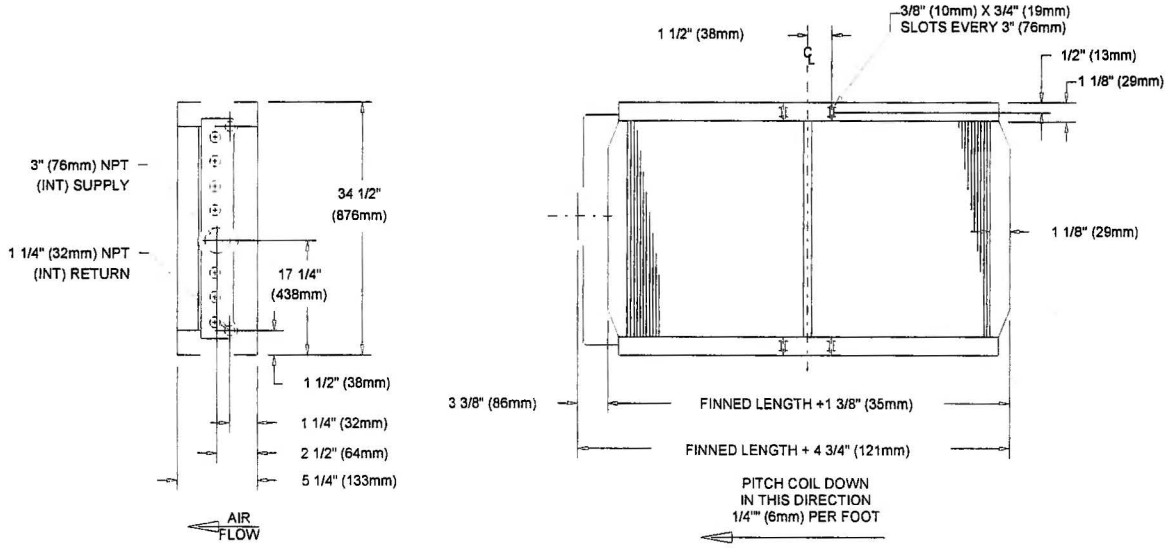
Unit No.	Coil Tag	Steam Pressure	Entering Air Temp	Leaving Air Temp	Capacity (MBH)	Steam Load Lbs/hr	Feature Codes
AHU-3	PCH-3	5	-10	68	2,932	3064	LC

Feature Codes (cont.)	
LC	Left Hand Control

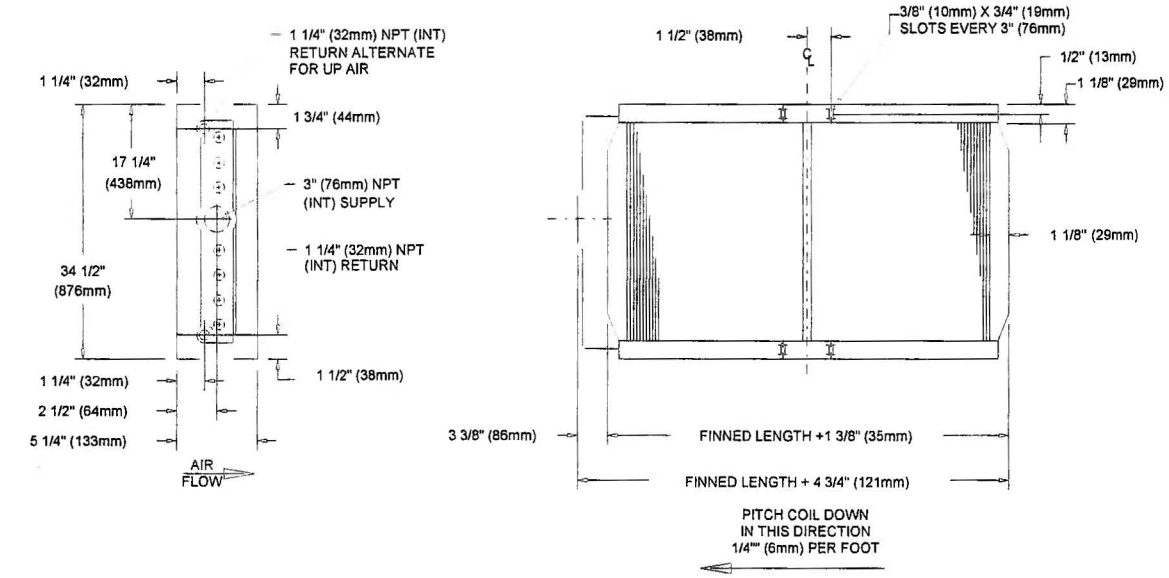
06 APP 00
3-1

Unit Dimensions - Heating Coils
Item: A1 Qty: 1 Tag(s): PHC-1

HORIZONTAL AIR FLOW RIGHT HAND SUPPLY
OR
VERTICAL UP AIR FLOW RIGHT HAND SUPPLY



HORIZONTAL AIR FLOW LEFT HAND SUPPLY
OR
VERTICAL UP AIR FLOW LEFT HAND SUPPLY



06APR00
3-2

Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

TRANE®

Coil Information

Tag	**PHC-1**
Quantity	**1**
System type	**Steam**
Unit size and type	
Coil type	**NS coil**
Coil tube drainability	
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**33" (838 mm)**
Fin type	**Sigma-Flo**
Fin material	**Aluminum**
Fin spacing	**44**
Tube matl/wall thickness	**.031 (0.8 mm) copper 1" (25mm)**
Coil coating	**No**
Turbulators	
Actual airflow	**9525.0 cfm**
Entering dry bulb	**40.00 F**
Leaving dry bulb	**70.00 F**
Total capacity	**309.89 MBh**
Actual coil face area	**15.81 sq ft**
Air pressure drop	**0.11 in H2O**
Volume	**2.81 gal**
Elevation	**0.00 ft**
Face velocity	**602.37 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**143.9 lb**
Installed weight	

Hot Water Information

Fluid type	
Fluid concentration	
Standard flow rate	
Entering fluid temp	
Fluid temp drop	
Leaving fluid temp	
Fluid PD	
Max fluid PD	
Fluid velocity	
Fouling factor	
Reynolds number	

Steam Information

Steam pressure	**2.00 psig**
Steam PD	**0.20 psig**
Modulated	**On Off**
Degrees superheat	
Condensate flow rate	**1281.80 lb/hr**

Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**38100.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**1239.58 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	
Nominal ht stacked coil #1	**33**	Coil bank fluid PD	
Nominal ht stacked coil #2		Coil bank volume	**11.24 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**575.6 lb**
		Coil bank installed weight	

Note: Rated and Certified in accordance with the current edition of ARI Standard 410.

06 APR 00
3-3

Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

TRANE

Coil Information

Tag	**PHC-2**
Quantity	**1**
System type	**Steam**
Unit size and type	
Coil type	**NS coil**
Coil tube drainability	
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**33" (838 mm)**
Fin type	**Sigma-Flo**
Fin material	**Aluminum**
Fin spacing	**44**
Tube matl/wall thickness	**.031 (0.8 mm) copper 1" (25mm)**
Coil coating	**No**
Turbulators	
Actual airflow	**9525.0 cfm**
Entering dry bulb	**40.00 F**
Leaving dry bulb	**70.00 F**
Total capacity	**309.89 MBh**
Actual coil face area	**15.81 sq ft**
Air pressure drop	**0.11 in H2O**
Volume	**2.81 gal**
Elevation	**0.00 ft**
Face velocity	**602.37 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**143.9 lb**
Installed weight	

Hot Water Information

Fluid type	
Fluid concentration	
Standard flow rate	
Entering fluid temp	
Fluid temp drop	
Leaving fluid temp	
Fluid PD	
Max fluid PD	
Fluid velocity	
Fouling factor	
Reynolds number	

Steam Information

Steam pressure	**2.00 psig**
Steam PD	**0.20 psig**
Modulated	**On Off**
Degrees superheat	
Condensate flow rate	**1281.80 lb/hr**

Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**38100.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**1239.58 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	
Nominal ht stacked coil #1	**33**	Coil bank fluid PD	
Nominal ht stacked coil #2		Coil bank volume	**11.24 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**575.6 lb**
		Coil bank installed weight	

06 APR 00
3-4

Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

Coil Information

Tag	**PHC-4**
Quantity	**1**
System type	**Steam**
Unit size and type	
Coil type	**NS coil**
Coil tube drainability	
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**33" (838 mm)**
Fin type	**Sigma-Flo**
Fin material	**Aluminum**
Fin spacing	**43**
Tube matl/wall thickness	**.031 (0.8 mm) copper 1" (25mm)**
Coil coating	**No**
Turbulators	
Actual airflow	**9000.0 cfm**
Entering dry bulb	**40.00 F**
Leaving dry bulb	**70.00 F**
Total capacity	**292.81 MBh**
Actual coil face area	**15.81 sq ft**
Air pressure drop	**0.09 in H2O**
Volume	**2.81 gal**
Elevation	**0.00 ft**
Face velocity	**569.17 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**143.4 lb**
Installed weight	

Hot Water Information

Fluid type	
Fluid concentration	
Standard flow rate	
Entering fluid temp	
Fluid temp drop	
Leaving fluid temp	
Fluid PD	
Max fluid PD	
Fluid velocity	
Fouling factor	
Reynolds number	

Steam Information

Steam pressure	**2.00 psig**
Steam PD	**0.18 psig**
Modulated	**On Off**
Degrees superheat	
Condensate flow rate	**1211.23 lb/hr**

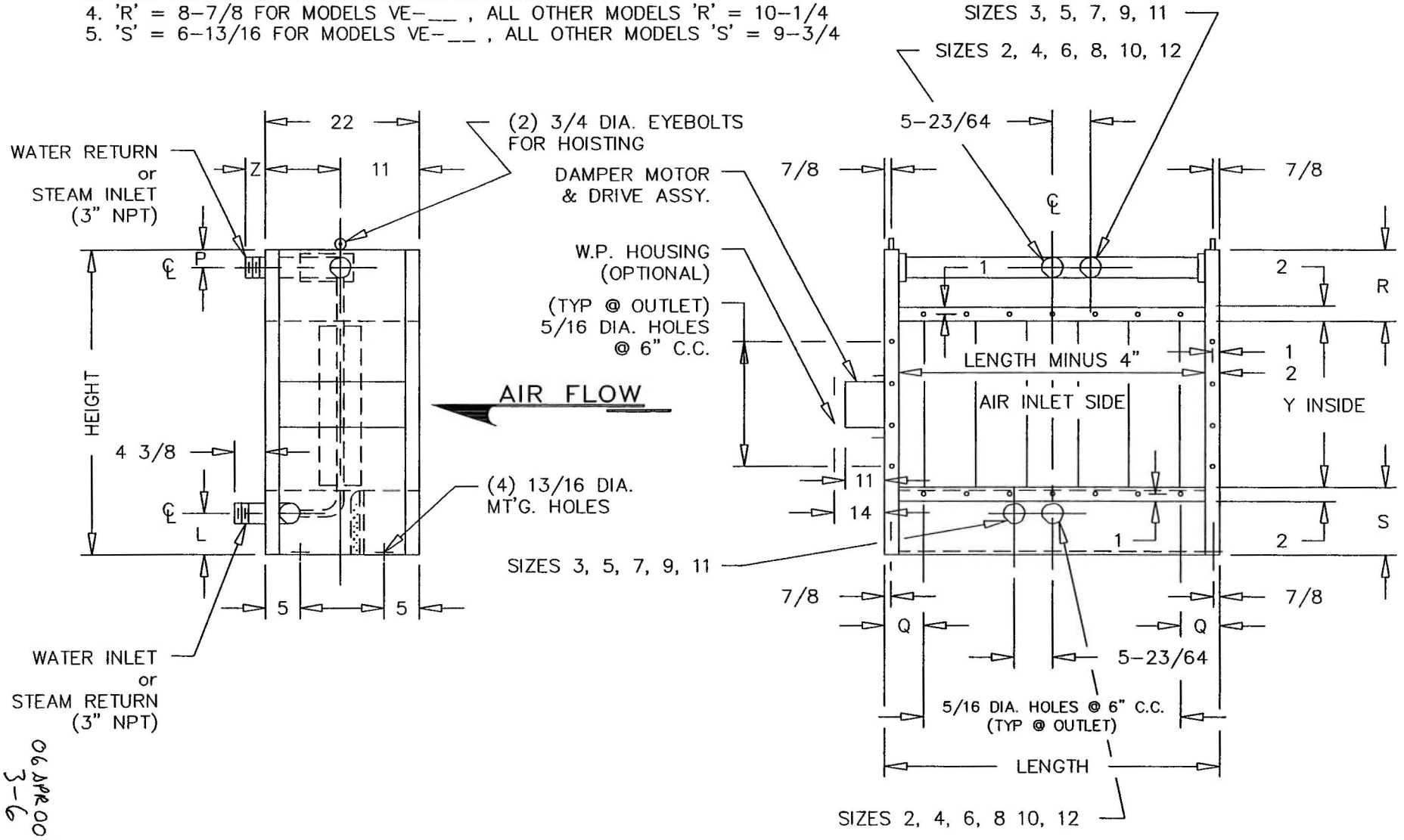
Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**36000.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**1171.26 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	
Nominal ht stacked coil #1	**33**	Coil bank fluid PD	
Nominal ht stacked coil #2		Coil bank volume	**11.24 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**573.5 lb**
		Coil bank installed weight	

