



Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
LittleRock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

Date: 4/16/2026

Return Request: 4/23/2026

Project: Hot Springs National Park – Rehabilitate Bathhouses – Maurice Bathhouse

Supplier: Powers of Arkansas

Manufacturer: Pace

Submittal: Indoor Modular Custom Air-Handling Units (Re-Submittal #1)

Submittal Number: 237313.001

Spec Section: 237313

Drawing # and Installation Location: MP4.0

ARCHITECT

Strata Architecture
1701 Oak Street, Suite 100
Kansas City, Missouri 64108
(816)474-0900

GENERAL CONTRACTOR

Tepa, LLC
2345 Grand Blvd, Suite 700
Kansas City, Missouri 64108
(816)708-1110

ENGINEER

IMEG Corp.
1600 Baltimore Street, Suite 300
Kansas City, Missouri 64108
(816)842-8437

MECHANICAL SUBCONTRACTOR

Comfort Systems USA (Arkansas), Inc.
9924 Landers Road
North Little Rock, Arkansas 72117
(501)834-3320

Comments:

CSUSA PROJECT NO.

25-7065

joe@comfortar.com

9924 Landers Road
No. LittleRock, AR 72117



RESUBMITTAL - Revision 1

Maurice Bathhouse

Submittal

JOB NUMBER

LOCATION

Hot Springs, AR

DATE

April 16, 2026

PRODUCTS

Air Handling Units - (AHU-1M, AHU-2M, AHU-3M) - JCI

PROJECT TEAM

EQUIPMENT



April Kesterson

Project Coordinator
april.kesterson@powers-hvac.com
(501) 813-0902



Eric Blaylock

Controls & Equipment Sales
eric.blaylock@powers-hvac.com
(501) 690-5510

ENGINEERING



Keith Clement

Engineering Sales
keith.clement@powers-hvac.com
(501) 472-1416

TABLE OF CONTENTS

Submittal	Products	Manufacturer	Spec #	Page
1	Air Handling Units - (AHU-1M, AHU-2M, AH	JCI	23 73 13	4

Submittal

JOB NAME	Maurice Bathhouse
JOB NUMBER	N/A
PRODUCT	Air Handling Units - (AHU-1M, AHU-2M, AHU-3M)
MANUFACTURER	JCI
LOCATION	Hot Springs, AR
DATE	April 16, 2026
SPECIFICATION	23 73 13
LEAD TIME	TBD
ARCHITECT	Strata Architecture
ENGINEER	IMEG Corp
CONTRACTOR	TEPA
CONTRACTOR POC	Joe Loomis
SUBMITTED BY	Eric Blaylock Keith Clement
SALESPERSON	Eric Blaylock

Resubmittal Notes

1. Basis of design alignment and approval path These units are being manufactured to the same requirements used for the basis of design. Any remaining changes need to be clearly captured in the submittal review comments so we can incorporate them before release. We are requesting an “approved as noted” set of submittals so we do not further impact the project schedule.
2. All units will be provided with piezo-ring airflow-measuring taps and transducers. Powers Controls will furnish/field-install necessary components and program the units as shown in the project documents.
3. AHU-1M and AHU-2M are furnished with rubber pad isolation due to fan array configuration limitations. Rubber pad data sheet provided in additional documents section of the submittal.
4. Cooling coil casings are stainless. Heating coil casings are being carried as galvanized per the AHU spec.
5. Heating coil air pressure drop at full airflow is accounted for in fan static and is carried in the internal static as user-added pressure drop. The current static breakdown reflects this pressure drop at full airflow.
6. AHU-3M cooling coil flow rate increased to 26.5 GPM to meet the scheduled cooling capacity and leaving air temperatures. Please coordinate hydronic requirements accordingly.
7. AHU-3M 3" base rail is included and is intended for structural support.
8. UV components are included in the submittal package. The UV basis included with the resubmittal aligns with UVDI air-stream disinfection and coil irradiation criteria, including high-output bi-axial lamp construction and performance parameters (air velocity and temperature operating ranges, and surface irradiation/intensity criteria).
9. Sound power data has been added to the AHU performance reports for each unit (openings and casing radiated).

BILL OF MATERIAL

ITEM	QTY	TAG	ITEM DESCRIPTIONS
I	1	AHU-1M	PAI-72x78
II	1	AHU-2M	PAI-54x60
III	1	AHU-3M	PAI-45x51

Johnson Controls' standard warranty for chillers and air-handlers begin upon startup or 6 months after shipment, whichever occurs first. If unit startup will occur more than 6 months after shipment, long term storage preparation and periodic inspections may be required at additional cost to the buyer. If these procedures are not followed, the warranty will be voided. Please contact your JCI representative for more details.

Quantity: 1 PAI-72x78

Unit Tag: AHU-1M

Unit Details

- 18 Month Parts Only Warranty (From Shipment)
- L/240 panel deflection and <1% leakage at ± 8" TSP
- 2" thick Foam Insulated (R16) panels with Enhanced Thermal Performance
- Exterior Material: 18 Ga. G90 Galvanized Steel
- Interior Liner Material: 20 Ga. G90 Galvanized Steel
- Floor Material: 16 Ga. G90 Galvanized Steel
- Doors with same construction as unit. Doors provided with View Ports and Thermal Break Design.
- 6 " High Formed Steel Base
- Unit Voltage/Phase/Hertz: 208/3/60
- Motor Controls By Others
- 120V Wiring Type: SJO Cable
- High Voltage Wiring Type: Motor Cable
- Integral LED light(s) wired to single switch/outlet on FS segment.

Mixing Box Segment

- Outside Air opening (Front)
- Return Air opening (Top)
- Outside Air Damper Ruskin - CD50 (Aluminum) Parallel Blade
- Return Air Damper Ruskin - CD50 (Aluminum) Parallel Blade

Aluminum Sheet ABS30 blenders configured in a Horizontal arrangement

Rigid Filter Segment

- Side Load Filter Bank
- 4 in. MiniPleat MERV 11 Filters
- Magnehelic With Flag filter gauge (Gauge Range: 0 To 3.0 in. w.g.)

Heating Coil Segment

- Doors with same construction as unit. Doors provided with Thermal Break Design.
- Galvanized Steel Bulkhead with Galvanized Steel Coil Supports
- Coil Hand: Left
- 1 Row 8 FPI Heating Coil with 0.008 " Aluminum fins
- 5/8" Tube Diameter with 0.025" Tubewall Thickness
- Standard Return Bends with 0.025" Tubewall Thickness
- Galvanized Casing
- Copper Header; Steel MPT 1.5 " Connection

Cooling Coil Segment

- Galvanized Steel Bulkhead with Galvanized Steel Coil Supports
 - UV Light Option
- Coil Hand: Left
- 10 Row 10 FPI Cooling Coil with 0.01 " Aluminum fins
- 5/8" Tube Diameter with 0.035" Tubewall Thickness
- Standard Return Bends with 0.035" Tubewall Thickness

- Stainless Casing
- Copper Header; Steel MPT 2.5 " Connection
- UV Lights
 - Radiometer
- IAQ Drain Pan with 304 Stainless Steel Liner

Supply Fan Segment

- Galvanized Steel Bulkhead
 - Fan Flow Isolation Damper Model: CBD6 (Aluminum)
- 2x2 Fan Array with Lau Size 135 Model SF 12 blade Direct Drive SWSI Plenum Fan; Class 2
- Rubber Pad Isolation
- Air Flow Measuring: Piezo Ring (transducer not included)
- 7.5 HP TEFC (3600 RPM) Motor with Shaft Grounding Ring
- Supply Air opening (Top)

Items Not Included:

- Hauling, Unloading, Rigging, Installation and Re-Assembly of Equipment
- Taxes, Delayed Shipment, Expedited Freight, and Long Term Storage
- Extended Warranties beyond length of time shown above
- Any DDC Controls, End Devices, Sensors Actuators, Control Values, etc.
- Power Wiring to Lights and Outlets (Unless specified above)
- Single-Point Power Connection (Unless specified above)
- Factory or Field Leakage and Deflection Testing (Unless specified above); Factory Performance Testing (Units are AHRI Certified)

(Unless specified above)

- Outdoor Airflow Measuring Stations
- Installation of Ship Loose Filters (filters ship loose for installation by others in factory installed racks)
- Smoke Detectors
- Smoke Dampers and/or Fire/Smoke Dampers
- Connecting Wiring between Shipping Splits
- Long Term Storage Maintenance (required if AHU not started up within 6 months of shipment)
- Anything not listed above

Quantity: 1 PAI-54x60

Unit Tag: AHU-2M

Unit Details

- 18 Month Parts Only Warranty (From Shipment)
- L/240 panel deflection and <1% leakage at ± 8" TSP
- 2" thick Foam Insulated (R16) panels with Enhanced Thermal Performance
- Exterior Material: 18 Ga. G90 Galvanized Steel
- Interior Liner Material: 20 Ga. G90 Galvanized Steel
- Floor Material: 16 Ga. G90 Galvanized Steel
- Doors with same construction as unit. Doors provided with View Ports and Thermal Break Design.
- 6 " High Formed Steel Base
- Unit Voltage/Phase/Hertz: 208/3/60
- Motor Controls By Others
- 120V Wiring Type: SJO Cable
- High Voltage Wiring Type: Motor Cable
- Integral LED light(s) wired to single switch/outlet on FS segment.

Mixing Box Segment

- Outside Air opening (Front)
- Return Air opening (Top)
- Outside Air Damper Ruskin - CD50 (Aluminum) Parallel Blade
- Return Air Damper Ruskin - CD50 (Aluminum) Parallel Blade

Aluminum Sheet ABS24 blenders configured in a Horizontal arrangement

Rigid Filter Segment

- Side Load Filter Bank
- 4 in. MiniPleat MERV 11 Filters
- Magnehelic With Flag filter gauge (Gauge Range: 0 To 2.0 in. w.g.)

Heating Coil Segment

- Doors with same construction as unit. Doors provided with Thermal Break Design.
- Galvanized Steel Bulkhead with Galvanized Steel Coil Supports
- Coil Hand: Left
- 1 Row 8 FPI Heating Coil with 0.008 " Aluminum fins
- 5/8" Tube Diameter with 0.025" Tubewall Thickness
- Standard Return Bends with 0.025" Tubewall Thickness
- Galvanized Casing
- Copper Header; Steel MPT 1.5 " Connection

Cooling Coil Segment

- Galvanized Steel Bulkhead with Galvanized Steel Coil Supports
 - UV Light Option
- Coil Hand: Left
- 10 Row 10 FPI Cooling Coil with 0.01 " Aluminum fins
- 5/8" Tube Diameter with 0.035" Tubewall Thickness
- Standard Return Bends with 0.035" Tubewall Thickness
- Stainless Casing
- Copper Header; Steel MPT 1.5 " Connection
- NEMA 3R UV Control Panel
 - UV Lights
 - Radiometer
- IAQ Drain Pan with 304 Stainless Steel Liner

Supply Fan Segment

- Galvanized Steel Bulkhead
 - Fan Flow Isolation Damper Model: CBD6 (Aluminum)
- 2x2 Fan Array with Lau Size 105 Model SF 12 blade Direct Drive SWSI Plenum Fan; Class 2
- Rubber Pad Isolation
- Air Flow Measuring: Piezo Ring (transducer not included)
- 3 HP TEFC (3600 RPM) Motor with Shaft Grounding Ring
- Supply Air opening (Top)

Items Not Included:

- Hauling, Unloading, Rigging, Installation and Re-Assembly of Equipment
- Taxes, Delayed Shipment, Expedited Freight, and Long Term Storage
- Extended Warranties beyond length of time shown above
- Any DDC Controls, End Devices, Sensors Actuators, Control Values, etc.
- Power Wiring to Lights and Outlets (Unless specified above)
- Single-Point Power Connection (Unless specified above)
- Factory or Field Leakage and Deflection Testing (Unless specified above); Factory Performance Testing (Units are AHRI Certified)

(Unless specified above)

- Outdoor Airflow Measuring Stations
- Installation of Ship Loose Filters (filters ship loose for installation by others in factory installed racks)
- Smoke Detectors
- Smoke Dampers and/or Fire/Smoke Dampers
- Connecting Wiring between Shipping Splits
- Long Term Storage Maintenance (required if AHU not started up within 6 months of shipment)
- Anything not listed above

Quantity: 1 PAI-45x51

Unit Tag: AHU-3M

Unit Details

- 18 Month Parts Only Warranty (From Shipment)
- L/240 panel deflection and <1% leakage at ± 8 " TSP
- 2" thick Foam Insulated (R16) panels with Enhanced Thermal Performance
- Exterior Material: 18 Ga. G90 Galvanized Steel
- Interior Liner Material: 20 Ga. G90 Galvanized Steel
- Floor Material: 16 Ga. G90 Galvanized Steel
- Doors with same construction as unit. Doors provided with View Ports and Thermal Break Design.
- 3 " High Formed Steel Base
- Unit Voltage/Phase/Hertz: 208/3/60

- Motor Controls By Others
- 120V Wiring Type: SJO Cable
- High Voltage Wiring Type: Motor Cable
- Integral LED light(s) wired to single switch/outlet on FS segment.

Mixing Box Segment

- Outside Air opening (Front)
- Return Air opening (Top)
- Outside Air Damper Ruskin - CD50 (Aluminum) Parallel Blade
- Return Air Damper Ruskin - CD50 (Aluminum) Parallel Blade

Rigid Filter Segment

- Side Load Filter Bank
- 4 in. MiniPleat MERV 11 Filters
- Magnehelic With Flag filter gauge (Gauge Range: 0 To 2.0 in. w.g.)