06 APR 00
3-5

NOTES:

1. AFTER PIPING REMOVE NUTS & BOLTS ON BOTH SIDES OF LOWER HEADER
2. LEFT HAND DAMPER MOTOR LOCATION SHOWN, RIGHT HAND IS OPTIONAL
3. COIL AVAILABLE FOR HORIZONTAL AIR FLOW ONLY
4. 'R' = 8-7/8 FOR MODELS VE-___ , ALL OTHER MODELS 'R' = 10-1/4
5. 'S' = 6-13/16 FOR MODELS VE-__ , ALL OTHER MODELS 'S' = 9-3/4

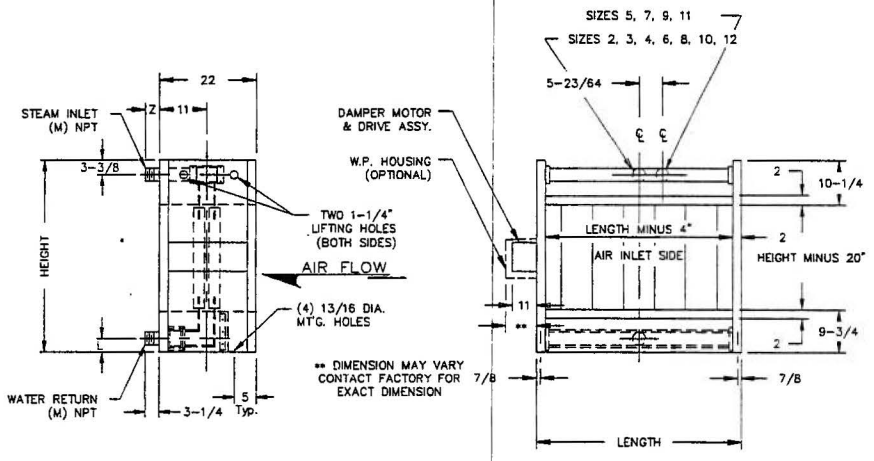


06 APR 00
3-6

SIZE DESIGNATIONS

STEAM COIL DIMENSIONS

(Coil Available For Horizontal Air Flow Only)



SIZE DESIGNATION

Second letter indicates height
Number indicates length
Letter Suffix indicates if coil:
- Single Tube Row - Steam (no suffix)
- Two Row - Steam (T)
- Three Row - Steam (TX)
- Two Row - Hot Water Design (W)
- One Row - Hot Water Design (no suffix)

EXAMPLE

Casting Height = 98"
Casting Length = 89-3/4"
VE-8T
Steam Coil, Two Rows Deep

NOTES

1. To Determine face area (FA), multiply outlet area by 0.56.
2. After piping, remove nuts and bolts on both sides of lower header.
3. Left-hand damper motor location shown; right-hand is optional.

SINGLE ROW STEAM COIL DIMENSIONS

CASING								2		3		4		5		6		7		8		9		10		11		12	
CASING LENGTH								25-7/16		36-3/16		46-7/8		57-5/8		68-5/16		79-1/16		89-3/4		100-1/2		111-3/16		121-29/32		132-5/8	
M								3		3		3		3		3		3		3		3		3		3		3	
Z								3-3/4		3-3/4		3-3/4		3-3/4		2-1/8		2-1/8		2-1/8		2-1/8		2-1/8		2-1/8		2-1/8	
SIZE	CASING HEIGHT	L	P	R	S	X	Y	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS
VA	44	5-15/16	5-1/8	10-1/4	9-3/4	4-3/8	24	3.57	265	5.39	327	7.15	386	8.94	453	10.7	534	12.5	600	14.3	698	—	—	—	—	—	—	—	—
VB	56	5-15/16	5-1/8	10-1/4	9-3/4	4-3/8	36	5.36	305	8.08	370	10.7	443	13.4	520	16.1	607	18.8	685	21.4	779	—	—	—	—	—	—	—	—
VC	68	5-15/16	5-1/8	10-1/4	9-3/4	4-3/8	48	7.15	335	10.8	415	14.3	495	17.9	580	21.4	673	25.0	760	28.6	857	32.2	920	35.8	1002	39.3	1147	42.9	1292
VD	80	5-15/16	5-1/8	10-1/4	9-3/4	4-3/8	60	—	—	13.5	455	17.9	540	22.3	640	26.8	745	31.3	835	35.7	947	40.2	1025	44.7	1117	49.1	1287	53.6	1457
VE	93-11/16	3	3-3/4	8-7/8	6-13/16	4-3/8	78	—	—	—	—	23.2	620	29.0	730	34.8	840	40.6	950	46.5	1072	52.2	1170	58.1	1270	63.8	1460	69.6	1658
* VF	116	5-15/16	5-1/8	10-1/4	9-3/4	4-3/8	96	—	—	—	—	—	—	35.8	825	42.9	940	50.1	1070	57.2	1195	64.4	1320	71.5	1430	78.7	1640	85.8	1870

TWO ROW STEAM COIL DIMENSIONS

CASING							2T		3T		4T		5T		6T		7T		8T		9T		10T		11T		12T	
LENGTH							25-7/16		36-3/16		46-7/8		57-5/8		68-5/16		79-1/16		89-3/4		100-1/2		111-3/16		121-29/32		132-5/8	
L							3-1/8		3-1/8		3-1/8		3-1/8		3-1/8		3-1/8		3-1/8		3-1/8		3-1/8		3-5/8		3-5/8	
M							3		3		3		3		3		3		3		3		3		4		4	
Z							3-1/4		3-1/4		3-1/4		3-1/4		5-1/4		5-1/4		5-1/4		5-1/4		5-1/4		5-1/4		5-1/4	
SIZE	CASING HEIGHT	P	R	S	X	Y	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS
VA	44	3-3/8	10-1/4	9-3/4	3-1/4	24	3.57	285	5.39	354	7.15	422	8.94	498	10.7	535	12.5	700	14.3	680	—	—	—	—	—	—	—	—
VB	56	3-3/8	10-1/4	9-3/4	3-1/4	36	5.36	325	8.08	399	10.7	482	13.4	568	16.1	665	18.8	777	21.4	905	—	—	—	—	—	—	—	—
VC	68	3-3/8	10-1/4	9-3/4	3-1/4	48	7.15	355	10.8	446	14.3	537	17.9	632	21.4	736	25.0	838	28.6	940	32.2	1042	35.8	1145	39.3	1350	42.9	1555
VD	80	3-3/8	10-1/4	9-3/4	3-1/4	60	—	—	13.5	488	17.9	585	22.3	696	26.8	812	31.3	970	35.7	1105	40.2	1220	44.7	1315	49.1	1525	53.6	1735
VE	98	3-3/8	10-1/4	9-3/4	3-1/4	78	—	—	—	—	23.2	669	29.0	792	34.8	966	40.6	1107	46.5	1238	52.2	1363	58.1	1479	63.8	1719	69.6	1959
* VF	116	3-3/8	10-1/4	9-3/4	3-1/4	96	—	—	—	—	—	—	35.8	900	42.9	1100	50.1	1255	57.2	1380	64.4	1490	71.5	1430	78.7	1900	85.8	2140

THREE ROW STEAM COIL DIMENSIONS

CASING							2TX		3TX		4TX		5TX		6TX		7TX		8TX		9TX		10TX		11TX		12TX	
LENGTH							25-7/16		36-3/16		46-7/8		57-5/8		68-5/16		79-1/16		89-3/4		100-1/2		111-3/16		121-29/32		132-5/8	
L							2-13/16		2-13/16		2-13/16		2-13/16		2-13/16		2-13/16		2-13/16		3-15/16		3-15/16		3-15/16		3-15/16	
M							3		3		3		3		3		3		3		4		4		4		4	
Z							3		3		3		3		6-1/4		6-1/4		6-1/4		6-1/4		6-1/4		6-1/4		6-1/4	
SIZE	CASING HEIGHT	P	R	S	X	Y	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS	OA FT²	WT LBS
VA	44	2-7/8	8-1/4	11-3/4	4-3/8	24	3.57	305	5.39	384	7.15	462	8.94	548	10.7	596	12.5	750	14.3	762	—	—	—	—	—	—	—	—
VB	56	2-7/8	8-1/4	11-3/4	4-3/8	36	5.36	347	8.08	434	10.7	527	13.4	624	16.1	733	18.8	864	21.4	995	—	—	—	—	—	—	—	—
VC	68	2-7/8	8-1/4	11-3/4	4-3/8	48	7.15	380	10.8	484	14.3	586	17.9	684	21.4	811	25.0	925	28.6	1040	32.2	1155	35.8	1270	39.3	1488	42.9	1705
VD	80	2-7/8	8-1/4	11-3/4	4-3/8	60	—	—	13.5	530	17.9	639	22.3	764	26.8	894	31.3	1060	35.7	1215	40.2	1342	44.7	1447	49.1	1676	53.6	1900
VE	98	2-7/8	8-1/4	11-3/4	4-3/8	78	—	—	—	—	23.2	732	29.0	871	34.8	1062	40.6	1218	46.5	1367	52.2	1507	58.1	1639	63.8	1894	69.6	2150
* VF	116	2-7/8	8-1/4	11-3/4	4-3/8	96	—	—	—	—	—	—	35.8	985	42.9	1230	50.1	1385	57.2	1520	64.4	1670	71.5	1860	78.7	2120	85.8	2320

06 APR 00

Vertical Tube Integral Face and By-Pass Damper Coil Performance

Job Name: U of K

Tag Coil: PHC-3
4/5/2000

Prepared by: Barry Rowton

Heating Coil:

Model No.	VA-6T Steam, 2 Row Coil
Fin Material	Aluminum
Fins per inch	12 fpi
Tube Material	Copper
Airflow Direction	Horizontal
Air Flow Rate	8,700 acfm
Altitude	0 ft. elevation
Outlet Velocity	813 FPM sea level
Air press. drop (alt.)	.47 in. W.C. at altitude,
Air press. drop (std.)	.47 in. W.C., at sea level
Entering air temp.	-10 F.
Leaving air temp.	68 F.
Steam pressure	5 psig
Steam temp.	226 F.
Steam load	766

Damper Controls:
Standard Left Hand Control Location
Special - Electric Control and Actuator Not Specified (Installed by Others)

Options/Notes:
40002 - VA-6T Steam, 2 Row Coil
40009 - Special Fin Spacing, 12 fpi