Vertical Coil Segment

- Doors with same construction as unit. Doors provided with Thermal Break Design.
- Galvanized Steel Bulkhead with Galvanized Steel Coil Supports
 - UV Light Option
- Coil Hand: Right
- 12 Row 10 FPI Cooling Coil with 0.008 " Aluminum fins
- 5/8" Tube Diameter with 0.035" Tubewall Thickness
- Standard Return Bends with 0.035" Tubewall Thickness
- Stainless Casing
- Copper Header; Steel MPT 1.5 " Connection
- Coil Hand: Right
- 2 Row 8 FPI Heating Coil with 0.008 " Aluminum fins
- 5/8" Tube Diameter with 0.035" Tubewall Thickness
- Standard Return Bends with 0.035" Tubewall Thickness
- Galvanized Casing
- Copper Header; Steel MPT 1.5 " Connection
- NEMA 3R UV Control Panel
 - UV Lights
 - Radiometer
- IAQ Drain Pan with 304 Stainless Steel Liner

Turning Segment

Supply Fan Segment

- Galvanized Steel Bulkhead
- 1x1 Single Fan with Twin City Size 150 Model EPFN 9 blade Direct Drive SWSI Plenum Fan; Class 2
- Isolation: 2" Springs
- Air Flow Measuring: Piezo Ring (transducer not included)
- 5 HP ODP (3600 RPM) Motor with Shaft Grounding Ring
- Supply Air opening (Top)

Items Not Included:

- Hauling, Unloading, Rigging, Installation and Re-Assembly of Equipment
- Taxes, Delayed Shipment, Expedited Freight, and Long Term Storage
- Extended Warranties beyond length of time shown above
- Any DDC Controls, End Devices, Sensors Actuators, Control Values, etc.
- Power Wiring to Lights and Outlets (Unless specified above)
- Single-Point Power Connection (Unless specified above)
- Factory or Field Leakage and Deflection Testing (Unless specified above); Factory Performance Testing (Units are AHRI Certified)

(Unless specified above)

- Outdoor Airflow Measuring Stations
- Installation of Ship Loose Filters (filters ship loose for installation by others in factory installed racks)
- Smoke Detectors
- Smoke Dampers and/or Fire/Smoke Dampers
- Connecting Wiring between Shipping Splits
- Long Term Storage Maintenance (required if AHU not started up within 6 months of shipment)
- Anything not listed above

Performance Ratings

Job Summary

Project Name:	Rehabilitate Bathhouses – Hot Springs National Park		
Unit Tag(s):	AHU-1M		
Quantity:	1	Environment:	Indoor



Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
PAI-72x78	12,500	335	7,744

Segment Sequence

(FS)(CC HC)(RF AB MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Mylar Lining	Thermal Break	Bulkhead Material
MB	2"	None	18 Ga. G-90 Galvanized	20 Ga. G-90 Galvanized	2" Foam	-	-	None
AB, RF, HC, CC, FS	2"	None	18 Ga. G-90 Galvanized	20 Ga. G-90 Galvanized	2" Foam	-	-	Galvanized Steel

Base Details

Segment(s)	Material	Paint
MB, AB, RF, HC, CC, FS	6" Formed Steel	None

Floor Details

Segment(s)	Gauge and Material	Paint	Insulation	Thermal Break	Attachment	Sub-Floor Gauge and Material
MB, AB, RF, HC, CC, FS	16 Ga. G-90 Galvanized	None	2"	-	Stitch Weld	None

Notes

Enhanced Thermal Performance construction.

Unit Electrical

Circuit Details

#	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	CC UV Light Panel	120/1/60	1.30	20	20
2	Electrical Outlet and Light Switch (on FS)	120/1/60	NaN	-	20

Electrical Details

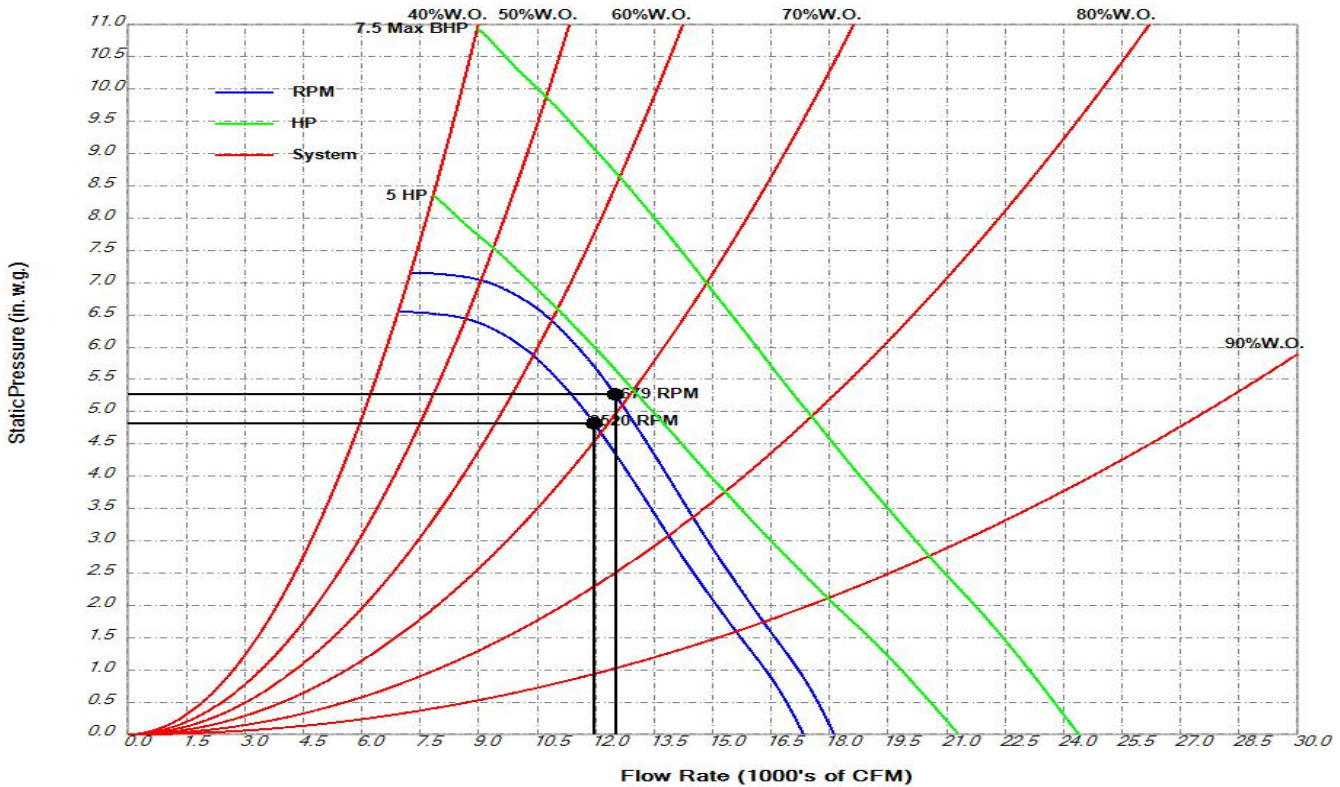
Minimum Unit SCCR	-	ETL Label (UL1995/NEC-2002)	Yes
Unit Light Type	LED	Light Switch Enclosure	Outdoor



Supply Fan(s)

Performance Details													
Fan Manufacturer	Model	# Blades	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Airflow per Fan (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	12	II	135	100	100	4	3,125	335	5.27	1.25	3,679	4.71
Max RPM	Wheel Type	Blade Type	Wheel Material	Base Material		Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints			
4,310	SWSI	Airfoil	Aluminum	-		Damper	Yes (K=963.00)	-	Rubber Pad	-			
Drive Type	FEI		FEP (KW)		Inlet Screen	Fan Cage	Fan Stand	Motor Removal Rail	Seismic Snubber				
Direct Drive	1.02		15.54		-	-	-	-	-				
Motor Details													
Type / MFG	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	RPM	Frame Size	FLA (Amps)	Efficiency	Location	SGR			
TEFC / Baldor	7.5	208/3/60	4	H	3,600	213T	19.76	Premium	Left	Yes			
At Motor Synchronous Details													
TSP (in w.g.)		Total Air Flow (CFM)			Fan Speed (RPM)			Fan Power (BHP)					
4.82		2,990			3,520			4.13					
Notes													

Unit is outside the scope of the AHRI Standard 430/431.
 Per California Energy Code (C.E.C.), Title 20, the selected fan ratings are only approved for use in equipment outside the state of California. Buyer assumes all liability for non-compliance of the noted regulation.

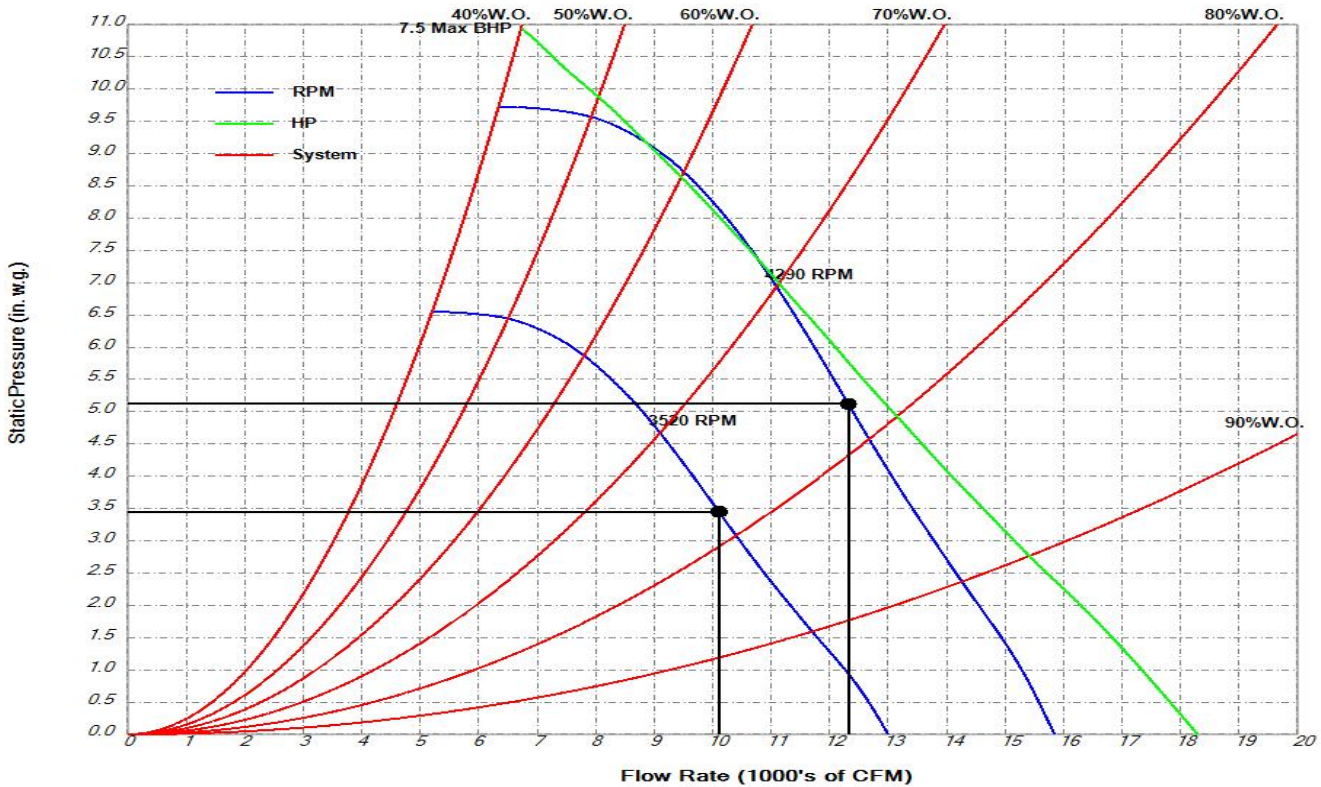


Supply Fan Redundancy

Fan and Motor Summary								
Manufacturer	Model	Size	% Wheel Width	% Wheel Diameter	Class	Max RPM	Motor Power (HP)	Motor Speed (RPM)
Lau	SF	135	100	100	II	4,310	7.5	3,600
Design Performance								
Operating Fans (#)	Airflow per Fan (CFM)	Total Airflow (CFM)	Total Airflow (%)	TSP (in w.g)	Fan Speed (RPM)	Total Fan Power (BHP)		
4	3,125	12,500	100	5.27	3,679	18.84		
Redundant Performance								
Operating Fans (#)	Airflow per Fan (CFM)	Total Airflow (CFM)	Total Airflow (%)	TSP (in w.g)	Fan Speed (RPM)	Total Fan Power (BHP)		
3	4,107	12,321	99	5.12	4,290	20.73		
Notes								

Redundancy limited due to maximum Fan Speed for Class.

VFD(s) must be balanced for operation at redundant rating with one fan manually disabled. Non-operating fan must have provision for airflow isolation (damper or manual blank off). Redundant rating is not part of the AHRI Central Station Air-Handling Unit (AHU) Certification Program.