06 APR 00
3-8

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Cooling Coil Schedule

Unit No.	Coil Tag	Air Flow (CFM)	Face Velocity (FPM)	No. Coils	Size H x L Each	Rows	Fins per ft.	Sensible Cooling	Total Cooling	Manufacturer	Model	Fin Design	Turbulators	* Handing
AHU-1,2	DHC-1, 2	38100	473	4	42x69	8	112	1236	1816	Trane	W	PH	Included	Right
AHU-3	DHC-3	34800	432	4	42x69	8	136	1644	3077	Trane	W	PH	Not Included	Right
AHU-4	DHC-4	36000	447	4	42x69	8	108	1168	1717	Trane	W	PH	Included	Right

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_2O)	Air Press Drop (in H_2O)	Altitude (Ft)	Fluid
AHU-1,2	DHC-1	82	68	52.6	52.5	45	60	242	11.9	0.83	0	Water
AHU-3	DHC-3	95	78	52.6	52.5	45	60	410	12.5	0.91	0	Water
AHU-4	DHC-4	82	68	52.6	52.4	45	60	229	10.8	0.73	0	Water

Unit No.	Coil Tag	Fin Material	Tube Material	Casing Material	Intermediate Drain	Coating
AHU-1,2	DHC-1	Aluminum .0075	5/8 OD Copper, .035 wall, copper headers	Galvanized	Stainless Steel Pan	None
AHU-3	DHC-3	Aluminum .0075	5/8 OD Copper, .035 wall, copper headers	Galvanized	Stainless Steel Pan	None
AHU-4	DHC-4	Aluminum .0075	5/8 OD Copper, .035 wall, copper headers	Galvanized	Stainless Steel Pan	None

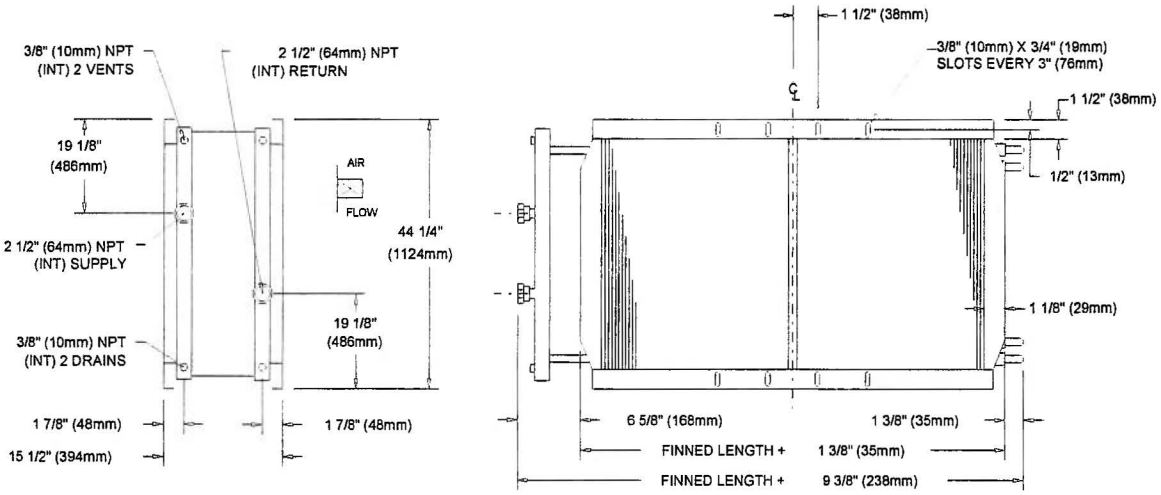
* Trane – Hand is determined by facing the coil with air hitting in face.

06 MPR00
4-1

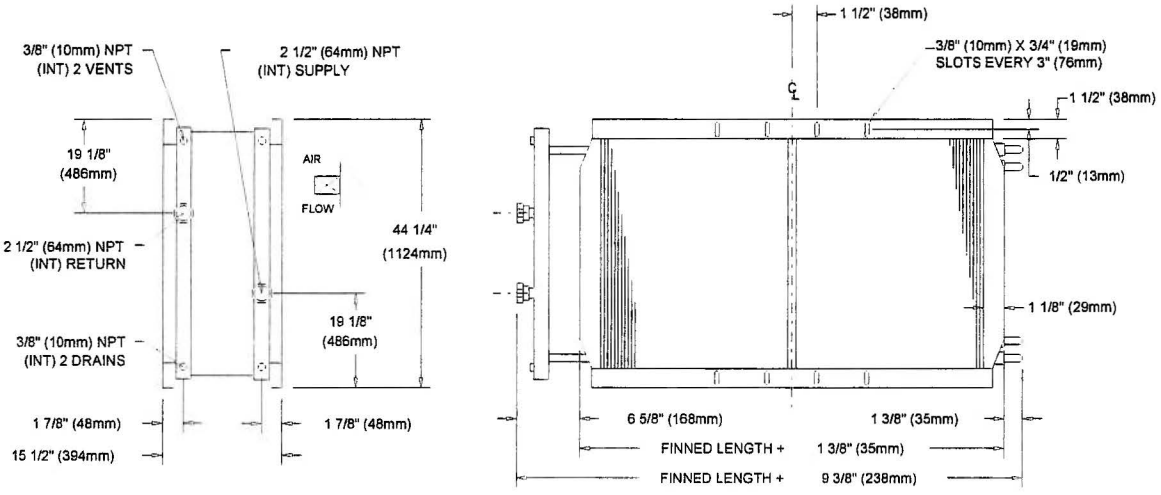
Unit Dimensions - Cooling Coils

Items: A1 - A16 Qty: 16 Tag(s): DHC-1, DHC-1, DHC-1, DHC-1, DHC-2, DHC-2, DHC-2, DHC-2, DHC-3, DHC-3, DHC-3, DHC-3, DHC-4, DHC-4, DHC-4, DHC-4

HORIZONTAL AIR FLOW RIGHT HAND SUPPLY



HORIZONTAL AIR FLOW LEFT HAND SUPPLY



06APR00
4-2

Cooling Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

Coil Information

Tag	**DHC-1**
Quantity	**1**
System type	**Chilled Water**
Unit size and type	
Coil type	**W coil**
Coil tube drainability	
Rows	**8**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin coating	
Fin material	**Aluminum**
Fin spacing	**112**
Fin type	**Prima-flo H**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**Yes**
Rigging weight	**735.5 lb**
Installed weight	**900.7 lb**
Actual airflow	**9525.0 cfm**
Entering dry bulb	**82.00 F**
Entering wet bulb	**68.00 F**
Total capacity	**453.87 MBh**
Sensible capacity	**309.11 MBh**
Leaving dry bulb	**52.60 F**
Leaving wet bulb	**52.46 F**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.83 in H2O**
Volume	**19.81 gal**
Elevation	**0.00 ft**
Face velocity	**473.29 ft/min**
Max APD	
Max face velocity	
Max fin spacing	

Chilled Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**60.52 gpm**
Entering fluid temp	**45.00 F**
Fluid temp rise	**15.00 F**
Leaving fluid temp	**60.00 F**
Fluid PD	**11.91 ft H2O**
Max fluid PD	
Fluid velocity	**2.64 ft/sec**
Fouling factor	**0.00000 hr-sq ft-deg F/Btu**
Reynolds number	

Refrigerant Information

Refrigerant type	
Liquid temp	
Suction temp	
Circuiting type	
Distributor size - ent air side	
Distributor size - lvg air side	
DX circuits - ent air side	
DX circuits - lvg air side	
Number of distr - ent coil type #1	
Number of distr - lvg coil type #1	
Number of distr - ent coil type #2	
Number of distr - lvg coil type #2	
Number of distr - ent coil type #3	
Number of distr - lvg coil type #3	
LDB - ent air vert split	
LWB - ent air vert split	
Total cap ent coil type #1	
Total cap lvg coil type #1	
Total cap ent coil type #2	
Total cap lvg coil type #2	
Total cap ent coil type #3	
Total cap lvg coil type #3	
Packed elbows	

Stacked Coil Information

Qty of stacked coil #1	**4.00 Each**	Coil bank total capacity	**1815.47 MBh**
Qty of stacked coil #2		Coil bank sensible capacity	**1236.43 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**242.06 gpm**
Nominal ht stacked coil #1	**42**	Coil bank volume	**79.25 gal**
Nominal ht stacked coil #2		Coil bank rigging weight	**3602.9 lb**
Nominal ht stacked coil #3		Coil bank installed weight	
Coil bank airflow	**38100.0 cfm**	Coil bank fluid PD	**11.91 ft H2O**

06 APR 00
4-3

Cooling Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

Coil Information

Tag	**DHC-2**
Quantity	**1**
System type	**Chilled Water**
Unit size and type	
Coil type	**W coil**
Coil tube drainability	
Rows	**8**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin coating	
Fin material	**Aluminum**
Fin spacing	**112**
Fin type	**Prima-flo H**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**Yes**
Rigging weight	**735.5 lb**
Installed weight	**900.7 lb**
Actual airflow	**9525.0 cfm**
Entering dry bulb	**82.00 F**
Entering wet bulb	**68.00 F**
Total capacity	**453.87 MBh**
Sensible capacity	**309.11 MBh**
Leaving dry bulb	**52.60 F**
Leaving wet bulb	**52.46 F**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.83 in H2O**
Volume	**19.81 gal**
Elevation	**0.00 ft**
Face velocity	**473.29 ft/min**
Max APD	
Max face velocity	
Max fin spacing	

Chilled Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**60.52 gpm**
Entering fluid temp	**45.00 F**
Fluid temp rise	**15.00 F**
Leaving fluid temp	**60.00 F**
Fluid PD	**11.91 ft H2O**
Max fluid PD	
Fluid velocity	**2.64 ft/sec**
Fouling factor	**0.00000 hr-sq ft-deg F/Btu**
Reynolds number	

Refrigerant Information

Refrigerant type	
Liquid temp	
Suction temp	
Circuiting type	
Distributor size - ent air side	
Distributor size - lvg air side	
DX circuits - ent air side	
DX circuits - lvg air side	
Number of distr - ent coil type #1	
Number of distr - lvg coil type #1	
Number of distr - ent coil type #2	
Number of distr - lvg coil type #2	
Number of distr - ent coil type #3	
Number of distr - lvg coil type #3	
LDB - ent air vert split	
LWB - ent air vert split	
Total cap ent coil type #1	
Total cap lvg coil type #1	
Total cap ent coil type #2	
Total cap lvg coil type #2	
Total cap ent coil type #3	
Total cap lvg coil type #3	
Packed elbows	

Stacked Coil Information

Qty of stacked coil #1	**4.00 Each**	Coil bank total capacity	**1815.47 MBh**
Qty of stacked coil #2		Coil bank sensible capacity	**1236.43 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**242.06 gpm**
Nominal ht stacked coil #1	**42**	Coil bank volume	**79.25 gal**
Nominal ht stacked coil #2		Coil bank rigging weight	**3602.9 lb**
Nominal ht stacked coil #3		Coil bank installed weight	
Coil bank airflow	**38100.0 cfm**	Coil bank fluid PD	**11.91 ft H2O**

06APR00
4-4

Cooling Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

Coil Information

Tag	**DHC-3**
Quantity	**1**
System type	**Chilled Water**
Unit size and type	
Coil type	**W coil**
Coil tube drainability	
Rows	**8**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin coating	
Fin material	**Aluminum**
Fin spacing	**136**
Fin type	**Prima-flo H**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**No**
Rigging weight	**774.6 lb**
Installed weight	**939.9 lb**
Actual airflow	**8700.0 cfm**
Entering dry bulb	**95.00 F**
Entering wet bulb	**78.00 F**
Total capacity	**769.25 MBh**
Sensible capacity	**411.12 MBh**
Leaving dry bulb	**52.60 F**
Leaving wet bulb	**52.50 F**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.91 in H2O**
Volume	**19.81 gal**
Elevation	**0.00 ft**
Face velocity	**432.30 ft/min**
Max APD	
Max face velocity	
Max fin spacing	

Chilled Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**102.57 gpm**
Entering fluid temp	**45.00 F**
Fluid temp rise	**15.00 F**
Leaving fluid temp	**60.00 F**
Fluid PD	**12.49 ft H2O**
Max fluid PD	
Fluid velocity	**4.48 ft/sec**
Fouling factor	**0.00000 hr-sq ft-deg F/Btu**
Reynolds number	