Water Coil(s)

Coil Information										
Segment[Index]	Coil Tag	Coil Duty	Fluid Type	Airflow (cfm)	Flow Direction	Density	Altitude (ft)			
HC[1]	-	Heating	Water	6250	Horizontal	Standard	335			
Coil Bank Configuration										
Segment[Index]	Tube Diameter (in) Fin Type	Total Fin Height (in)	Fin Length per Coil (in)	Face Velocity (fpm)	Stacking Rack Material	Coils High	Coils Wide	Coil Configuration	Coil Stagger (in)	Coil Pull Panel
HC[1]	0.625 Sine	60.50	65.00	229	-	1	1	Standard	0	Left Side
Airside Performance										
Segment[Index]	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	TMBH	SMBH	Air Pressure Drop (in w.g.)			
HC[1]	40.0	-	57.8	-	126	126	0.03			
Fluidside Performance										
Segment[Index]	EFT (°F)	LFT (°F)	Fluid Velocity (fps)	Fluid Flow (gpm)	Fluid Pressure Drop (ft)	Rows	Tubes Per Circuit	Reynolds Number		
HC[1]	140.0	86.7	0.6	4.8	0.2	1	4	4369		
Fin and Tube Configuration										
Segment[Index]	Fin Thickness (in) / Material	Fin Spacing (fpi)	Tube Thickness (in)	Turbulators	Return Bend Thickness	Casing Material	Coil Coating	Fouling Factor (hr.ft ² .°F/BTU)		
HC[1]	0.008 Aluminum	8	0.025	No	0.025	Galvanized	None	0.00050		

Header and Connection Configuration

Segment[Index]	Header Material	Connection Material	Connection Diameter (in)	Connection Offset (in)	Connection Type	Connection Location/Rotation
HC[1]	Copper	Steel	1.5	0	MPT	Left

Other Performance

Segment[Index]	Dry Weight (lbs)	Fluid Weight (lbs)	Internal Volume (ft ³)
HC[1]	136	36	0.6

Notes

- Performance is shown for the entire coil bank. Performance is not per coil.
- Coil index indicates position in segment. Example: CC-1, index 1; Spacer, index 2; CC-1, index 3
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- All Coils: Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- HC[1]: AHRI Certified: Yes. Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program, which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org.
- All Coils: CDW Tube Spacing: 1.50 x 1.30
- All Coils: Coil DII Version: 8.14



Glycol Coil(s)

Coil Information

Segment[Index]	Coil Tag	Coil Duty	Fluid Type	Glycol Percentage	Airflow (cfm)	Flow Direction	Density	Altitude (ft)
CC[1]	-	Cooling	Propylene Glycol	30	12500	Horizontal	Standard	335

Coil Bank Configuration

Segment[Index]	Tube Diameter (in) Fin Type	Total Fin Height (in)	Fin Length per Coil (in)	Face Velocity (fpm)	Stacking Rack Material	Coils High	Coils Wide	Coil Configuration	Coil Stagger (in)	Coil Pull Panel
CC[1]	0.625 Sine	60.50	65.00	458	-	2	1	Standard	0	Left Side

Airside Performance

Segment[Index]	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	TMBH	SMBH	Air Pressure Drop (in w.g.)
CC[1]	80.0	66.8	51.3	51.3	570	388	1.13

Fluidside Performance

Segment[Index]	EFT (°F)	LFT (°F)	Fluid Velocity (fps)	Fluid Flow (gpm)	Fluid Pressure Drop (ft)	Rows	Tubes Per Circuit	Reynolds Number
CC[1]	42.0	54.2	3.7	98.6	13.7	10	12	3980

Fin and Tube Configuration

Segment[Index]	Fin Thickness (in) / Material	Fin Spacing (fpi)	Tube Thickness (in)	Turbulators	Return Bend Thickness	Casing Material	Coil Coating	Fouling Factor (hr.ft ² .°F/BTU)
CC[1]	0.010 Aluminum	10	0.035	No	0.035	Stainless	None	0.00050

Header and Connection Configuration

Segment[Index]	Header Material	Connection Material	Connection Diameter (in)	Connection Offset (in)	Connection Type	Connection Location/Rotation
CC[1]	Copper	Steel	2.5	0	MPT	Left

Other Performance

Segment[Index]	Dry Weight (lbs)	Fluid Weight (lbs)	Internal Volume (ft³)
CC[1]	1276	294	4.6

Notes

- Performance is shown for the entire coil bank. Performance is not per coil.
- Coil index indicates position in segment. Example: CC-1, index 1; Spacer, index 2; CC-1, index 3
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- CC[1]: AHRI Certified:Yes.Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program, which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org.
- All Coils: CDW Tube Spacing: 1.50 x 1.30
- All Coils: Coil DII Version: 8.14
- CC[1]: Note: When Conditions that produce condensate exist, coil face velocities above 626 fpm may result in condensate carryover.



Drain(s)

Details

Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
CC	Stainless Steel, 304	Left	None

UV

UV Surface Decontamination Details

Segment	Manufacturer	Total Watts	Amps	V/Ph/Hz	Radiometer
CC	V-Max	156	1.30	120/1/60	Yes

Filter(s)

Details								
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material	
RF	Primary Filter	4"	Side	Mini Pleat 60% Efficiency (MERV 11)	-	-	Galvanized Steel	
Sizes						Filter Gauge Details		
Segment	Filter	1 st Filter Size H x W (in)	1 st Qty	2 nd Filter Size H x W (in)	2 nd Qty	Location	Type	Range (in w.g)
RF	Primary Filter	20x24	6	20x20	3	Door	Magnehelic with Flag	0 - 3.0

Damper(s)

Details												
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area (ft ²)	Airflow (CFM)	Min Airflow Measurement (CFM)	Type	Config	Model	Material	Blade Orientation
MB	Outside Air	21.00 x 19.00	1	902	2.8	2,500	-	Control	100%	CD50	Aluminum	Parallel
MB	Return Air	15.25 x 66.00	1	1,788	7.0	12,500	-	Control	100%	CD50	Aluminum	Parallel
FS	Inlet Air	18.65 x 20.78	4	1,161	10.8	12,500	-	Counterbalanced Backdraft	100%	CBD6	Aluminum	Parallel

Air Blender(s)

Details							
Blender Type	Quantity	Size	Material	Arrangement	Area (ft ²)	Area Ratio	
Blender Products Inc, Series IV	2	ABS30	Aluminum	Horizontal	10.3	0.30	

Door(s)

Details												
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	ViewPort Wire	Test Port	Spare Gasket	Thermal Break	Fastener Type	Safety Latch	Noncontact Safety Interlock
MB	Left	Outward	Front	66 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	-
RF	Left	Outward	Front	66 x 10 x 2	None	-	-	-	Yes	Plated	-	Yes
HC	Left	Outward	Front	66 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
CC	Left	Outward	Rear	66 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
FS	Left	Outward	Rear	66 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	Yes	Yes

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (ft ²)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	CD50 (Control Damper - Aluminum Airfoil)	7.0	12,500	1,788	0.19	0.00
MB	Return Air Opening	7.0	12,500	1,788	0.54	0.00
AB	Air Blender(s)	10.3	12,500	1,211	0.24	0.00
RF	4" Mini Pleat 60% Efficiency (MERV 11)	28.3	12,500	441	0.42	0.00
RF	Dirty Filter Allowance	0.0		0	0.83	0.00
HC	Heating - 1 Row - 8 Fins Per Inch	54.6	12,500	229	0.03	0.00
CC	Cooling - 10 Row - 10 Fins Per Inch	27.3	12,500	458	1.13	0.00
CC	UV Lights	0.0	12,500	0	0.03	0.00
FS	CBD6 (Backdraft Damper With Counterbalance)	10.8	12,500	1,161	0.07	0.00
FS	Supply Air Opening	7.0	12,500	1,791	0.54	0.00
FS	External Static - User Entered	0.0		0	1.25	0.00
				Total	5.27	0.00

Dimensions and Weight

Details					
Segment	Description	Length ¹ (in)	Height (in)	Width ² (in)	Weight ³ (lbs)
MB	Mixing Box	33	72	78	820
AB	Air Blender	29	72	78	544
RF	Rigid Filter	13	72	78	321
HC	Heating Coil	28	72	78	665
CC	Cooling Coil	55	72	78	2,550
FS	Fan (Supply)	65	72	78	2,844
Overall		223			

Notes

¹The length includes bottom tier segments only.

²The width does not include coil connection extensions or door latches that extend beyond the unit casing. The width does not include the depth of any pipe chases.

³See Shipping Summary for notes on weights.

Report and Sound Summary:

Unit Sound Power Levels (dBs re 10 ⁻¹² Watts)									
Opening	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Supply Air, Top, FS-1	87	90	90	94	97	93	89	91	
Return Air, MB-1	81	80	75	81	81	70	65	66	
Outside Air, MB-1	77	76	71	76	77	66	61	62	79
Casing Radiated	79	76	70	72	81	63	55	55	81

Notes

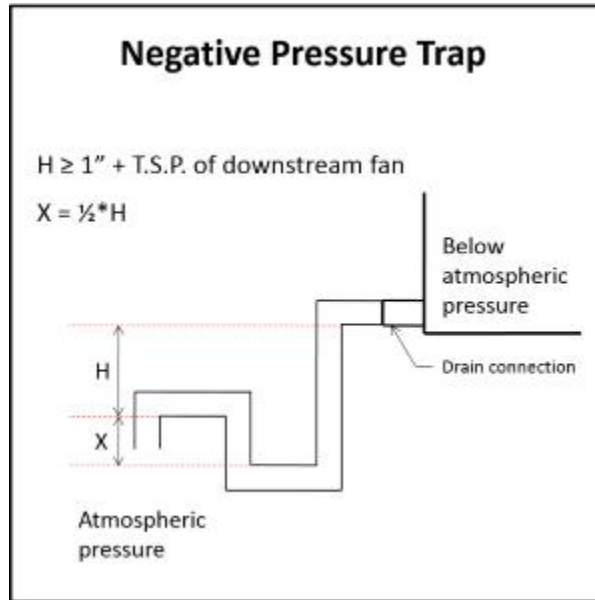
Sound data is determined from interpolation of AHU test data in accordance with the latest version of AHRI Standard 260 Sound Rating of Ducted Air Moving and Conditioning Equipment.. Unit attenuation is calculated based on measured appurtenance insertion loss, and industry accepted acoustic models.

NOTES:

1. AMCA-311 fan sound certification tolerances (+6 dB in the 63 Hz band and +3 dB in all other bands) apply to unit sound power levels.
2. The overall A-weighted sound power level is applicable to non-ducted openings and casing radiated sound only.
3. AHU manufacturer makes no claims regarding NC levels. Acoustic analysis to determine compliance with scheduled or specified NC levels is by others

Recommended Trap Height

Details									
Segment	Applicable Fan	Fan TSP (in w.g.)	Positive or Negative	Calculated Dimensions (in)			Recommended Dimensions (in)		Base Rail Height (in)
				H	X	H + X	H	H + X	
CC	Supply Fan	5.27	Negative	5.66	2.83	8.49	5.75	8.50	6



Notes

Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.

Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details

Air Handling Unit AHU's meet IBC seismic requirements for non-critical equipment ($I_p = 1.0$) for locations with design spectral response $S_d \leq 0.43$. Units must be rigid mounted.

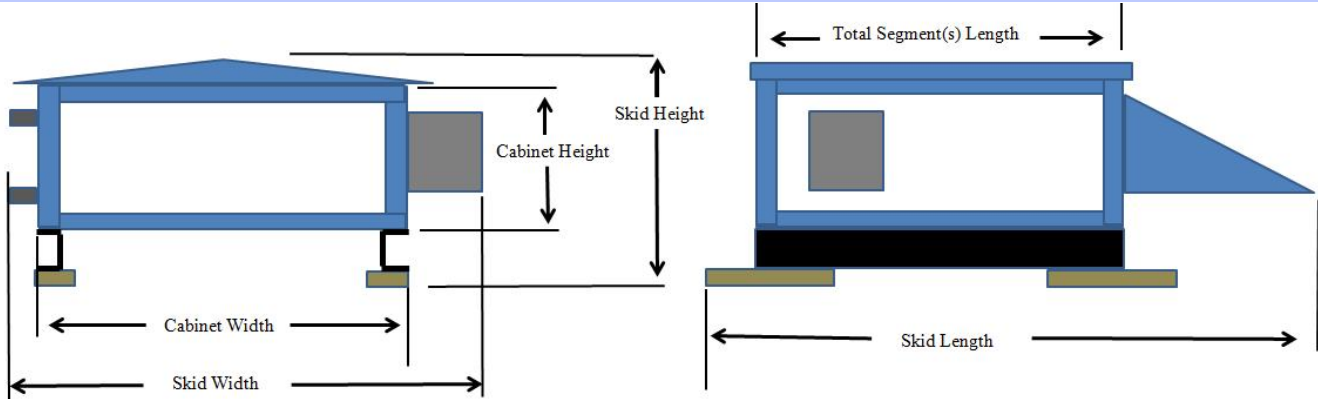
The anchorage of the unit to the ground or building structure needs to be evaluated by and is the responsibility of the engineer of record. Specification of seismic requirements is the responsibility of the project design engineer. If formal certification is required, please contact your sales representative and/or application engineer for review. Certain application and site requirements may require additional cost and/or lead time.

Component locations are listed as Segment Hand (Unit Hand): ex. Left (Right). See Submittal Drawing for additional details.

Air handling unit parameters vary depending on conditions. Parameters such as airflows, air pressure drops, and coil capacities are shown for design conditions.

Shipping Summary

Details					
Skid	Skid Length (in)	Skid Height (in)	Skid Width (in)	Shipping Weight (lbs)	Operating Weight (lbs)
RF AB MB	75	85	83	1,710	1,685
CC HC	83	84	88	2,963	3,215
FS	65	85	88	2,917	2,844
Overall					7,744



Notes

Skid Width: Total width of the shipping skid, including any items that may extend beyond the cabinet (this includes any door handles, coil connections, drain connections, lifting lugs, mounted pipe-chases, electrical/control components, tie-down brackets, side dampers).

Skid Height: Total height of the shipping skid, including any items that may extend beyond the cabinet (this includes any base-rails, shipping wood-blocks, roof peak, discharge flanges, mounted gas-furnace flue pipes).

Skid Length: Total length of the shipping skid, including any items that may extend beyond the cabinet (this includes any mounted rain-hoods, discharge flanges, tie-down brackets, shipping wood-blocks, front dampers, split connectors, electrical/control components, outrigging extensions, isolation dampers, inlet baskets).

Shipping Weight: Represents the estimated shipping weight with a tolerance of +/- 10% for values greater than 5,000 lbs. Values less than 5,000 lbs. may have higher percentage variation but not any consequential shipping impact. Shipping weight does not include ship loose and/or field-installed items but does include estimate for shipping materials and/or opening covers.

Operating Weight: Represents the estimated operational weight with a tolerance of +/- 10% for values greater than 5,000 lbs. Values less than 5,000 lbs. may have higher percentage variation. Operational weight estimate includes unit shell, internal components and structure, and known ship loose and/or field-installed items (weather hoods, pipe chases, factory-provided filter media and estimated fluid weight in coils). Actual operating weight will be heavier due to additional field installed materials including but not limited to field-provided filter media, piping, control devices, and/or inertia base concrete.

Job Summary

Project Name:	Rehabilitate Bathhouses – Hot Springs National Park		
Unit Tag(s):	AHU-2M		
Quantity:	1	Environment:	Indoor



Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
PAI-54x60	5,000	335	5,107

Segment Sequence

(FS)(CC)(HC RF)(AB MB)

Unit Construction

Casing Details								
Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Mylar Lining	Thermal Break	Bulkhead Material
MB	2"	None	18 Ga. G-90 Galvanized	20 Ga. G-90 Galvanized	2" Foam	-	-	None
AB, RF, HC, CC, FS	2"	None	18 Ga. G-90 Galvanized	20 Ga. G-90 Galvanized	2" Foam	-	-	Galvanized Steel

Base Details		
Segment(s)	Material	Paint
MB, AB, RF, HC, CC, FS	6" Formed Steel	None

Floor Details						
Segment(s)	Gauge and Material	Paint	Insulation	Thermal Break	Attachment	Sub-Floor Gauge and Material
MB, AB, RF, HC, CC, FS	16 Ga. G-90 Galvanized	None	2"	-	Stitch Weld	None

Notes

Enhanced Thermal Performance construction.

Unit Electrical

Circuit Details					
#	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	CC UV Light Panel	120/1/60	1.24	15	15
2	Electrical Outlet and Light Switch (on FS)	120/1/60	NaN	-	15

Electrical Details			
Minimum Unit SCCR	-	ETL Label (UL1995/NEC-2002)	Yes
Unit Light Type	Light Switch Enclosure		
LED	Indoor		



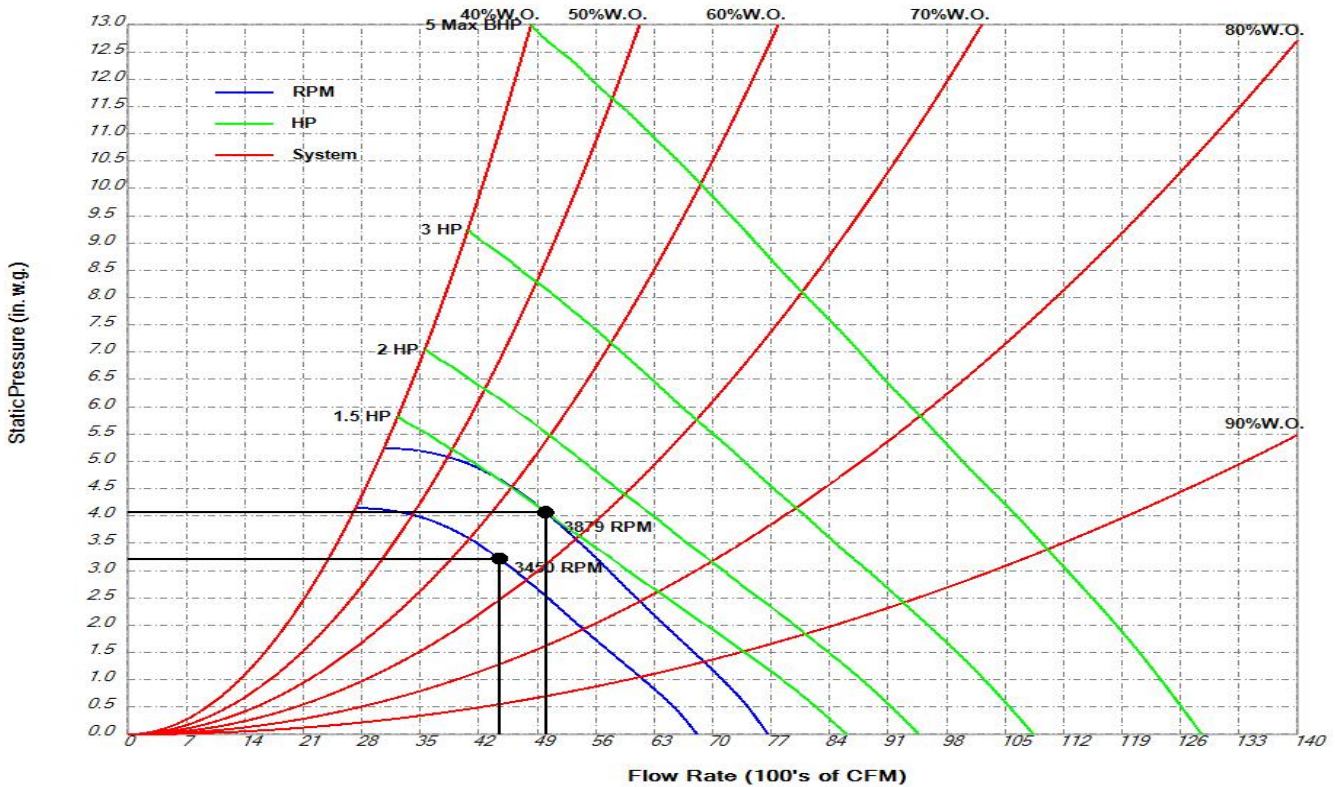
Supply Fan(s)

Performance Details													
Fan Manufacturer	Model	# Blades	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Airflow per Fan (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	12	II	105	100	100	4	1,250	335	4.07	1.00	3,879	1.50
Max RPM	Wheel Type	Blade Type	Wheel Material	Base Material			Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints		
5,625	SWSI	Airfoil	Aluminum	-			Damper	Yes (K=592.00)	-	Rubber Pad	-		
Drive Type		FEI	FEP (KW)		Inlet Screen	Fan Cage	Fan Stand	Motor Removal Rail	Seismic Snubber				
Direct Drive		1.03	5.17		-	-	-	-	-				
Motor Details													
Type / MFG	Motor Power (HP)		V/Ph/Hz	Quantity	Insulation Class	RPM	Frame Size	FLA (Amps)	Efficiency	Location	SGR		
TEFC / Baldor	3.0		208/3/60	4	H	3,600	182T	8.22	Premium	Left	Yes		
At Motor Synchronous Details													
TSP (in w.g.)			Total Air Flow (CFM)				Fan Speed (RPM)				Fan Power (BHP)		
3.22			1,112				3,450				1.06		

Notes

Certified by the AHRI Central Station Air-Handling Unit (AHU) Certification Program, based on AHRI Standard 430/431. AHRI certified units are subject to rigorous and continuous testing, have performance ratings independently measured and are third-party verified. Certified units may be found in the AHRI Directory at www.ahridirectory.org

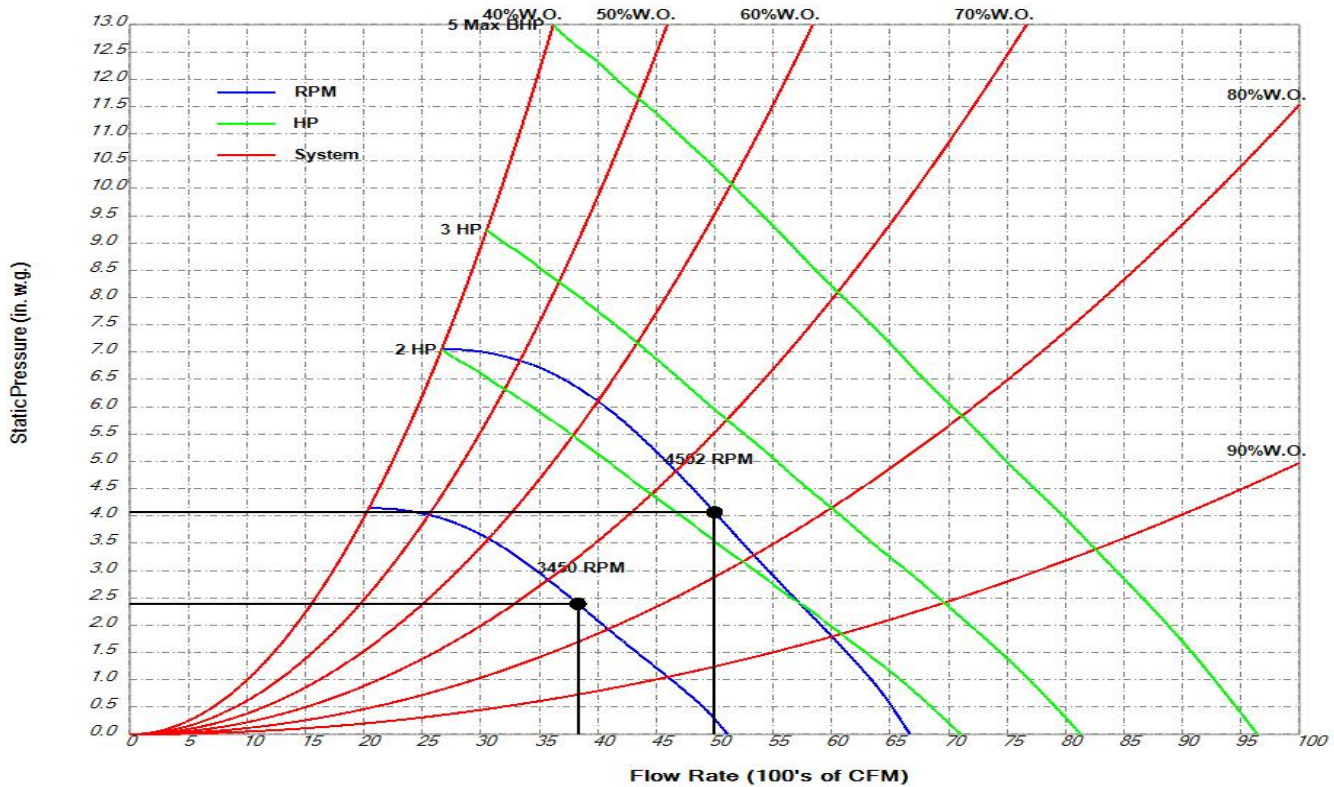
Per California Energy Code (C.E.C.), Title 20, the selected fan ratings are only approved for use in equipment outside the state of California. Buyer assumes all liability for non-compliance of the noted regulation.



Supply Fan Redundancy

Fan and Motor Summary								
Manufacturer	Model	Size	% Wheel Width	% Wheel Diameter	Class	Max RPM	Motor Power (HP)	Motor Speed (RPM)
Lau	SF	105	100	100	II	5,625	3.0	3,600
Design Performance								
Operating Fans (#)	Airflow per Fan (CFM)	Total Airflow (CFM)	Total Airflow (%)	TSP (in w.g.)	Fan Speed (RPM)	Total Fan Power (BHP)		
4	1,250	5,000	100	4.07	3,879	6.00		
Redundant Performance								
Operating Fans (#)	Airflow per Fan (CFM)	Total Airflow (CFM)	Total Airflow (%)	TSP (in w.g.)	Fan Speed (RPM)	Total Fan Power (BHP)		
3	1,667	5,000	100	4.07	4,502	6.63		
Notes								

VFD(s) must be balanced for operation at redundant rating with one fan manually disabled. Non-operating fan must have provision for airflow isolation (damper or manual blank off). Redundant rating is not part of the AHRI Central Station Air-Handling Unit (AHU) Certification Program.



Water Coil(s)

Coil Information										
Segment[Index]	Coil Tag	Coil Duty	Fluid Type	Airflow (cfm)	Flow Direction	Density	Altitude (ft)			
HC[1]	-	Heating	Water	2500	Horizontal	Standard	335			
Coil Bank Configuration										
Segment[Index]	Tube Diameter (in) Fin Type	Total Fin Height (in)	Fin Length per Coil (in)	Face Velocity (fpm)	Stacking Rack Material	Coils High	Coils Wide	Coil Configuration	Coil Stagger (in)	Coil Pull Panel
HC[1]	0.625 Sine	45.25	47.00	169	-	1	1	Standard	0	Left Side
Airside Performance										
Segment[Index]	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	TMBH	SMBH	Air Pressure Drop (in w.g.)			
HC[1]	30.0	-	59.7	-	86	86	0.02			
Fluidside Performance										
Segment[Index]	EFT (°F)	LFT (°F)	Fluid Velocity (fps)	Fluid Flow (gpm)	Fluid Pressure Drop (ft)	Rows	Tubes Per Circuit	Reynolds Number		
HC[1]	140.0	101.3	0.7	4.5	0.2	1	4	6280		
Fin and Tube Configuration										
Segment[Index]	Fin Thickness (in) / Material	Fin Spacing (fpi)	Tube Thickness (in)	Turbulators	Return Bend Thickness	Casing Material	Coil Coating	Fouling Factor (hr.ft ² .°F/BTU)		
HC[1]	0.008 Aluminum	8	0.025	No	0.025	Galvanized	None	0.00050		

Header and Connection Configuration

Segment[Index]	Header Material	Connection Material	Connection Diameter (in)	Connection Offset (in)	Connection Type	Connection Location/Rotation
HC[1]	Copper	Steel	1.5	0	MPT	Left

Other Performance

Segment[Index]	Dry Weight (lbs)	Fluid Weight (lbs)	Internal Volume (ft ³)
HC[1]	87	21	0.3

Notes

- Performance is shown for the entire coil bank. Performance is not per coil.
- Coil index indicates position in segment. Example: CC-1, index 1; Spacer, index 2; CC-1, index 3
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- All Coils: Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- HC[1]: AHRI Certified: Yes. Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program, which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org.
- All Coils: CDW Tube Spacing: 1.50 x 1.30
- All Coils: Coil DII Version: 8.14



Glycol Coil(s)

Coil Information

Segment[Index]	Coil Tag	Coil Duty	Fluid Type	Glycol Percentage	Airflow (cfm)	Flow Direction	Density	Altitude (ft)
CC[1]	-	Cooling	Propylene Glycol	30	5000	Horizontal	Standard	335

Coil Bank Configuration

Segment[Index]	Tube Diameter (in) Fin Type	Total Fin Height (in)	Fin Length per Coil (in)	Face Velocity (fpm)	Stacking Rack Material	Coils High	Coils Wide	Coil Configuration	Coil Stagger (in)	Coil Pull Panel
CC[1]	0.625 Sine	45.25	47.00	339	-	1	1	Standard	0	Left Side

Airside Performance

Segment[Index]	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	TMBH	SMBH	Air Pressure Drop (in w.g.)
CC[1]	80.0	66.8	51.1	51.1	229	156	0.68

Fluidside Performance

Segment[Index]	EFT (°F)	LFT (°F)	Fluid Velocity (fps)	Fluid Flow (gpm)	Fluid Pressure Drop (ft)	Rows	Tubes Per Circuit	Reynolds Number
CC[1]	42.0	53.9	2.8	40.7	12.4	10	16	3002

Fin and Tube Configuration

Segment[Index]	Fin Thickness (in) / Material	Fin Spacing (fpi)	Tube Thickness (in)	Turbulators	Return Bend Thickness	Casing Material	Coil Coating	Fouling Factor (hr.ft ² .°F/BTU)
CC[1]	0.010 Aluminum	10	0.035	No	0.035	Stainless	None	0.00050

Header and Connection Configuration						
Segment[Index]	Header Material	Connection Material	Connection Diameter (in)	Connection Offset (in)	Connection Type	Connection Location/Rotation
CC[1]	Copper	Steel	1.5	0	MPT	Left

Other Performance			
Segment[Index]	Dry Weight (lbs)	Fluid Weight (lbs)	Internal Volume (ft³)
CC[1]	691	151	2.3

Notes

- Performance is shown for the entire coil bank. Performance is not per coil.
- Coil index indicates position in segment. Example: CC-1, index 1; Spacer, index 2; CC-1, index 3
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- CC[1]: AHRI Certified:Yes.Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program, which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org.
- All Coils: CDW Tube Spacing: 1.50 x 1.30
- All Coils: Coil DII Version: 8.14
- CC[1]: Note: When Conditions that produce condensate exist, coil face velocities above 626 fpm may result in condensate carryover.