Refrigerant Information

Refrigerant type	
Liquid temp	
Suction temp	
Circuiting type	
Distributor size - ent air side	
Distributor size - lvg air side	
DX circuits - ent air side	
DX circuits - lvg air side	
Number of distr - ent coil type #1	
Number of distr - lvg coil type #1	
Number of distr - ent coil type #2	
Number of distr - lvg coil type #2	
Number of distr - ent coil type #3	
Number of distr - lvg coil type #3	
LDB - ent air vert split	
LWB - ent air vert split	
Total cap ent coil type #1	
Total cap lvg coil type #1	
Total cap ent coil type #2	
Total cap lvg coil type #2	
Total cap ent coil type #3	
Total cap lvg coil type #3	
Packed elbows	

Stacked Coil Information

Qty of stacked coil #1	**4.00 Each**	Coil bank total capacity	**3076.98 MBh**
Qty of stacked coil #2		Coil bank sensible capacity	**1644.48 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**410.26 gpm**
Nominal ht stacked coil #1	**42**	Coil bank volume	**79.25 gal**
Nominal ht stacked coil #2		Coil bank rigging weight	**3759.6 lb**
Nominal ht stacked coil #3		Coil bank installed weight	
Coil bank airflow	**34800.0 cfm**	Coil bank fluid PD	**12.49 ft H2O**

06 APR 00
4-5

Cooling Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

TRANE®

Coil Information

Tag	**DHC-4**
Quantity	**1**
System type	**Chilled Water**
Unit size and type	
Coil type	**W coil**
Coil tube drainability	
Rows	**8**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin coating	
Fin material	**Aluminum**
Fin spacing	**108**
Fin type	**Prima-flo H**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**Yes**
Rigging weight	**726.9 lb**
Installed weight	**892.2 lb**
Actual airflow	**9000.0 cfm**
Entering dry bulb	**82.00 F**
Entering wet bulb	**68.00 F**
Total capacity	**429.14 MBh**
Sensible capacity	**292.07 MBh**
Leaving dry bulb	**52.60 F**
Leaving wet bulb	**52.45 F**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.73 in H2O**
Volume	**19.81 gal**
Elevation	**0.00 ft**
Face velocity	**447.20 ft/min**
Max APD	
Max face velocity	
Max fin spacing	

Chilled Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**57.22 gpm**
Entering fluid temp	**45.00 F**
Fluid temp rise	**15.00 F**
Leaving fluid temp	**60.00 F**
Fluid PD	**10.81 ft H2O**
Max fluid PD	
Fluid velocity	**2.50 ft/sec**
Fouling factor	**0.00000 hr-sq ft-deg F/Btu**
Reynolds number	

Refrigerant Information

Refrigerant type	
Liquid temp	
Suction temp	
Circuiting type	
Distributor size - ent air side	
Distributor size - lvg air side	
DX circuits - ent air side	
DX circuits - lvg air side	
Number of distr - ent coil type #1	
Number of distr - lvg coil type #1	
Number of distr - ent coil type #2	
Number of distr - lvg coil type #2	
Number of distr - ent coil type #3	
Number of distr - lvg coil type #3	
LDB - ent air vert split	
LWB - ent air vert split	
Total cap ent coil type #1	
Total cap lvg coil type #1	
Total cap ent coil type #2	
Total cap lvg coil type #2	
Total cap ent coil type #3	
Total cap lvg coil type #3	
Packed elbows	

Stacked Coil Information

Qty of stacked coil #1	**4.00 Each**	Coil bank total capacity	**1716.58 MBh**
Qty of stacked coil #2		Coil bank sensible capacity	**1168.28 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**228.88 gpm**
Nominal ht stacked coil #1	**42**	Coil bank volume	**79.25 gal**
Nominal ht stacked coil #2		Coil bank rigging weight	**3568.9 lb**
Nominal ht stacked coil #3		Coil bank installed weight	
Coil bank airflow	**36000.0 cfm**	Coil bank fluid PD	**10.81 ft H2O**

06 APPROO
4-6

TRANE

Lexington

Air Handling Systems

1515 Mercer Road
Lexington, KY 40511
TEL 606 259 2544
FAX 606 259 2518

Tom Erpenbeck
Product Engineering

To: Scott Sandberg, Sales Manager
The Trane Company
2432 Fortune Drive, Suite 110
Lexington, KY 40509

Date: March 1, 2000

Subject: **MOISTURE CARRYOVER**

I have been asked to respond to concerns about moisture carryover with Trane dehumidification coils. The Trane Company spends a great deal of testing time and engineering resources to guarantee that a properly maintained coil will not exhibit moisture carryover when the coil is operating at or below the capacity and face velocity it was selected at.

The Trane Company tests each of its 5 fin surfaces for moisture carryover. The result of this testing is moisture carryover face velocity limits for each of the fin surfaces as a function of fin series. These face velocity limits are encoded into each of Trane's selection programs to guarantee that each dehumidifying coil selection is checked for possible moisture carryover problems. Trane has used this method to guard against moisture carryover for over 15 years and has found it to be very successful for face velocities up to 750 fpm.

Specifically, the coils in question are:

Tag	Fin Series (fpf)	Face Velocity (ft/min)	Face Velocity Limit (ft/min)
AHU-1,2	112	473	731
AHU-3	136	432	657
AHU-4	108	447	740

The coils on AHU-1 and 2 will operate at 258 feet per minute under the maximum velocity for these coils. The coil on AHU-3 will operate at 225 feet per minute under the maximum velocity for this coil. The coil on AHU-4 will operate at 293 feet per minute under the maximum velocity for this coil. This data shows that the coils in question will have no moisture carryover problems.

It should be noted that fin surface cleanliness will effect a coil's moisture carryover limit. A coil that does not have proper upstream filtration will have a reduced moisture carryover limit due to a dirty fin surface. It is important to keep the fin surface clean to guard against moisture carryover problems.

If you have any further questions or concerns, please contact me.

Tom Erpenbeck
Product Engineering
Air Handling Systems

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Re-Heat Coil Schedule

Unit No.	Coil Tag	Air Flow (CFM)	Face Velocity (FPM)	No. Coils	Size H x L Each	Rows	Fins per ft.	Total Heating (MBH)	Manufacturer	Model	Fin Design	Turbulators	* Handing
AHU-1,2	RHC-1, 2	38100	473	4	42x69	1	97	413	Trane	WC	PH	Not Included	Right
AHU-3	RHC-3	34800	432	4	42x69	1	103	377	Trane	WC	PE	Not Included	Right
AHU-4	RHC-4	36000	447	4	42x69	1	104	390	Trane	WC	PE	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_2O)	Air Pressure (in H_2O)	Altitude (Ft)	Fluid
AHU-1,2	RHC-1	50	60	120	90	27.6	0.1	0.08	0	Water
AHU-3	RHC-3	50	60	120	90	25.2	0.08	0.08	0	Water
AHU-4	RHC-4	50	60	120	90	26.1	0.09	0.07	0	Water

Unit No.	Coil Tag	Fin Material	Tube Material	Casing Material	Coating
AHU-1,2	RHC-1	Aluminum .0075	5/8 OD Copper, .035 wall	Galvanized	None
AHU-3	RHC-3	Aluminum .0075	5/8 OD Copper, .035 wall	Galvanized	None
AHU-4	RHC-4	Aluminum .0075	5/8 OD Copper, .035 wall	Galvanized	None

* Trane – Hand is determined by facing the coil with air hitting in face.

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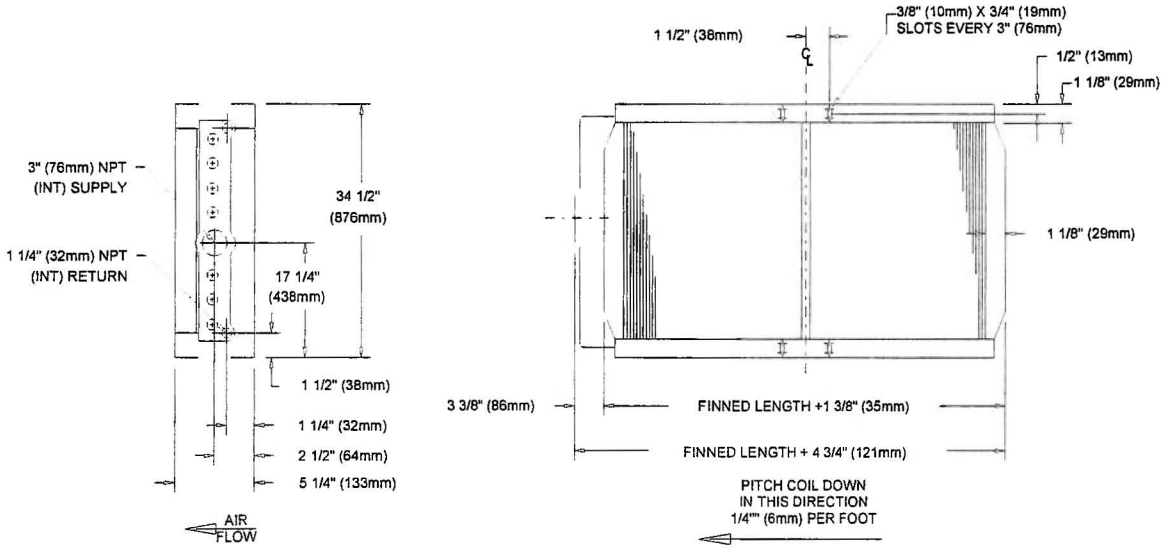
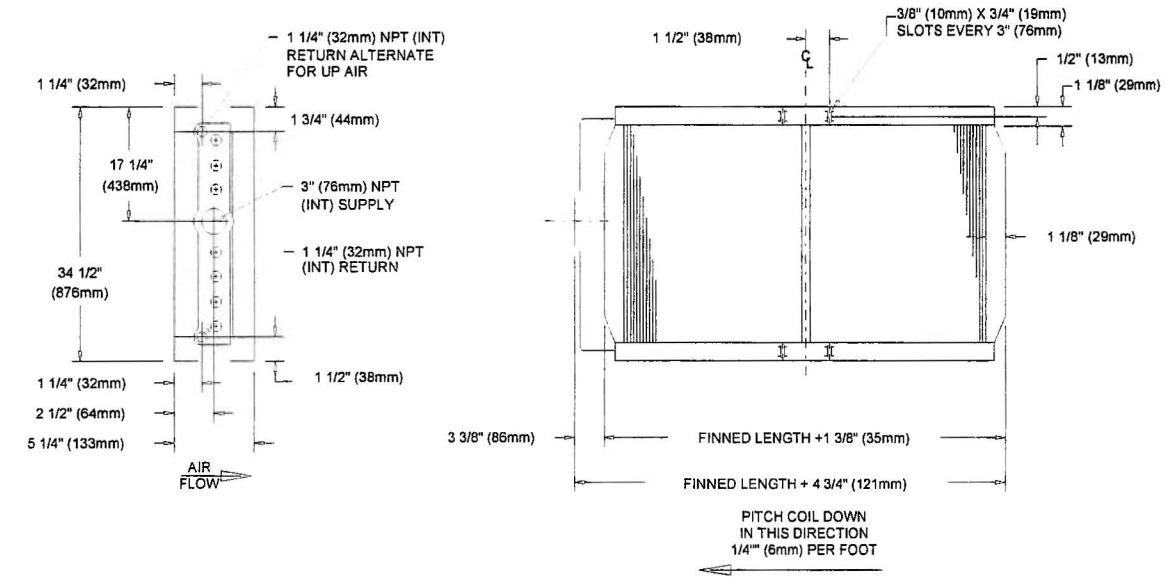
Unit Dimensions - Heating Coils
Item: A1 Qty: 1 Tag(s): PHC-1

HORIZONTAL AIR FLOW RIGHT HAND SUPPLY
OR
VERTICAL UP AIR FLOW RIGHT HAND SUPPLY



HORIZONTAL AIR FLOW LEFT HAND SUPPLY
OR
VERTICAL UP AIR FLOW LEFT HAND SUPPLY



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Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

Coil Information

Tag	**RHC-1**
Quantity	**1**
System type	**Hot Water**
Unit size and type	
Coil type	**WC coil**
Coil tube drainability	**Drainable**
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin type	**Prima-Flo H**
Fin material	**Aluminum**
Fin spacing	**97**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**No**
Actual airflow	**9525.0 cfm**
Entering dry bulb	**50.00 F**
Leaving dry bulb	**60.00 F**
Total capacity	**103.30 MBh**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.08 in H2O**
Volume	**2.89 gal**
Elevation	**0.00 ft**
Face velocity	**473.29 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**109.4 lb**
Installed weight	**133.5 lb**

Hot Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**6.90 gpm**
Entering fluid temp	**120.00 F**
Fluid temp drop	**30.00 F**
Leaving fluid temp	**90.00 F**
Fluid PD	**0.10 ft H2O**
Max fluid PD	
Fluid velocity	**0.60 ft/sec**
Fouling factor	**0.00050 hr-sq ft-deg F/Btu**
Reynolds number	

Steam Information

Steam pressure
Steam PD
Modulated
Degrees superheat
Condensate flow rate

Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**38100.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**413.19 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**27.60 gpm**
Nominal ht stacked coil #1	**42**	Coil bank fluid PD	**0.10 ft H2O**
Nominal ht stacked coil #2		Coil bank volume	**11.56 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**437.5 lb**
		Coil bank installed weight	**533.8 lb**

06 APR 00
S-3

Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

Coil Information

Tag	**RHC-2**
Quantity	**1**
System type	**Hot Water**
Unit size and type	
Coil type	**WC coil**
Coil tube drainability	**Drainable**
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin type	**Prima-Flo H**
Fin material	**Aluminum**
Fin spacing	**97**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**No**
Actual airflow	**9525.0 cfm**
Entering dry bulb	**50.00 F**
Leaving dry bulb	**60.00 F**
Total capacity	**103.30 MBh**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.08 in H2O**
Volume	**2.89 gal**
Elevation	**0.00 ft**
Face velocity	**473.29 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**109.4 lb**
Installed weight	**133.5 lb**

Hot Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**6.90 gpm**
Entering fluid temp	**120.00 F**
Fluid temp drop	**30.00 F**
Leaving fluid temp	**90.00 F**
Fluid PD	**0.10 ft H2O**
Max fluid PD	
Fluid velocity	**0.60 ft/sec**
Fouling factor	**0.00050 hr-sq ft-deg F/Btu**
Reynolds number	

Steam Information

Steam pressure	
Steam PD	
Modulated	
Degrees superheat	
Condensate flow rate	

Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**38100.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**413.19 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**27.60 gpm**
Nominal ht stacked coil #1	**42**	Coil bank fluid PD	**0.10 ft H2O**
Nominal ht stacked coil #2		Coil bank volume	**11.56 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**437.5 lb**
		Coil bank installed weight	**533.8 lb**

06 APROO
5-4

Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

TRANE®

Coil Information

Tag	**RHC-3**
Quantity	**1**
System type	**Hot Water**
Unit size and type	
Coil type	**WC coil**
Coil tube drainability	**Drainable**
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin type	**Prima-Flo E**
Fin material	**Aluminum**
Fin spacing	**103**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**No**
Actual airflow	**8700.0 cfm**
Entering dry bulb	**50.00 F**
Leaving dry bulb	**60.00 F**
Total capacity	**94.35 MBh**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.06 in H2O**
Volume	**2.89 gal**
Elevation	**0.00 ft**
Face velocity	**432.30 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**111.0 lb**
Installed weight	**135.1 lb**

Hot Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**6.30 gpm**
Entering fluid temp	**120.00 F**
Fluid temp drop	**30.00 F**
Leaving fluid temp	**90.00 F**
Fluid PD	**0.08 ft H2O**
Max fluid PD	
Fluid velocity	**0.55 ft/sec**
Fouling factor	**0.00050 hr-sq ft-deg F/Btu**
Reynolds number	

Steam Information

Steam pressure	
Steam PD	
Modulated	
Degrees superheat	
Condensate flow rate	

Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**34800.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**377.41 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**25.21 gpm**
Nominal ht stacked coil #1	**42**	Coil bank fluid PD	**0.08 ft H2O**
Nominal ht stacked coil #2		Coil bank volume	**11.56 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**443.9 lb**
		Coil bank installed weight	**540.2 lb**

06 APR00
5-5

Heating Coil

Job Information

3139 - U of K Mech Eng Bldg
FT. Smith - Aire Systems
(A00)Aire Systems Sales
Comments

TRANE

Coil Information

Tag	**RHC-4**
Quantity	**1**
System type	**Hot Water**
Unit size and type	
Coil type	**WC coil**
Coil tube drainability	**Drainable**
Rows	**1**
Finned length	**69" (1753 mm)**
Nominal coil height	**42" (1067 mm)**
Fin type	**Prima-Flo E**
Fin material	**Aluminum**
Fin spacing	**104**
Tube matl/wall thickness	**.035 (0.889 mm) copper**
Coil coating	**No**
Turbulators	**No**
Actual airflow	**9000.0 cfm**
Entering dry bulb	**50.00 F**
Leaving dry bulb	**60.00 F**
Total capacity	**97.60 MBh**
Actual coil face area	**20.13 sq ft**
Air pressure drop	**0.07 in H2O**
Volume	**2.89 gal**
Elevation	**0.00 ft**
Face velocity	**447.20 ft/min**
Max APD	
Max face velocity	
Max fin spacing	
Rigging weight	**111.2 lb**
Installed weight	**135.3 lb**

Hot Water Information

Fluid type	**Water**
Fluid concentration	
Standard flow rate	**6.52 gpm**
Entering fluid temp	**120.00 F**
Fluid temp drop	**30.00 F**
Leaving fluid temp	**90.00 F**
Fluid PD	**0.09 ft H2O**
Max fluid PD	
Fluid velocity	**0.57 ft/sec**
Fouling factor	**0.00050 hr-sq ft-deg F/Btu**
Reynolds number	

Steam Information

Steam pressure	
Steam PD	
Modulated	
Degrees superheat	
Condensate flow rate	

Stacked Information

Qty of stacked coil #1	**4.00 Each**	Coil bank airflow	**36000.0 cfm**
Qty of stacked coil #2		Coil bank total capacity	**390.42 MBh**
Qty of stacked coil #3		Coil bank standard flow rate	**26.07 gpm**
Nominal ht stacked coil #1	**42**	Coil bank fluid PD	**0.09 ft H2O**
Nominal ht stacked coil #2		Coil bank volume	**11.56 gal**
Nominal ht stacked coil #3		Coil bank rigging weight	**445.0 lb**
		Coil bank installed weight	**541.3 lb**

06 APR 00
5-6

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Damper Schedule

Unit No.	Qty.	Service	Damper WXH (in)	CFM	Velocity (FPM)	Blade Action	Torque (in-lbs)	Manufacturer	Model	Feature Codes
AHU-1,2	2	Relief	30x72	19050	1270	Opposed Blade	105	Ruskin	CD-50	FF
AHU-1,2	1	Return	60x72	38100	1270	Opposed Blade	210	Ruskin	CD-50	FF, VB, TB, SJS
AHU-1,2	1	Outside Air	72x60	38100	1270	Opposed Blade	210	Ruskin	CD-50	FF, VB, TB, SJS
AHU-4	2	Relief	24x66	18000	1636	Opposed Blade	77	Ruskin	CD-50	FF
AHU-4	1	Return	66x60	36000	1309	Opposed Blade	193	Ruskin	CD-50	FF, VB, TB, SJS
AHU-4	1	Outside Air	60x66	36000	1309	Parallel Blade	193	Ruskin	CD-50	FF, VB, TB, SJS

Feature Codes

SJS	Special Jackshaft
FF	Front Flange
RF	Rear Flange
VB	Vertical Blade
SS LINK	Stainless Steel Linkage
SSB	Stainless Steel Bearings
TB	Thrust Bearings
ES	End Switch Package
SF	Special Finish
MM	Motor Mounting Brackets

06 APR 00
6-1

RUSKIN®

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.

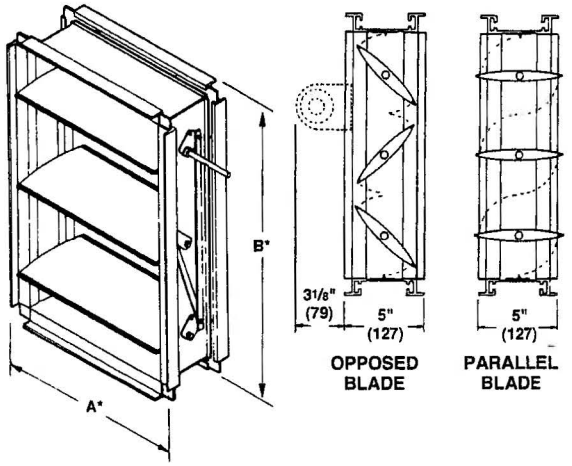
SEALS
Blade Edge – Extruded Ruskiprene (TPR) for -72°F to +275°F (-58°C to +135°C).
Jamb – Flexible metal compressible type.

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

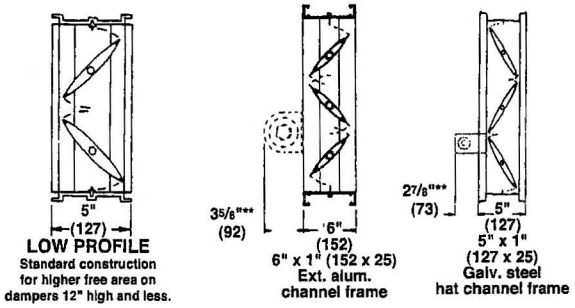
FINISH
Mill.

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.



FRAME CONSTRUCTION OPTIONS



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.

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		

TOTAL CFM LEAKAGE AT 1" W.G. STATIC PRESSURE DIFFERENTIAL

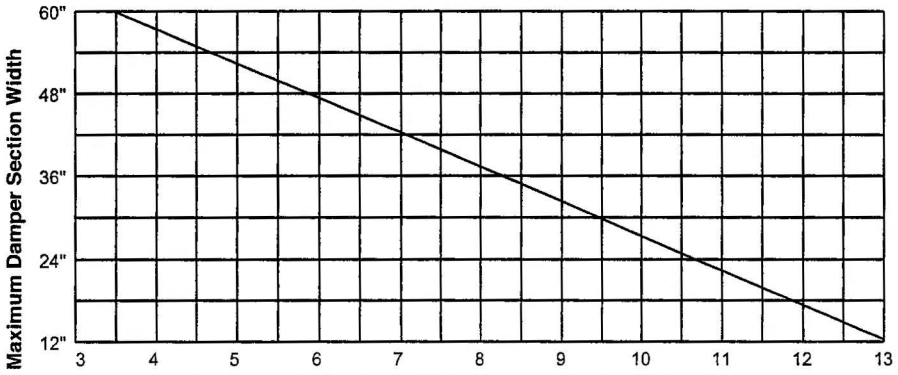
DAMPER WIDTH (INCHES)	DAMPER HEIGHT (INCHES)											
	8" (203)	12" (305)	18" (457)	24" (610)	30" (762)	36" (914)	42" (1067)	48" (1219)	54" (1372)	60" (1524)	66" (1676)	72" (1829)
6" (152)	3	4	6	9	11	13	15	17	19	21	23	25
12" (305)	2	3	4	5	7	8	9	11	12	13	15	16
24" (610)	4	5	8	11	13	16	19	21	23	26	29	31
36" (914)	5	8	12	16	20	23	27	31	35	39	43	47
48" (1219)	6	7	13	15	21	24	28	32	36	40	44	48
60" (1524)	7	10	15	20	25	30	35	40	45	50	55	60

LEAKAGE CORRECTION FACTOR

DAMPER WIDTH (INCHES)	STATIC PRESSURE (Inches Water Gage)										
	1" (25)	2" (51)	3" (76)	4" (102)	5" (127)	6" (152)	7" (178)	8" (203)	9" (229)	10" (254)	11" (279)
6" (152)	1.0	1.6	2.0	2.4	2.7	3.1	3.4	3.6	3.9	4.1	4.4
12" (305)	1.0	1.6	2.0	2.4	2.7	3.1	3.4	3.6	3.9	4.1	
24" (610)	1.0	1.6	2.0	2.4	2.7	3.1	3.4	3.6	3.9		
36" (914)	1.0	1.6	2.0	2.4	2.7	3.1	3.4	3.6			
48" (1219)	1.0	1.5	1.9	2.4	2.7*	3.4*					
60" (1524)	1.0	1.4	2.0								

*For opposed blades only

CD50 PRESSURE LIMITATIONS



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

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

Ruskin Manufacturing Company certifies that the CD50 Damper 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 Certified Ratings Seal applies to air leakage performance only.