Drain(s)

Details			
Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
CC	Stainless Steel, 304	Left	None

UV

UV Surface Decontamination Details					
Segment	Manufacturer	Total Watts	Amps	V/Ph/Hz	Radiometer
CC	V-Max	149	1.24	120/1/60	Yes

Filter(s)

Details								
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material	
RF	Primary Filter	4"	Side	Mini Pleat 60% Efficiency (MERV 11)	-	-	Galvanized Steel	
Sizes						Filter Gauge Details		
Segment	Filter	1 st Filter Size H x W (in)	1 st Qty	2 nd Filter Size H x W (in)	2 nd Qty	Location	Type	Range (in w.g)
RF	Primary Filter	24x24	2	20x24	2	Door	Magnehelic with Flag	0 - 2.0

Damper(s)

Details												
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area (ft ²)	Airflow (CFM)	Min Airflow Measurement (CFM)	Type	Config	Model	Material	Blade Orientation
MB	Outside Air	15.25 x 17.00	1	833	1.8	1,500	-	Control	100%	CD50	Aluminum	Parallel
MB	Return Air	9.50 x 44.00	1	1,722	2.9	5,000	-	Control	100%	CD50	Aluminum	Parallel
FS	Inlet Air	15.04 x 16.28	4	735	6.8	5,000	-	Counterbalanced Backdraft	100%	CBD6	Aluminum	Parallel

Air Blender(s)

Details							
Blender Type	Quantity	Size	Material	Arrangement	Area (ft ²)	Area Ratio	
Blender Products Inc, Series IV	2	ABS24	Aluminum	Horizontal	6.6	0.35	

Door(s)

Details												
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	ViewPort Wire	Test Port	Spare Gasket	Thermal Break	Fastener Type	Safety Latch	Noncontact Safety Interlock
MB	Left	Outward	Front	48 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	-
RF	Left	Outward	Front	48 x 10 x 2	None	-	-	-	Yes	Plated	-	Yes
HC	Left	Outward	Front	48 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
CC	Left	Outward	Rear	48 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
FS	Left	Outward	Rear	48 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	Yes	Yes

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (ft ²)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	CD50 (Control Damper - Aluminum Airfoil)	2.9	5,000	1,722	0.30	0.00
MB	Return Air Opening	2.9	5,000	1,722	0.50	0.00
AB	Air Blender(s)	6.6	5,000	758	0.08	0.00
RF	4" Mini Pleat 60% Efficiency (MERV 11)	14.7	5,000	341	0.25	0.00
RF	Dirty Filter Allowance	0.0		0	1.00	0.00
HC	Heating - 1 Row - 8 Fins Per Inch	29.6	5,000	169	0.02	0.00
CC	Cooling - 10 Row - 10 Fins Per Inch	14.7	5,000	339	0.68	0.00
CC	UV Lights	0.0	5,000	0	0.03	0.00
FS	CBD6 (Backdraft Damper With Counterbalance)	6.8	5,000	735	0.02	0.00
FS	Supply Air Opening	4.7	5,000	1,071	0.19	0.00
FS	External Static - User Entered	0.0		0	1.00	0.00
				Total	4.07	0.00

Dimensions and Weight

Details					
Segment	Description	Length ¹ (in)	Height (in)	Width ² (in)	Weight ³ (lbs)
MB	Mixing Box	21	54	60	470
AB	Air Blender	22	54	60	334
RF	Rigid Filter	15	54	60	243
HC	Heating Coil	31	54	60	517
CC	Cooling Coil	61	54	60	1,678
FS	Fan (Supply)	60	54	60	1,865
Overall		210			

Notes

¹The length includes bottom tier segments only.

²The width does not include coil connection extensions or door latches that extend beyond the unit casing. The width does not include the depth of any pipe chases.

³See Shipping Summary for notes on weights.

Report and Sound Summary:

Unit Sound Power Levels (dBs re 10 ⁻¹² Watts)									
Opening	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Supply Air, Top, FS-1	81	80	83	88	89	82	81	79	
Return Air, MB-1	75	72	71	74	75	63	56	54	
Outside Air, MB-1	73	70	69	72	73	61	54	52	75
Casing Radiated	74	68	64	66	74	53	48	44	75

Notes

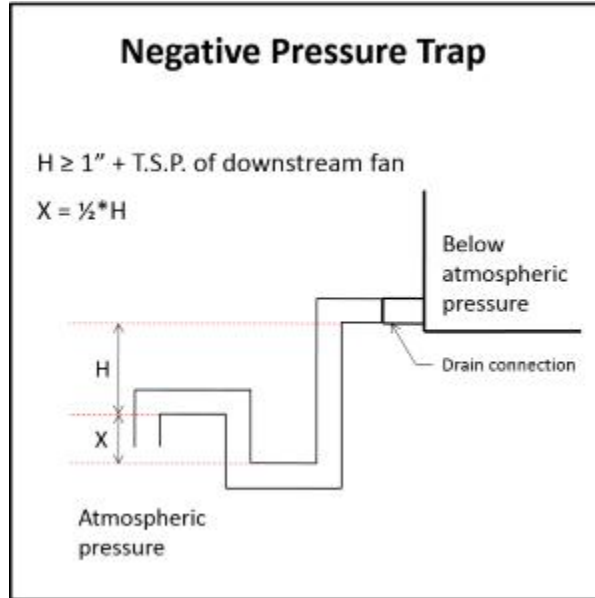
Sound data is determined from interpolation of AHU test data in accordance with the latest version of AHRI Standard 260 Sound Rating of Ducted Air Moving and Conditioning Equipment.. Unit attenuation is calculated based on measured appurtenance insertion loss, and industry accepted acoustic models.

NOTES:

1. AMCA-311 fan sound certification tolerances (+6 dB in the 63 Hz band and +3 dB in all other bands) apply to unit sound power levels.
2. The overall A-weighted sound power level is applicable to non-ducted openings and casing radiated sound only.
3. AHU manufacturer makes no claims regarding NC levels. Acoustic analysis to determine compliance with scheduled or specified NC levels is by others

Recommended Trap Height

Details									
Segment	Applicable Fan	Fan TSP (in w.g.)	Positive or Negative	Calculated Dimensions (in)			Recommended Dimensions (in)		Base Rail Height (in)
				H	X	H + X	H	H + X	
CC	Supply Fan	4.07	Negative	4.86	2.43	7.29	5.00	7.25	6



Notes

Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.

Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details

Air Handling Unit AHU's meet IBC seismic requirements for non-critical equipment ($I_p = 1.0$) for locations with design spectral response $S_d \leq 0.43$. Units must be rigid mounted.

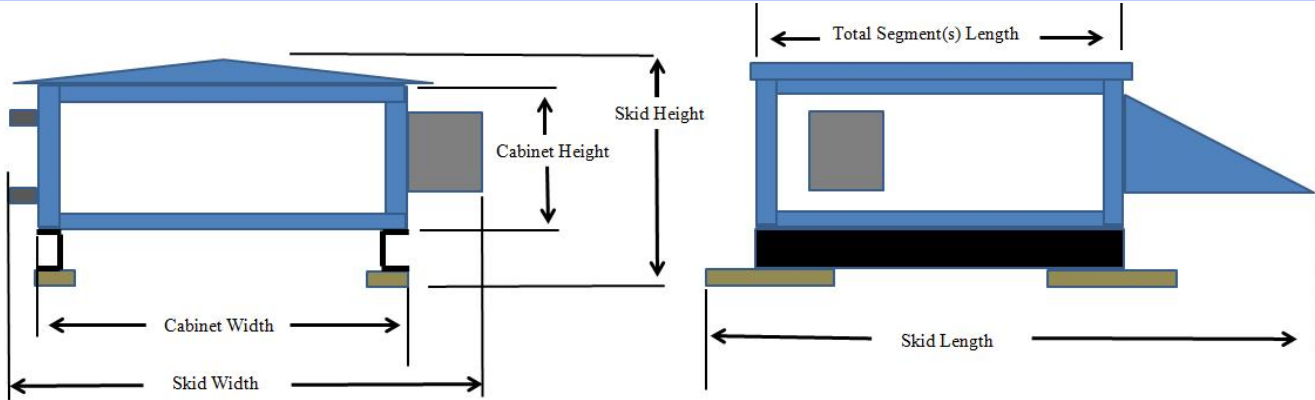
The anchorage of the unit to the ground or building structure needs to be evaluated by and is the responsibility of the engineer of record. Specification of seismic requirements is the responsibility of the project design engineer. If formal certification is required, please contact your sales representative and/or application engineer for review. Certain application and site requirements may require additional cost and/or lead time.

Component locations are listed as Segment Hand (Unit Hand): ex. Left (Right). See Submittal Drawing for additional details.

Air handling unit parameters vary depending on conditions. Parameters such as airflows, air pressure drops, and coil capacities are shown for design conditions.

Shipping Summary

Details					
Skid	Skid Length (in)	Skid Height (in)	Skid Width (in)	Shipping Weight (lbs)	Operating Weight (lbs)
AB MB	43	67	65	856	804
HC RF	46	66	65	766	760
CC	61	66	70	1,585	1,678
FS	60	67	70	1,924	1,865
Overall					5,107



Notes

Skid Width: Total width of the shipping skid, including any items that may extend beyond the cabinet (this includes any door handles, coil connections, drain connections, lifting lugs, mounted pipe-chases, electrical/control components, tie-down brackets, side dampers).

Skid Height: Total height of the shipping skid, including any items that may extend beyond the cabinet (this includes any base-rails, shipping wood-blocks, roof peak, discharge flanges, mounted gas-furnace flue pipes).

Skid Length: Total length of the shipping skid, including any items that may extend beyond the cabinet (this includes any mounted rain-hoods, discharge flanges, tie-down brackets, shipping wood-blocks, front dampers, split connectors, electrical/control components, outrigging extensions, isolation dampers, inlet baskets).

Shipping Weight: Represents the estimated shipping weight with a tolerance of +/- 10% for values greater than 5,000 lbs. Values less than 5,000 lbs. may have higher percentage variation but not any consequential shipping impact. Shipping weight does not include ship loose and/or field-installed items but does include estimate for shipping materials and/or opening covers.

Operating Weight: Represents the estimated operational weight with a tolerance of +/- 10% for values greater than 5,000 lbs. Values less than 5,000 lbs. may have higher percentage variation. Operational weight estimate includes unit shell, internal components and structure, and known ship loose and/or field-installed items (weather hoods, pipe chases, factory-provided filter media and estimated fluid weight in coils). Actual operating weight will be heavier due to additional field installed materials including but not limited to field-provided filter media, piping, control devices, and/or inertia base concrete.

Job Summary

Project Name:	Rehabilitate Bathhouses – Hot Springs National Park		
Unit Tag(s):	AHU-3M		
Quantity:	1	Environment:	Indoor



Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
PAI-45x51	3,000	335	3,339

Segment Sequence

(TN FS)/(VC)(RF MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Mylar Lining	Thermal Break	Bulkhead Material
MB, TN	2"	None	18 Ga. G-90 Galvanized	20 Ga. G-90 Galvanized	2" Foam	-	-	None
RF, VC, FS	2"	None	18 Ga. G-90 Galvanized	20 Ga. G-90 Galvanized	2" Foam	-	-	Galvanized Steel

Base Details

Segment(s)	Material	Paint
MB, RF, VC	3" Formed Steel	None

Floor Details

Segment(s)	Gauge and Material	Paint	Insulation	Thermal Break	Attachment	Sub-Floor Gauge and Material
MB, RF, VC	16 Ga. G-90 Galvanized	None	2"	-	Screw Down	None
TN, FS	16 Ga. G-90 Galvanized	None	2" Foam	-	-	N/A

Notes

Enhanced Thermal Performance construction.

Unit Electrical

Circuit Details

#	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	VC UV Light Panel	120/1/60	0.75	15	15
2	Electrical Outlet and Light Switch (on FS)	120/1/60	NaN	-	15

Electrical Details

Minimum Unit SCCR	-	ETL Label (UL1995/NEC-2002)	Yes
Unit Light Type	LED	Light Switch Enclosure	Indoor

Supply Fan(s)

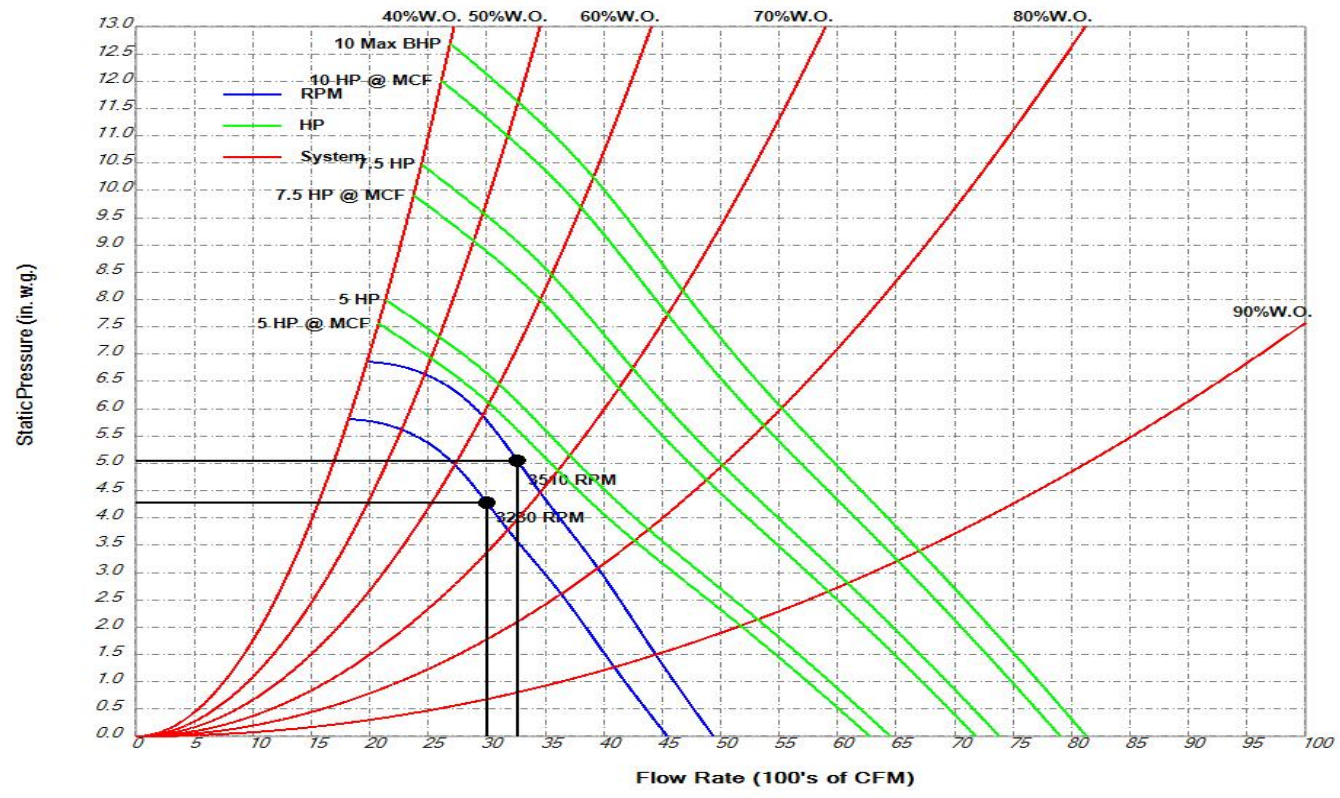
Performance Details													
Fan Manufacturer	Model	# Blades	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Airflow per Fan (CFM)	Altitude (ft)	TSP (in w.g.)	ESP (in w.g.)	Fan Speed (RPM)	Fan Power (BHP)
Twin City	EPFN	9	II	150	100	100	1	3,000	335	4.28	0.50	3,230	3.26
Max RPM	Wheel Type	Blade Type	Wheel Material	Base Material		Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints			
3,909	SWSI	Airfoil	Aluminum	-		None	Yes (K=1206.40)	-	2" Spring	Yes			
Drive Type	FEI		FEP (KW)	Inlet Screen	Fan Cage	Fan Stand	Motor Removal Rail	Seismic Snubber					
Direct Drive	1.27		2.78	-	-	-	-	-					

Motor Details										
Type / MFG	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	RPM	Frame Size	FLA (Amps)	Efficiency	Location	SGR
ODP / WEG	5.0	208/3/60	1	F	3,600	182T	14.04	Premium	Right	Yes

At Motor Synchronous Details			
TSP (in w.g.)	Total Air Flow (CFM)	Fan Speed (RPM)	Fan Power (BHP)
5.05	3,260	3,510	4.18

Notes

Unit is outside the scope of the AHRI Standard 430/431.
 Per California Energy Code (C.E.C.), Title 20, the selected fan ratings are only approved for use in equipment outside the state of California. Buyer assumes all liability for non-compliance of the noted regulation.



Water Coil(s)

Coil Information							
Segment[Index]	Coil Tag	Coil Duty	Fluid Type	Airflow (cfm)	Flow Direction	Density	Altitude (ft)
VC[2]	-	Heating	Water	3000	Horizontal	Standard	335

Coil Bank Configuration										
Segment[Index]	Tube Diameter (in) Fin Type	Total Fin Height (in)	Fin Length per Coil (in)	Face Velocity (fpm)	Stacking Rack Material	Coils High	Coils Wide	Coil Configuration	Coil Stagger (in)	Coil Pull Panel
VC[2]	0.625 Sine	36.25	38.00	314	-	1	1	Standard	0	Right Side

Airside Performance							
Segment[Index]	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	TMBH	SMBH	Air Pressure Drop (in w.g.)
VC[2]	55.0	-	85.6	-	101	101	0.08

Fluidside Performance								
Segment[Index]	EFT (°F)	LFT (°F)	Fluid Velocity (fps)	Fluid Flow (gpm)	Fluid Pressure Drop (ft)	Rows	Tubes Per Circuit	Reynolds Number
VC[2]	140.0	103.3	1.1	5.6	0.6	2	8	9510

Fin and Tube Configuration									
Segment[Index]	Fin Thickness (in) / Material	Fin Spacing (fpi)	Tube Thickness (in)	Turbulators	Return Bend Thickness	Casing Material	Coil Coating	Fouling Factor (hr.ft².°F/BTU)	
VC[2]	0.008 Aluminum	8	0.035	No	0.035	Galvanized	None	0.00050	

Header and Connection Configuration						
Segment[Index]	Header Material	Connection Material	Connection Diameter (in)	Connection Offset (in)	Connection Type	Connection Location/Rotation
VC[2]	Copper	Steel	1.5	0	MPT	Right

Other Performance			
Segment[Index]	Dry Weight (lbs)	Fluid Weight (lbs)	Internal Volume (ft³)
VC[2]	106	25	0.4

- ### Notes
- Performance is shown for the entire coil bank. Performance is not per coil.
 - Coil index indicates position in segment. Example: CC-1, index 1; Spacer, index 2; CC-1, index 3
 - Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
 - All Coils: Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
 - VC[2]: AHRI Certified:Yes.Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program, which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahrirectory.org.
 - All Coils: CDW Tube Spacing: 1.50 x 1.30
 - All Coils: Coil DII Version: 8.14



Glycol Coil(s)

Coil Information										
Segment[Index]	Coil Tag	Coil Duty	Fluid Type	Glycol Percentage	Airflow (cfm)	Flow Direction	Density	Altitude (ft)		
VC[1]	-	Cooling	Propylene Glycol	30	3000	Horizontal	Standard	335		
Coil Bank Configuration										
Segment[Index]	Tube Diameter (in) Fin Type	Total Fin Height (in)	Fin Length per Coil (in)	Face Velocity (fpm)	Stacking Rack Material	Coils High	Coils Wide	Coil Configuration	Coil Stagger (in)	Coil Pull Panel
VC[1]	0.625 Sine	36.25	38.00	314	-	1	1	Standard	0	Right Side
Airside Performance										
Segment[Index]	EAT-DB (°F)	EAT-WB (°F)	LAT-DB (°F)	LAT-WB (°F)	TMBH	SMBH	Air Pressure Drop (in w.g.)			
VC[1]	80.0	66.8	51.9	51.9	131	90	0.65			
Fluidside Performance										
Segment[Index]	EFT (°F)	LFT (°F)	Fluid Velocity (fps)	Fluid Flow (gpm)	Fluid Pressure Drop (ft)	Rows	Tubes Per Circuit	Reynolds Number		
VC[1]	42.0	52.4	1.8	26.5	5.6	12	16	1923		
Fin and Tube Configuration										
Segment[Index]	Fin Thickness (in) / Material	Fin Spacing (fpi)	Tube Thickness (in)	Turbulators	Return Bend Thickness	Casing Material	Coil Coating	Fouling Factor (hr.ft ² .°F/BTU)		
VC[1]	0.008 Aluminum	10	0.035	No	0.035	Stainless	None	0.00050		
Header and Connection Configuration										
Segment[Index]	Header Material	Connection Material	Connection Diameter (in)	Connection Offset (in)	Connection Type	Connection Location/Rotation				
VC[1]	Copper	Steel	1.5	0	MPT	Right				
Other Performance										
Segment[Index]	Dry Weight (lbs)			Fluid Weight (lbs)			Internal Volume (ft ³)			
VC[1]	509			125			1.9			

Notes

- Performance is shown for the entire coil bank. Performance is not per coil.
- Coil index indicates position in segment. Example: CC-1, index 1; Spacer, index 2; CC-1, index 3
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- VC[1]: AHRI Certified:Yes.Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program, which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org.
- All Coils: CDW Tube Spacing: 1.50 x 1.30
- All Coils: Coil DII Version: 8.14
- VC[1]: Note: When Conditions that produce condensate exist, coil face velocities above 626 fpm may result in condensate carryover.



Drain(s)

Details			
Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
VC	Stainless Steel, 304	Right	None

UV

UV Surface Decontamination Details					
Segment	Manufacturer	Total Watts	Amps	V/Ph/Hz	Radiometer
VC	V-Max	90	0.75	120/1/60	Yes

Filter(s)

Details							
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material
RF	Primary Filter	4"	Side	Mini Pleat 60% Efficiency (MERV 11)	-	-	Galvanized Steel

Sizes				Filter Gauge Details				
Segment	Filter	1 st Filter Size H x W (in)	1 st Qty	2 nd Filter Size H x W (in)	2 nd Qty	Location	Type	Range (in w.g)
RF	Primary Filter	20x20	2	16x20	2	Door	Magnehelic with Flag	0 - 2.0

Damper(s)

Details												
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area (ft ²)	Airflow (CFM)	Min Airflow Measurement (CFM)	Type	Config	Model	Material	Blade Orientation
MB	Outside Air	15.25 x 12.00	1	826	1.3	1,050	-	Control	100%	CD50	Aluminum	Parallel
MB	Return Air	9.50 x 26.00	1	1,749	1.7	3,000	-	Control	100%	CD50	Aluminum	Parallel

Door(s)

Details												
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	ViewPort Wire	Test Port	Spare Gasket	Thermal Break	Fastener Type	Safety Latch	Noncontact Safety Interlock
MB	Right	Outward	Front	39 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
RF	Right	Outward	Front	39 x 12 x 2	None	-	-	-	Yes	Plated	-	Yes
VC	Right	Outward	Rear	39 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
TN	Right	Outward	Rear	39 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	-	Yes
FS	Right	Outward	Front	39 x 18 x 2	Standard Double Pane	-	-	-	Yes	Plated	Yes	Yes

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (ft ²)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	CD50 (Control Damper - Aluminum Airfoil)	1.7	3,000	1,749	0.37	0.00
MB	Return Air Opening	1.7	3,000	1,749	0.51	0.00
RF	4" Mini Pleat 60% Efficiency (MERV 11)	10.0	3,000	300	0.19	0.00
RF	Dirty Filter Allowance	0.0		0	1.06	0.00
VC	Cooling - 12 Row - 10 Fins Per Inch	9.6	3,000	314	0.65	0.00
VC	Heating - 2 Row - 8 Fins Per Inch	9.6	3,000	314	0.08	0.00
VC	UV Lights	0.0	3,000	0	0.03	0.00
VC	Internal Opening	0.0	3,000	0	0.10	0.00
TN	Safety Cover	3.1	3,000	960	0.10	0.00
TN	Internal Opening	3.1	3,000	960	0.10	0.00
FS	Supply Air Opening	2.5	3,000	1,200	0.24	0.00
FS	External Static - User Entered	0.0		0	0.50	0.00
FS	Cabinet Effect	0.0	3,000	0	0.35	0.00
				Total	4.28	0.00

Dimensions and Weight

Details					
Segment	Description	Length ¹ (in)	Height (in)	Width ² (in)	Weight ³ (lbs)
MB	Mixing Box	24	45	51	391
RF	Rigid Filter	15	45	51	200
VC	Vertical Coil	75	45	51	1,739
TN	Turning	21	45	51	293
FS	Fan (Supply)	51	45	51	716
Overall		114			

Notes

¹The length includes bottom tier segments only.

²The width does not include coil connection extensions or door latches that extend beyond the unit casing. The width does not include the depth of any pipe chases.

³See Shipping Summary for notes on weights.

Report and Sound Summary:

Unit Sound Power Levels (dBs re 10 ⁻¹² Watts)									
Opening	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Supply Air, Top, FS-1	75	76	79	90	83	79	80	74	
Return Air, MB-1	63	62	67	73	60	56	56	47	
Outside Air, MB-1	62	60	66	72	59	54	55	46	70
Casing Radiated	66	63	61	68	66	50	48	39	69

Notes

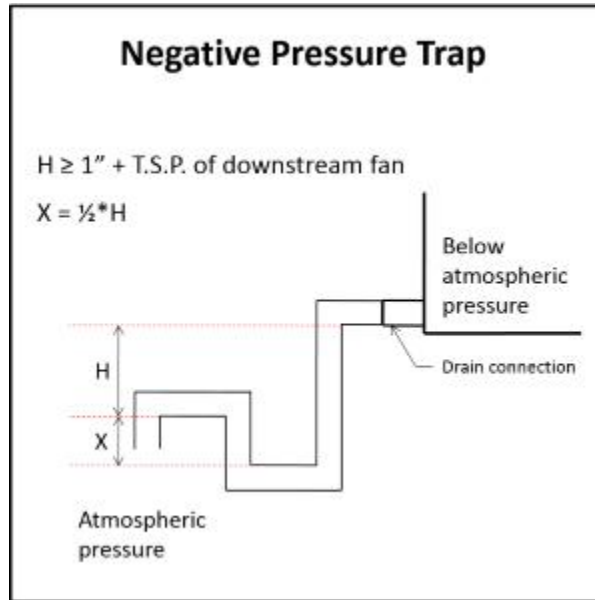
Sound data is determined from interpolation of AHU test data in accordance with the latest version of AHRI Standard 260 Sound Rating of Ducted Air Moving and Conditioning Equipment.. Unit attenuation is calculated based on measured appurtenance insertion loss, and industry accepted acoustic models.