To determine leakage at static pressure differentials higher than one inch water gage, multiply leakage at one inch (from upper table) by correction factor for higher static pressure and appropriate UNIT WIDTH (from lower table). Example: Find leakage for a 36"w x 24"h damper at 3 inches w.g. 16 CFM x 2.0 = 32 CFM leakage at 3 inches w.g.

Leakage ratings are based on AMCA Standard 500 using Test Setup Apparatus Figure 5.5. Torque applied holding damper closed at 7 in. lbs. per sq. ft. of damper with minimum of 20 in. lbs. Air leakage is based on operation between 50°F to 104°F.

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.

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Humidifier Schedule

Unit No.	Humidifier tag	Humidification Source	Manufacturer	Type	Model	Air Flow (CFM)	Output Capacity Lbs/hr	Steam Pressure
AHU-1,2	H-1, H-2	Boiler Steam	Dri-Steem	Maxi-Bank	1 DM-8-60	38100	290	2
AHU-3	H-3	Boiler Steam	Dri-Steem	Ultra-Sorb	1 US-LH-3	34800	972	2
AHU-4	H-4	Boiler Steam	Dri-Steem	Maxi-Bank	1 DM-8-60	36000	274	2

Unit No.	Humidifier tag	Dispersion Tube Spacing (in)	Mounting Position of Disp. Tubes	Control	Accessories Included
AHU-1,2	H-1, H-2	18	Horizontal	Pneumatic	Pneumatic Control Valve, F&T Steam Trap, Inlet Strainer
AHU-3	H-3	3	Horizontal	Pneumatic	Pneumatic Control Valve, F&T Steam Trap, Inlet Strainer
AHU-4	H-4	18	Horizontal	Pneumatic	Pneumatic Control Valve, F&T Steam Trap, Inlet Strainer

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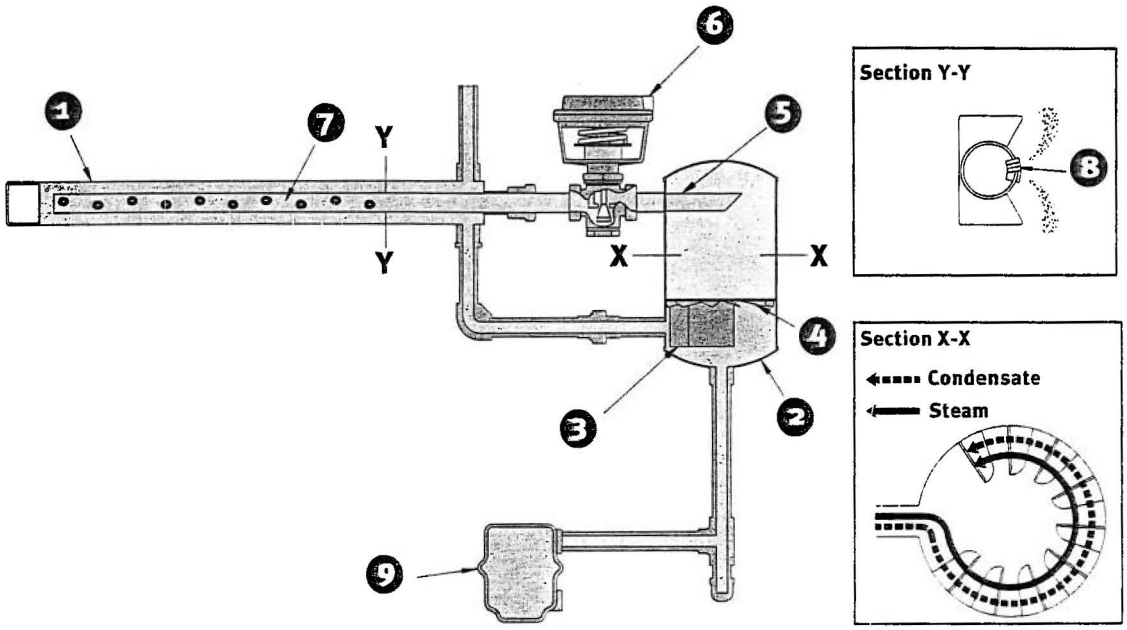
Steam Injection components.



Please see the next page for a description of how these components operate together.

1. Steam jacket
A chamber that jackets the inner dispersion tube with hot steam to eliminate condensation and dripping.

2. Steam separator
Removes entrained water droplets and slugs of condensation.

3. Deflector plate
Inside the steam separator, deflects water into a circular pattern and toward the drain.

4. Multi-baffle plate
Allows only steam to rise into the upper region of the separator.

5. Internal drying tube
Excludes any remaining moisture particles, allowing only dry steam to leave the separator.

6. Steam valve
Controls the amount of steam allowed into the dispersion tube.

7. Dispersion tube
Provides uniform steam dispersion across the duct width.

8. Thermal-resin tubelet
Unique tubelets extend into the center of the dispersion tube so only the hottest, driest steam is discharged into the air. These tubelets also have an exceptional ability to trap noise generated by the valve, making DRI-STEEM's Steam Injection humidifiers the quietest in the industry.

9. Steam trap
Allows only condensate to pass to the condensate return system.

Components.

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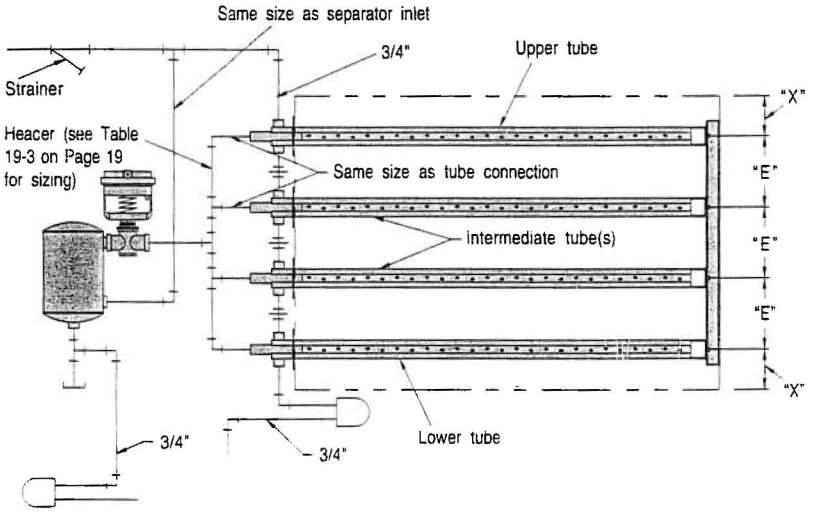
7-2

Multiple-Tube/MAXI-BANK® dimensions.

Figure 16-1:



Notes:

Refer to Tables 15-1 and 16-1 for capacities. Refer to Tables 17-1, 17-2, 18-1, 18-2, and 19-3 for dimensions.

1. "X" shall not be greater than "E" dimension nor less than ½ "E."
2. Tubes should span at least 90% of coil or airstream width.
3. Steam should discharge against airstream.
4. If tubes are insulated, the dispersion tube will disperse with airflow.

Table 16-1: Dispersion tube capacity (lbs/hr)

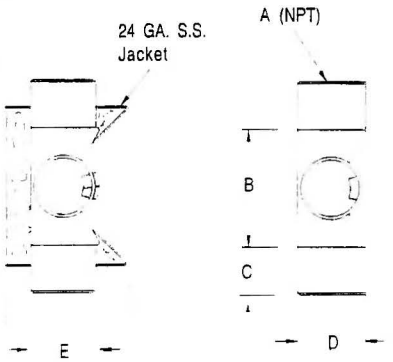
Tube length	60- & 70-series tubes	80-series tubes
24" to 35"	180	350
36" to 48"	210	450
Longer than 48"	250	525

Multiple-Tube®

06SPR00
7-3

Multiple-Tube/MAXI-BANK® dimensions.

Figure 17-1:

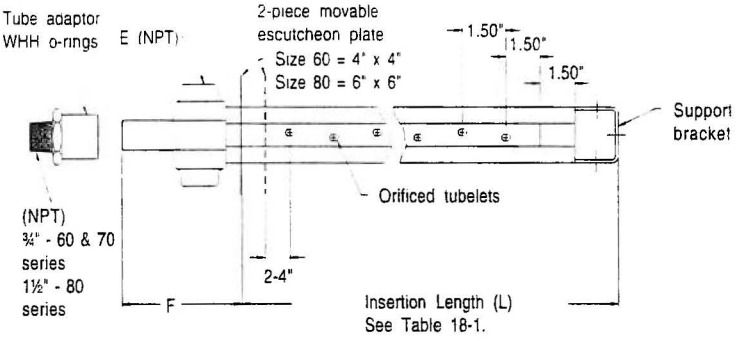


Insulated Non-insulated

Table 17-1: Multiple-Tube/ MAXI-BANK dispersion tube dimensions in inches (mm)

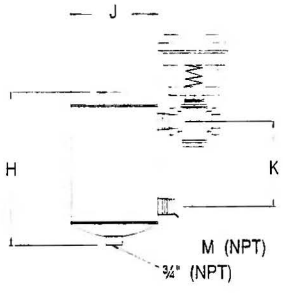
Tube no.	A	B	C	D	E	F
60	½ (13)	1-7/8 (48)	13/16 (21)	1-1/8 (29)	½ (50)	4 (102)
70	¾ (19)	2-5/8 (67)	13/16 (21	1-7/8 (48)	¾ (76)	4 (102)
80	1½ (38)	3 (76)	1-1/16 (27)	2½ (64)	1½ (92)	5½ (140)

Figure 17-2:



Note:
See Table 17-1.

Figure 17-3:



Note:
See Table 17-2.

Table 17-2: Multiple-Tube/MAXI-BANK separator dimensions in inches (mm)

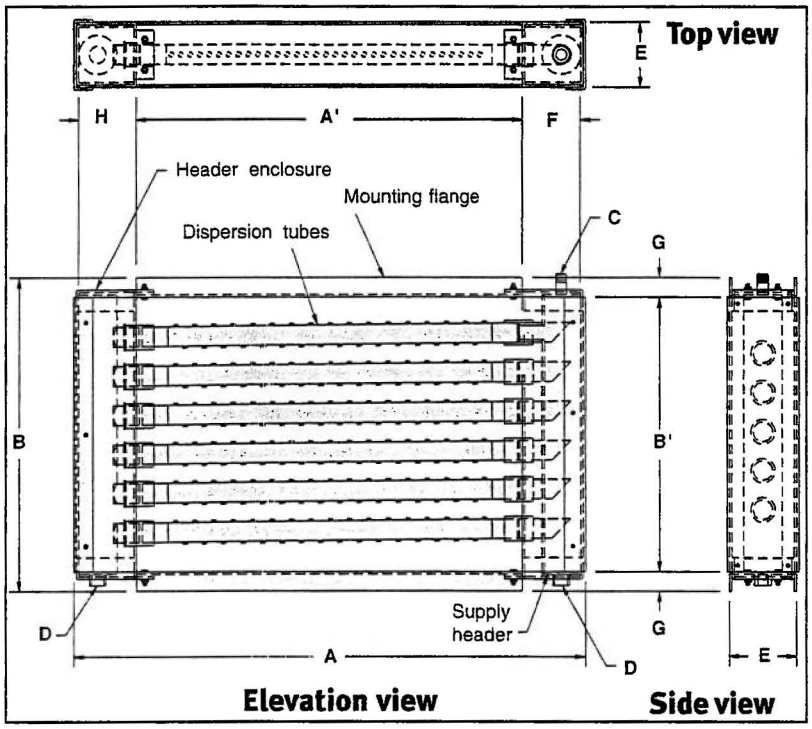
Separator size	H	J	K	M	Shipping wt *	
					lbs	kg
5	10(254)	5(127)	5½(140)	1/2 (13)	19	8.6
6	10½(267)	6(152)	5⅜ (137)	3/4(19)	21	9.5
7	11(280)	7(178)	5½(140)	3/4 (19)	24	10.9
8	13½(343)	8(203)	6 7/8 (175)	1-1/2 (38)	43	19.5
9	14¼ (368)	9(229)	7(178)	2 (50)	52	23.5

Note:
* Includes control valve, drain trap and strainer.