NOTES:

1. AMCA-311 fan sound certification tolerances (+6 dB in the 63 Hz band and +3 dB in all other bands) apply to unit sound power levels.
2. The overall A-weighted sound power level is applicable to non-ducted openings and casing radiated sound only.
3. AHU manufacturer makes no claims regarding NC levels. Acoustic analysis to determine compliance with scheduled or specified NC levels is by others

Recommended Trap Height

Details									
Segment	Applicable Fan	Fan TSP (in w.g.)	Positive or Negative	Calculated Dimensions (in)			Recommended Dimensions (in)		Base Rail Height (in)
				H	X	H + X	H	H + X	
VC	Supply Fan	4.28	Negative	4.49	2.24	6.74	4.50	6.75	3



Notes

Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.

Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details

Air Handling Unit AHU's meet IBC seismic requirements for non-critical equipment ($I_p = 1.0$) for locations with design spectral response $S_d \leq 0.43$. Units must be rigid mounted.

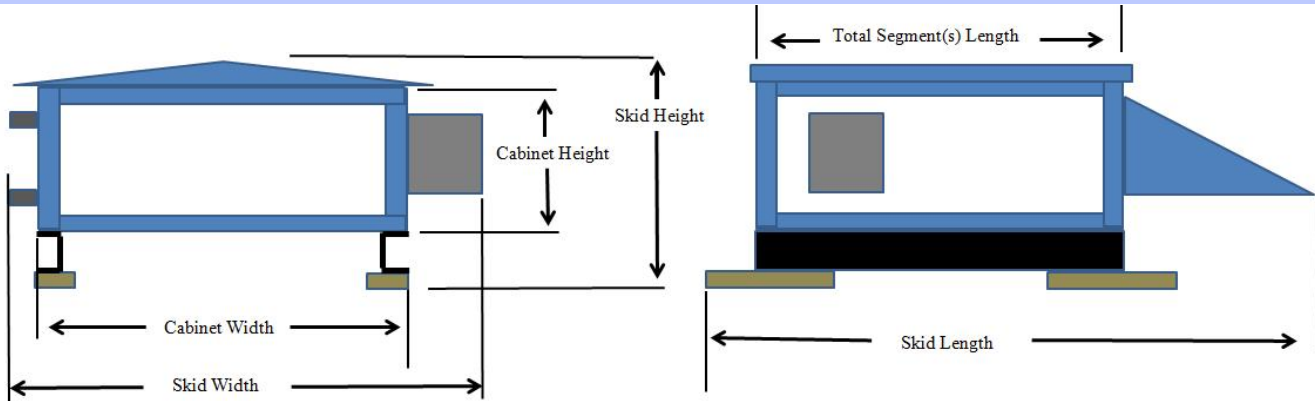
The anchorage of the unit to the ground or building structure needs to be evaluated by and is the responsibility of the engineer of record. Specification of seismic requirements is the responsibility of the project design engineer. If formal certification is required, please contact your sales representative and/or application engineer for review. Certain application and site requirements may require additional cost and/or lead time.

Component locations are listed as Segment Hand (Unit Hand): ex. Left (Right). See Submittal Drawing for additional details.

Air handling unit parameters vary depending on conditions. Parameters such as airflows, air pressure drops, and coil capacities are shown for design conditions.

Shipping Summary

Details					
Skid	Skid Length (in)	Skid Height (in)	Skid Width (in)	Shipping Weight (lbs)	Operating Weight (lbs)
RF MB	39	55	58	619	591
VC	75	55	63	1,646	1,739
TN FS	72	52	63	1,063	1,009
Overall					3,339



Notes

Skid Width: Total width of the shipping skid, including any items that may extend beyond the cabinet (this includes any door handles, coil connections, drain connections, lifting lugs, mounted pipe-chases, electrical/control components, tie-down brackets, side dampers).

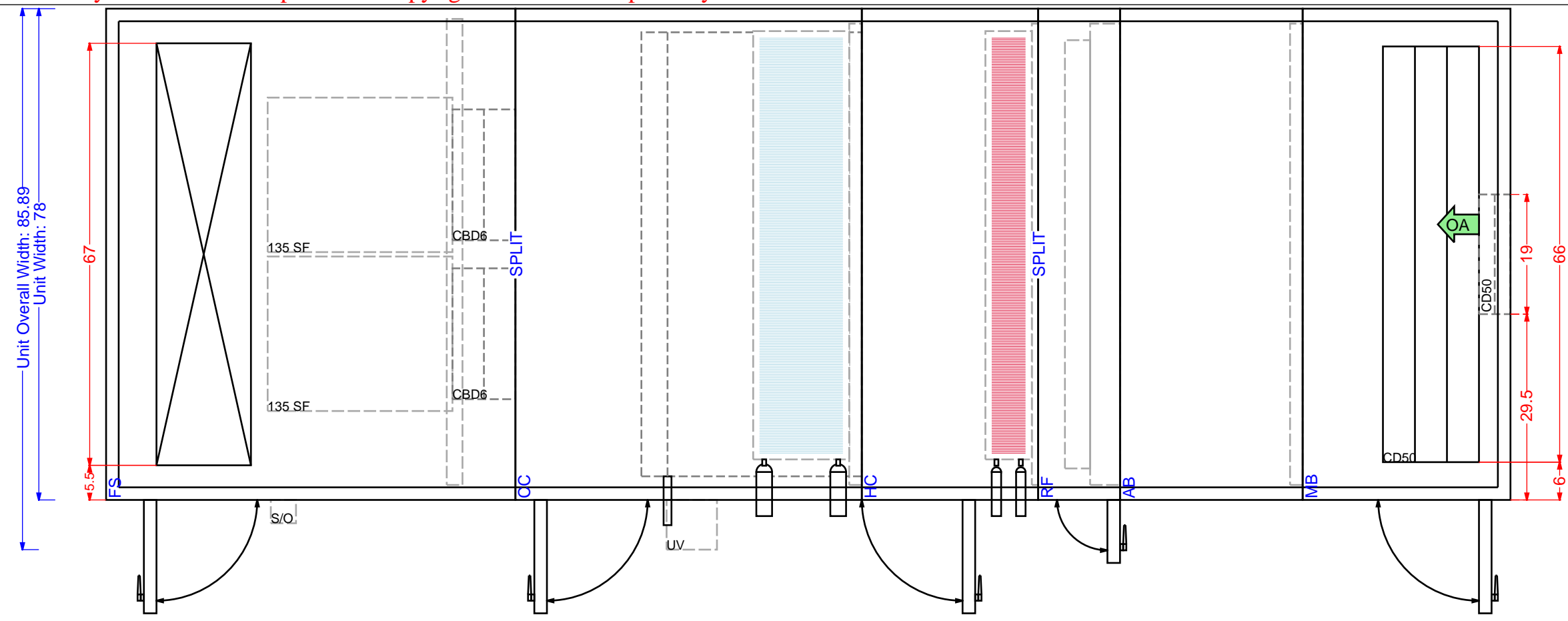
Skid Height: Total height of the shipping skid, including any items that may extend beyond the cabinet (this includes any base-rails, shipping wood-blocks, roof peak, discharge flanges, mounted gas-furnace flue pipes).

Skid Length: Total length of the shipping skid, including any items that may extend beyond the cabinet (this includes any mounted rain-hoods, discharge flanges, tie-down brackets, shipping wood-blocks, front dampers, split connectors, electrical/control components, outrigging extensions, isolation dampers, inlet baskets).

Shipping Weight: Represents the estimated shipping weight with a tolerance of +/- 10% for values greater than 5,000 lbs. Values less than 5,000 lbs. may have higher percentage variation but not any consequential shipping impact. Shipping weight does not include ship loose and/or field-installed items but does include estimate for shipping materials and/or opening covers.

Operating Weight: Represents the estimated operational weight with a tolerance of +/- 10% for values greater than 5,000 lbs. Values less than 5,000 lbs. may have higher percentage variation. Operational weight estimate includes unit shell, internal components and structure, and known ship loose and/or field-installed items (weather hoods, pipe chases, factory-provided filter media and estimated fluid weight in coils). Actual operating weight will be heavier due to additional field installed materials including but not limited to field-provided filter media, piping, control devices, and/or inertia base concrete.

Unit Drawings



UNIT CONSTRUCTION
 MODEL: PAI-72x78 UNIT TYPE: Indoor
 MOTOR LOCATION: (FS)Left
 UNIT OPERATING WEIGHT: 7744 lbs.(+/- 10%)

PLAN VIEW

AIRFLOW: Right (Supply), Left (Return)

NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on one side of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Overall dimensions account for: outdoor roof peak and overhang, motor control and / or factory package control boxes, coil connections, rain hoods, pipe chases, AMS - 60 damper / EAML louver (if applicable,) base rail - in order to convey the true space requirements for the unit.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, gas fuel system, etc.

Skid weights represent estimated shipping weight including shipping materials and/or opening covers but does not include ship loose and/or field-installed items.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

(S) - Designates Shipped Loose Item(s)

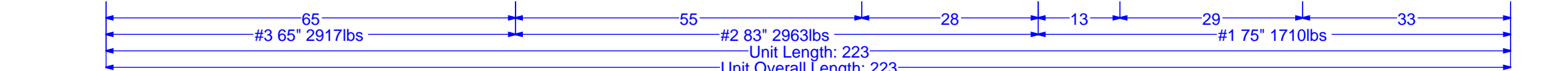
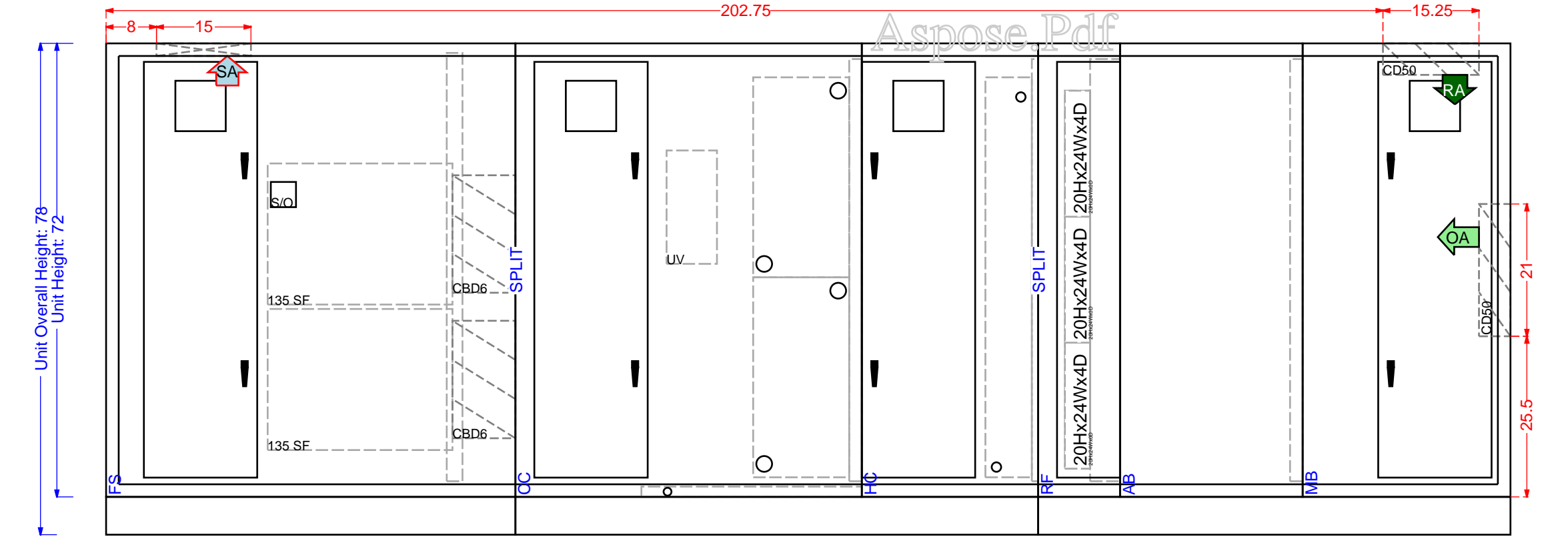
PIPING CONNECTIONS
(In order of Airflow)

SEGMENT	TYPE	HAND	QTY	SPLY	RTN
HC	MPT	Left	1 Sup 1 Ret	1.5"	1.5"
CC	MPT	Left	1 Sup 1 Ret	2.5"	2.5"
CC	MPT	Left	1 Sup 1 Ret	2.5"	2.5"