Multiple-Tube®

06APR00
7-4

ULTRA-SORB® LH dimensions.



Key features of Model LH

- Horizontal dispersion tubes
- Suitable for large AHUs or ducts
- Use when duct width is greater than duct height
- Recommended for use with boiler steam

Table 7-1: ULTRA-SORB Model LH dimensions

Dimension	Description	Inches (mm)
A	Overall Width	21" (533) minimum to 129" (3277) maximum in 1" (25.4) increments
A'	Face Width	12" (305) minimum to 120" (3048) maximum in 1" (25.4) increments
B	Overall Height	15" (381) minimum to 120" (3048) maximum in 1" (25.4) increments
B'	Face Height	12" (305) minimum to 120" (3048) maximum in 1" (25.4) increments
C	Steam Inlet (NPT)	Boiler Steam: Determined by supply steam pressure
D	Condensate Drain (NPT)	¾" (19) NPT
E	Header Enclosure (front to back)	3" and 4" Header E=5", 5" Header E=6" and 6" Header E=7"
F	Header Enclosure	3" Header F=4½, 4" Header F=5½", 5" Header F=6½", 6" Header F=7½"
G	Flange	1½" (40)
H	Condensate header enclosure	4½" (115)

Table 7-2: Boiler steam header capacities

Header Diameter	Capacity Lbs/hr		Capacity Kg/hr
3"	980	75 mm	445
4"	1750	100 mm	790
5"	2750	125 mm	1245
6"	4000	150 mm	1815

Notes:

- Header dimensions are determined by capacity. See Tables 6-2 and 7-2.

Dimensions.

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Connecting to the steam source.

Connecting to evaporative humidifiers

Connection options include hard piping, vapor hose, flange and multiple connections. Refer to Table 13-1 for recommended capacity.

Table 13-1*: Hose/pipe steam capacity for evaporative humidifiers (in pounds per hour)

Vapor hose			Copper or stainless steel tubing and schedule 40 steel pipe		
Hose I.D.	Developed length of 10' (3.0 meters)**		Tube or pipe size	Developed length of 20' (6.1 meters)**	
1 ½"	150 pph	68 kg	1 ½"	150 pph	64 kg
2"	250 pph	113.4 kg	2"	220 pph	95.3 kg
			3"	450 pph	186 kg
			4"	750 pph	318 kg
			5"	1400 pph	590 kg
			6"	2300 pph	953 kg

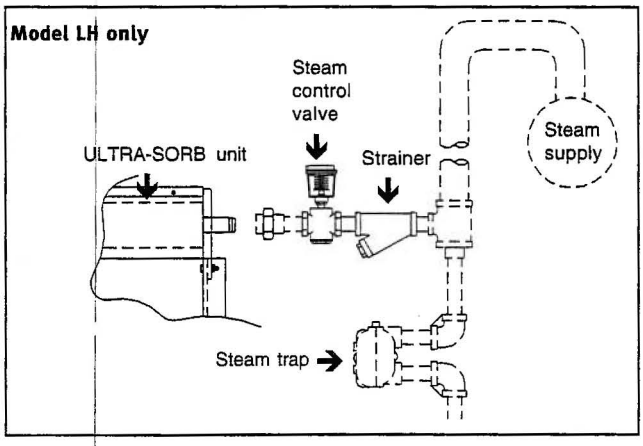
Notes for Table 13-1

* Based on total pressure drop in piping/hose of 5" (127 mm) W.C.

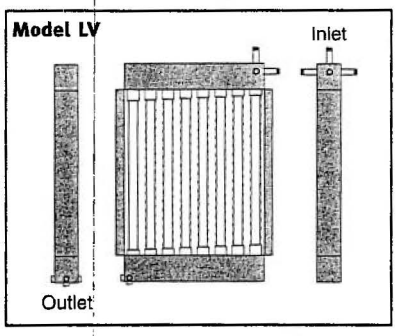
** For developed length add 50% to measured length for pipe fittings.

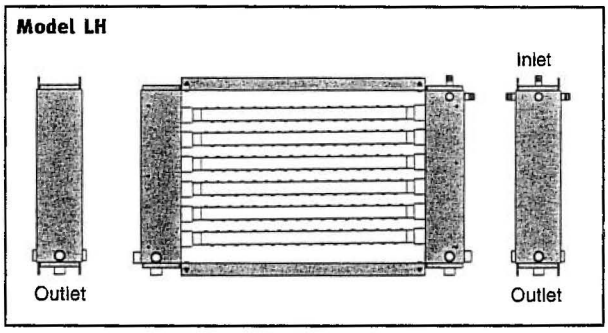
To minimize loss of humidifier capacity and efficiency, we recommend that tubing/piping be insulated.

Connection to a boiler



Steam inlet and condensate outlet location options





Piping.

06APR00
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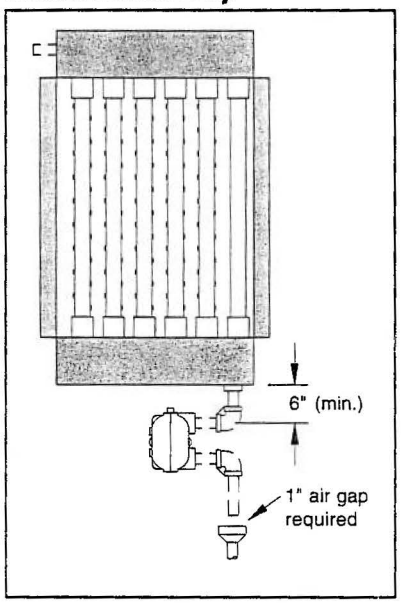
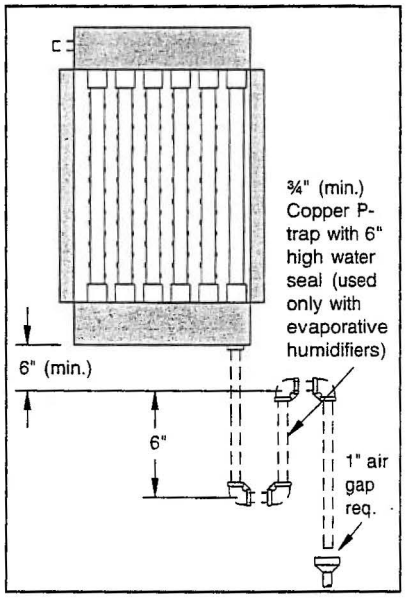
Condensate drainage.

The ULTRA-SORB® operates with virtually zero internal pressure. Therefore, the condensate should be drained to a floor drain or into a small condensate pump (designed for 212°F/100°C) which, in turn, will return it to the steam source. In either case, the ULTRA-SORB's drain connection must be at an elevation that will permit gravity drainage.

Condensate drainage with a steam trap

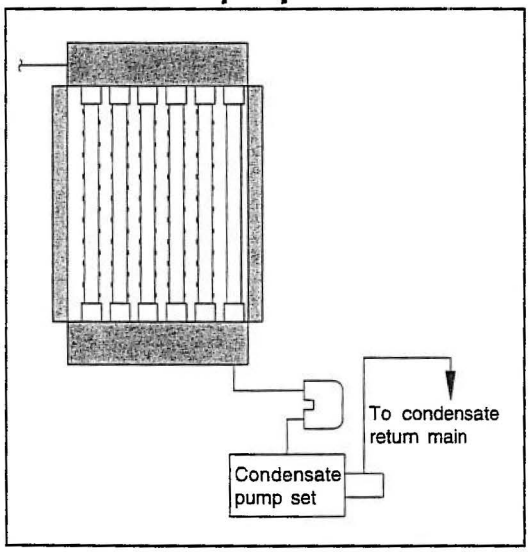


Condensate drainage with a water seal



Note:
When using a thermostatic trap, a 24" cooling leg is required prior to the trap.

Condensate drainage to a condensate pump



Drainage.

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TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

Sound Attenuator Schedule

Unit Tag	Total CFM	Sound Attenuator Bank Size (W x H x D)	Air Pressure Drop	Velocity (FPM)	Dynamic Insertion Loss								Model Number	Manufacturer
					63	125	250	500	1K	2K	4K	8K		
AHU 1,2	38,100	96" x 72" x 36"	0.25	794	5	5	19	15	12	11	9	8	RNM-LV-F1	Vibro-Acoustics
AHU 3	34,800	96" x 72" x 36"	0.24	750	5	5	19	15	12	11	9	8	RNM-LV-F1	Vibro-Acoustics
AHU 4	36,000	96" x 72" x 36"	0.22	725	5	5	19	15	12	11	9	8	RNM-LV-F1	Vibro-Acoustics

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06 APR 00

Vibro-Acoustics®

SILENCER SHEETS

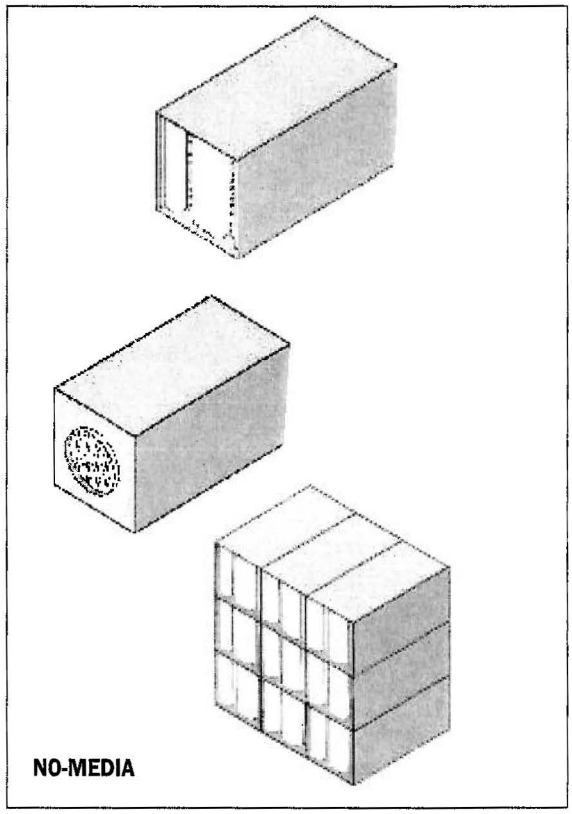
SS3

CNM/RNM CIRCULAR AND RECTANGULAR NO-MEDIA STRAIGHT SILENCERS

DESCRIPTION

Vibro-Acoustics' RNM and CNM silencers do not contain glass fiber and are void of any fill material whatsoever. The Helmholtz resonator principle is used as the primary sound-reducing mechanism. Rectangular models utilize splitters, sometimes called baffles, which incorporate expansion chambers. The chambers are covered by specially tuned perforated metal. Similarly circular models have center-bodies, sometimes referred to as pods. The expansion chambers are in the centerbodies and external to the duct connection size.

Splitters in rectangular models vary in quantity and thickness, and air passages also vary in width. Circular models vary in centerbody diameter, air passage width and external body dimensions. The splitters and centerbodies are aerodynamically shaped to minimize pressure drop.



MODEL NAMES

Vibro-Acoustics' silencer model names are coded to help identify their recommended application range.

Rectangular

RNM - ___ - ___

SILENCER TYPE

VELOCITY RANGE
ULV, LV, MV, HV

FREQUENCY INDICATOR*
F1, F2, F3, F4, F5, F6, F7, F8, F9

Circular

CNM - ___ - ___

SILENCER TYPE

VELOCITY RANGE
LV, MV, HV, UHV

FREQUENCY INDICATOR*
F1, F2

*The lower the Frequency Indicator, the better the silencer's insertion loss in the low frequency range. The higher the Frequency Indicator, the better the silencer's insertion loss in the mid to high frequency ranges.

APPLICATION

- ◆ wherever glass fiber is not acceptable in duct and air handling systems
- ◆ when it is necessary to periodically sterilize the entire interior of the silencer
- ◆ in laboratory fume hood systems, pharmaceutical manufacturing facilities, food processing plants, hospitals, clean rooms, kitchen exhausts, etc.
- ◆ in supply, return or exhaust ductwork
- ◆ in fan plenums and air handling units (both supply and return)
- ◆ on cooling towers, air-cooled chillers, etc.
- ◆ on the receiver side of valves, dampers, terminal boxes, etc.
- ◆ substitution for acoustically lined duct (see SAS 10)
- ◆ normal recommended duct velocity range

RNM-ULV	0-500 fpm		
RNM-LV	0-750 fpm	CNM-LV	0-750 fpm
RNM-MV	750-1250 fpm	CNM-MV	750-1250 fpm
RNM-HV	1250-2000 fpm	CNM-HV	1250-2000 fpm
		CNM-UHV	2000-3500 fpm

Patents U.S. 4,287,962;
CAN. 1,137,877; CAN. 1,160,959

continued next page...

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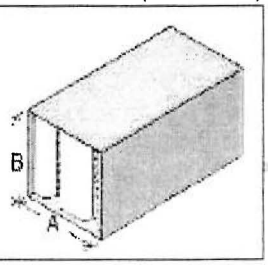
RNM-LV-F1
RECTANGULAR NO-MEDIA
LOW VELOCITY SILENCER (<750 FPM)

Vibro-Acoustics®
CERTIFIED PERFORMANCE DATA

HOW TO SPECIFY:
EXAMPLE

32 X 21 RNM-LV-F1 X 60

32	21	RNM-LV-F1	60
Duct Width	Duct Height	Silencer Model	Silencer Length



Insertion Loss (IL)

LENGTH (inches)	FACE VELOCITY (feet per minute)	OCTAVE BAND - Hz/DYNAMIC INSERTION LOSS (dB) 63	125	250	500	1000	2000	4000	8000
36	- 750	6	7	21	16	14	12	12	11
	0	4	4	15	12	11	10	10	9
	+ 750	5	5	19	15	12	11	9	8
60	- 750	9	9	22	17	15	13	11	11
	0	8	5	16	13	13	11	10	10
	+ 750	8	7	21	17	14	12	10	9
84	- 750	10	11	25	21	16	15	13	12
	0	9	7	17	16	15	13	12	11
	+ 750	9	10	23	20	16	13	12	11
108	- 750	11	13	27	25	18	16	14	13
	0	10	9	19	18	17	14	14	12
	+ 750	10	12	25	24	18	15	14	12

+ : "forward flow" where noise & airflow move in same direction (e.g. supply side)

- : "reverse flow" where noise & airflow move in opposite directions (e.g. return side)

See pages 4.1 - 4.25 for selection information.

Pressure Drop (PD)

LENGTH (inches)	FACE VELOCITY (feet per minute) / Pressure Drop (in.w.g.) 250	500	750	1000	1250	1500	1750
36	0.02	0.09	0.19	0.35	0.54	0.78	1.06
60	0.02	0.07	0.15	0.26	0.41	0.59	0.80
84	0.02	0.07	0.16	0.28	0.44	0.63	0.86
108	0.02	0.08	0.17	0.30	0.47	0.68	0.92

: Acceptable (0 - 0.35")

: Caution (>0.35") Pressure Drop may be too high for certain applications

Pressure drops are reported in accordance with ASTM E477 methods and are based upon IDEAL flow conditions (5 diameters of straight duct on silencer inlet and 10 on outlet). Less than ideal conditions will result in an increase in pressure drop due to System Effects. See Silencer System Effects Data on page 4.19.

CROSS-SECTION SIZES*
"A" dimension (inches):
15-16
29-32
58-64
87-96
116-128
145-160
174-192
203-224
232-240
"B" dimension:
ANY SIZE
Approx. weight
4.2 lbs/cu.ft.

** To ensure a silencer selection that matches the ductwork dimensions, see page 4.25 or 5.95.*

Generated Noise (GN) @ 5 sq.ft. face area

LENGTH (inches)	FACE VELOCITY (feet per minute)	OCTAVE BAND - Hz/GENERATED NOISE (dB re 10^{-12} watts) 63	125	250	500	1000	2000	4000	8000
ALL	- 750	51	47	46	49	56	60	54	39
	- 500	51	43	43	46	51	51	40	31
	+ 500	52	40	36	40	47	46	37	30
	+ 750	54	45	39	43	52	55	51	39

GN correction chart at right must be used to correct GN to other face areas.

FACE AREA (sq.ft.)	2.5	5	10	20	40	80
dB	-3	0	+3	+6	+9	+12

Patents U.S. 4,287,962;CAN. 1,137,877; CAN. 1,160,959

06 APR 00
8-3

TRANE
Custom Air Handlers

Job: U of K Mech Eng
EQ Number: 3139
Date: April 6, 2000
Rev.:

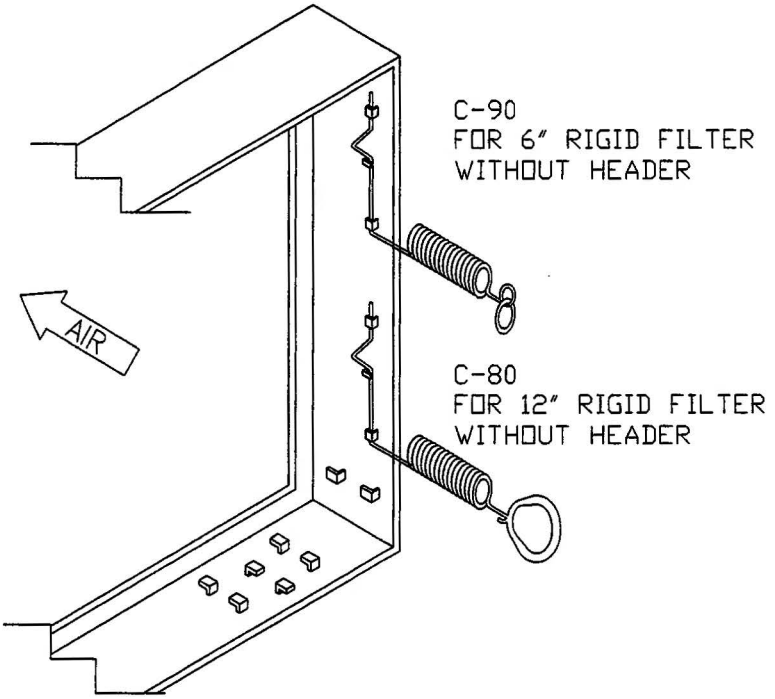
Filter Schedule

Unit No.	CFM	Face Velocity (FPM)	Filter Qty & Size required	Fastener Type	Frame Type	Manufacturer	Gauge	Access
AHU-1,2	38100	454	(18) 24x24 (6) 24x12	C-79-1 & C-80	Galv. Type8	FARR	Dwyer Magnehelic 2002	Upstream
AHU-3	34800	414	(18) 24x24 (3) 24x12	C-79-1 & C-80	Galv. Type8	FARR	Dwyer Magnehelic 2002	Upstream
AHU-4	36000	429	(18) 24x24 (3) 24x12	C-79-1 & C-80	Galv. Type8	FARR	Dwyer Magnehelic 2002	Upstream

Note: Filter frames, fasteners and draft gauges furnished and installed by Aire Systems. Filters by others.

06 APR 00
9-1

FLITER/HOLDING FRAME/CLIP APPLICATION GUIDE



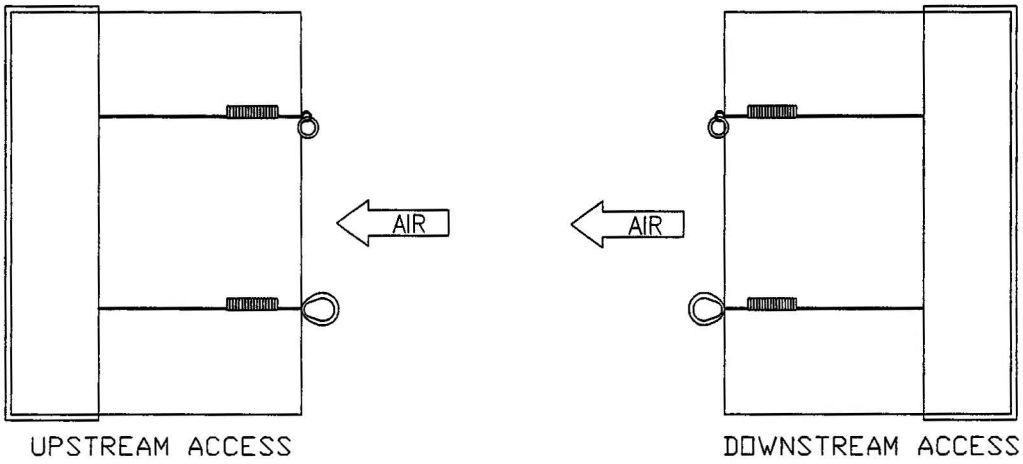


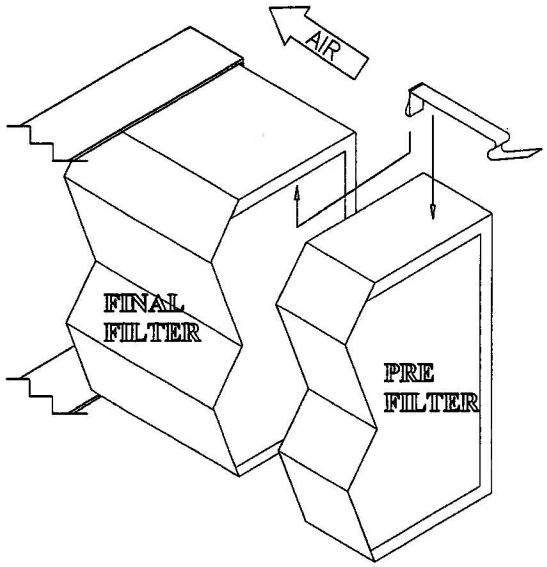
Figure 5.

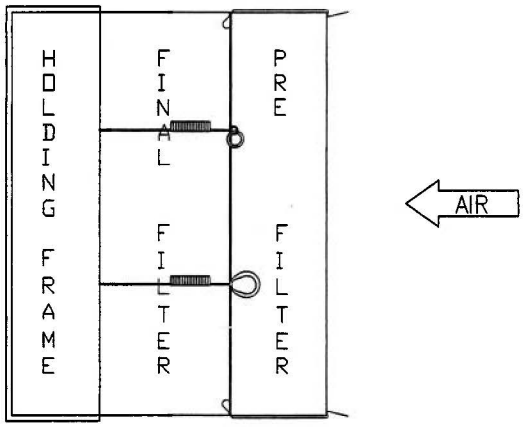
C-90 & C-80 Clip location for 6" & 12" Rigid filter without peripheral header for up & downstream access.

C-90 & C-80 Filter Clip Application

FLITER/HOLDING FRAME/CLIP APPLICATION GUIDE

C-79-1 (2" Pre Filter)
C-79-2 (4" Pre Filter)





C-79-1 C-79-2 Filter Clip location to 2" & 4" Pre filter used with 6" & 12" Rigid filter without peripheral header for upstream access.

C-79 Filter Clip Application

AIRE SYSTEMS MANUFACTURING CORPORATION

06 APR 00