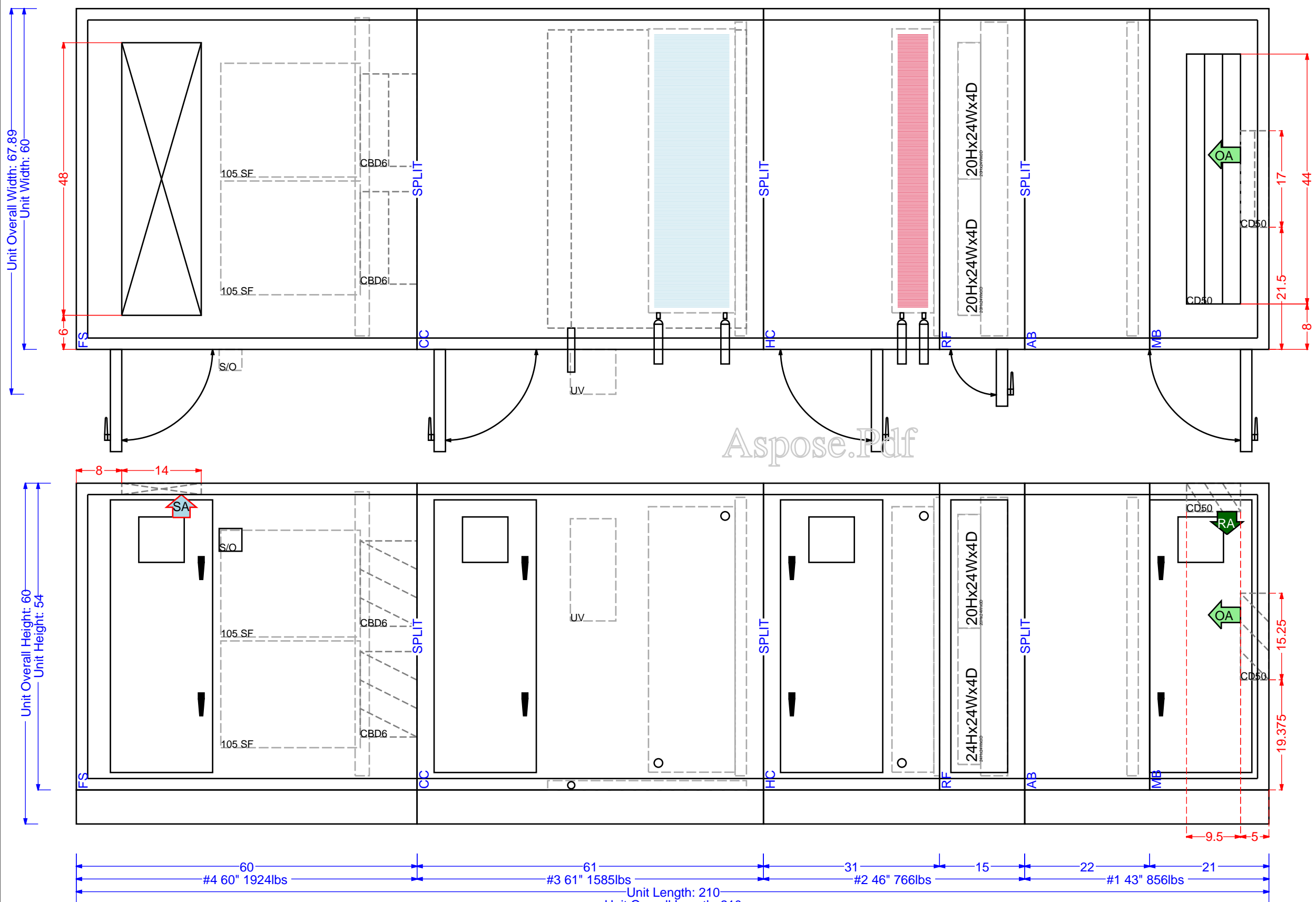
Drain pan connection size 1 1/4" MPT SCH 40
(Connections on Left side(s) of unit)

SEGMENT LIST

SEG	DESCRIPTION	X START	LENGTH
MB	Mixing Box	0	33
AB	Air Blower	33	29
RF	Rigid Filter	62	13
HC	Heating Coil	75	28
CC	Cooling Coil	103	55
FS	Fan (Supply)	158	65



REV	DATE	REVISION CHANGE	REV BY	Solution XT UNIT DRAWING		QUICK VIEW		ALL DIMENSIONS SHOWN IN: INCHES DRAWING SCALE: NTS DIMENSION TOLERANCES: UNIT (+/- 1/2"); PIPING (+/- 2") DRAWING NOT TO BE USED FOR CONSTRUCTION	
				MODEL: PAI-72x78	6/11/2024 2:27:40 PM UTC	CONTRACT #:			
				DESIGNATION: AHU-1M		UNIT TAG: AHU-1M			
				PROJECT NAME: Rehabilitate Bathhouses - Hot Springs National Park					



UNIT CONSTRUCTION
 MODEL: PAI-54x60 UNIT TYPE: Indoor
 MOTOR LOCATION: (FS)Left
 UNIT OPERATING WEIGHT: 5107 lbs.(+/- 10%)

PLAN VIEW

AIRFLOW: Left (Return), Right (Supply)

NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on one side of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Overall dimensions account for: outdoor roof peak and overhang, motor control and / or factory package control boxes, coil connections, rain hoods, pipe chases, AMS - 60 damper / EAML louver (if applicable,) base rail - in order to convey the true space requirements for the unit.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, gas fuel system, etc.

Skid weights represent estimated shipping weight including shipping materials and/or opening covers but does not include ship loose and/or field-installed items.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")

(S) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

SEGMENT	TYPE	HAND	QTY	SPLY	RTN
HC	MPT	Left	1 Sup 1 Ret	1.5"	1.5"
CC	MPT	Left	1 Sup 1 Ret	1.5"	1.5"

Drain pan connection size 1 1/4" MPT SCH 40
(Connections on Left side(s) of unit)

SEGMENT LIST

SEG	DESCRIPTION	X START	LENGTH
MB	Mixing Box	0	21
AB	Air Blender	21	22
RF	Rigid Filter	43	15
HC	Heating Coil	58	31
CC	Cooling Coil	89	61
FS	Fan (Supply)	150	60

REV	DATE	REVISION CHANGE	REV BY

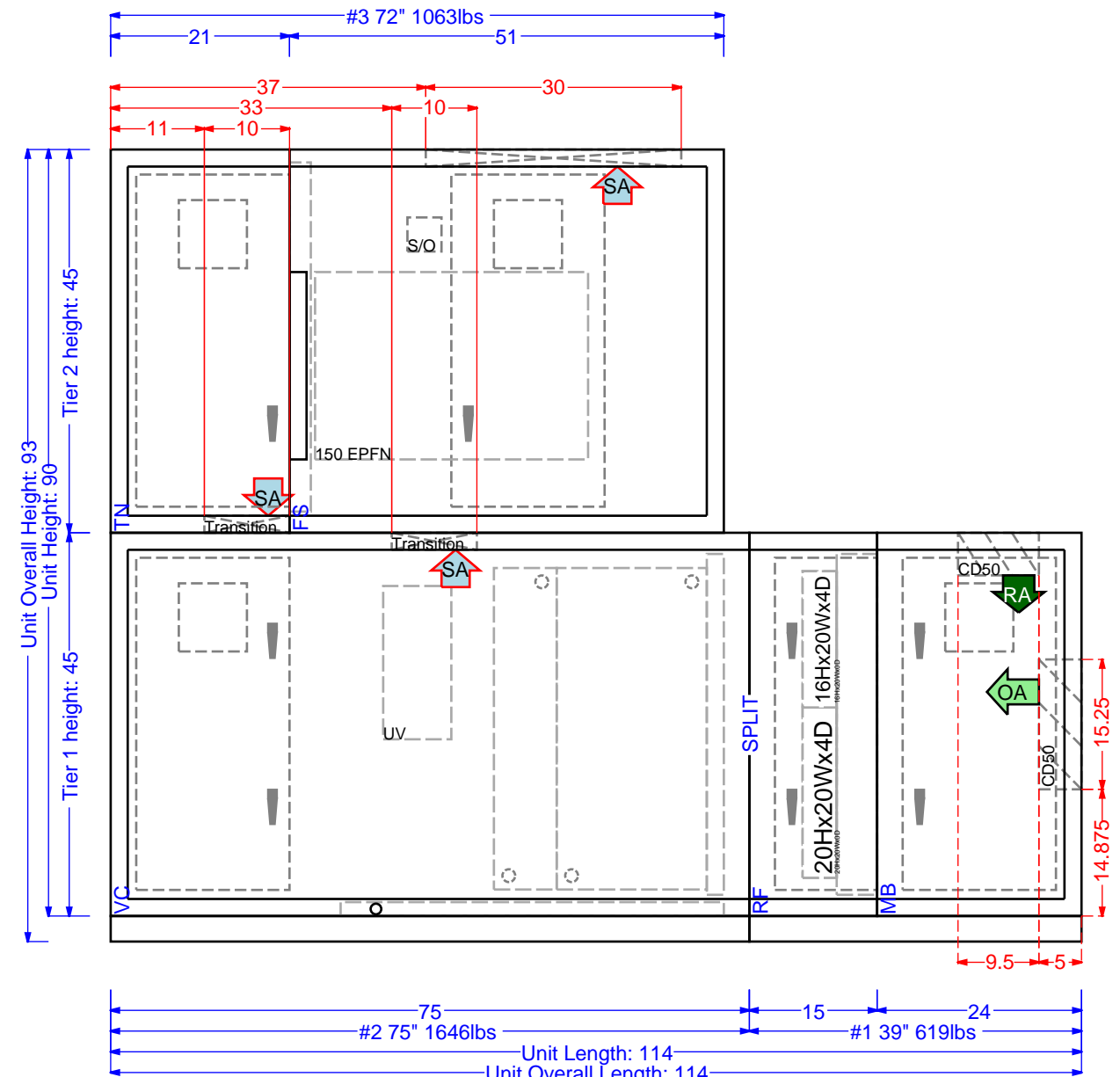
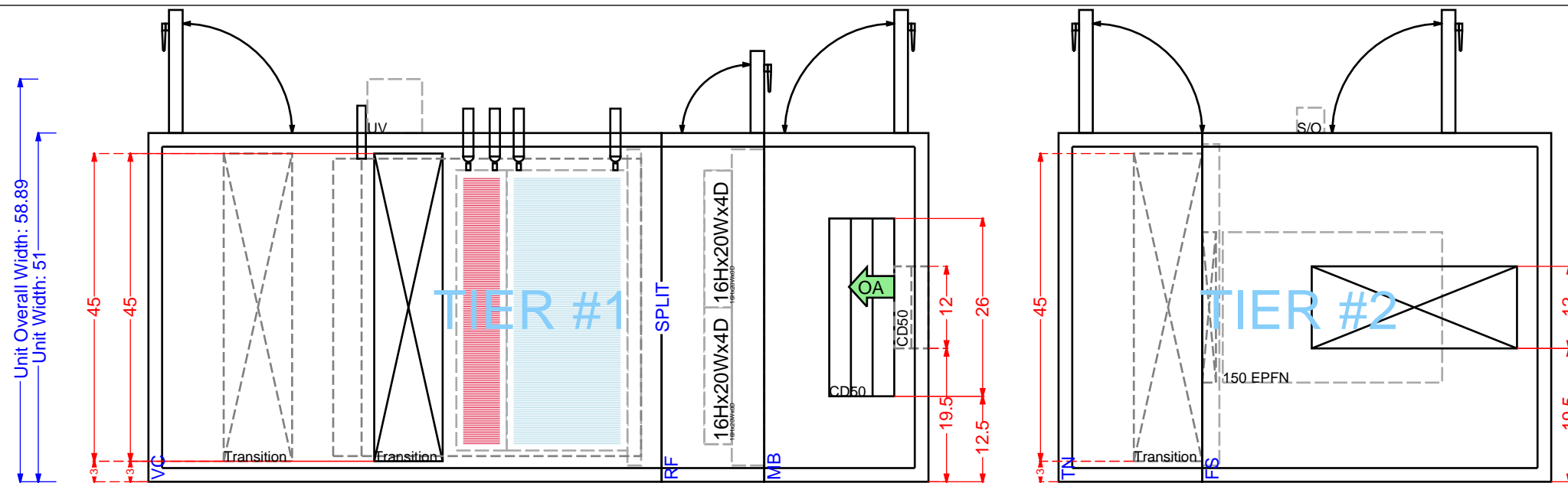
Solution XT UNIT DRAWING

MODEL: PAI-54x60 6/11/2024 2:27:40 PM UTC
 DESIGNATION: AHU-2M
 PROJECT NAME: Rehabilitate Bathhouses - Hot Springs National Park

QUICK VIEW

CONTRACT #:
 UNIT TAG: AHU-2M

ALL DIMENSIONS SHOWN IN: INCHES
 DRAWING SCALE: NTS
 DIMENSION TOLERANCES: UNIT (+/- 1/2"); PIPING (+/- 2")
DRAWING NOT TO BE USED FOR CONSTRUCTION



UNIT CONSTRUCTION
 MODEL: PAI-45x51 UNIT TYPE: Indoor
 MOTOR LOCATION: (FS)Right
 UNIT OPERATING WEIGHT: 3339 lbs.(+/- 10%)

PLAN VIEW

Right
 Rear (Supply) ← → Front (Return)
 Left
 ↓
 AIRFLOW

NOTES

Units with a baserail and a bottom opening: Duct connection flush with the bottom of unit, not flush with bottom of baserail.

Refer to performance report for shipping split details.

Allow sufficient space around the unit for removing the access panels and various parts of the unit. A minimum clearance equal to the width of the unit must be provided on one side of the unit for removing the coil or fan assembly.

Contractor responsible for penetrations and connections of all electrical boxes and internal coil connections.

Overall dimensions account for: outdoor roof peak and overhang, motor control and / or factory package control boxes, coil connections, rain hoods, pipe chases, AMS - 60 damper / EAML louver (if applicable,) base rail - in order to convey the true space requirements for the unit.

Certain items may extend beyond cabinet dimensions including: door handles, light switches, electrical boxes, lifting lugs, gas fuel system, etc.

Skid weights represent estimated shipping weight including shipping materials and/or opening covers but does not include ship loose and/or field-installed items.

Dimension tolerances: Unit (+/- 1/2"); Piping (+/- 2")
 (S) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
 (In order of Airflow)

SEGMENT	TYPE	HAND	QTY	SPLY	RTN
VC	MPT	Right	1 Sup 1 Ret	1.5"	1.5"
VC	MPT	Right	1 Sup 1 Ret	1.5"	1.5"

Drain pan connection size 1 1/4" MPT SCH 40
 (Connections on Right side(s) of unit)

SEGMENT LIST

SEG	DESCRIPTION	X START	LENGTH
MB	Mixing Box	0	24
RF	Rigid Filter	24	15
VC	Vertical Coil	39	75
FS	Fan (Supply)	42	51
TN	Turning	93	21

REV	DATE	REVISION CHANGE	REV BY

Solution XT UNIT DRAWING

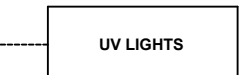
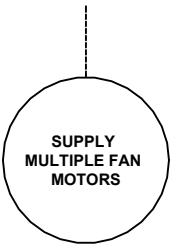
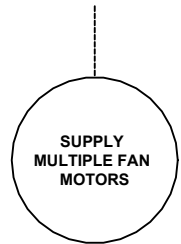
MODEL: PAI-45x51 4/1/2026 7:11:46 PM UTC
 DESIGNATION: AHU-3M
 PROJECT NAME: Rehabilitate Bathhouses – Hot Springs National Park

QUICK VIEW

CONTRACT #:
 UNIT TAG: AHU-3M

ALL DIMENSIONS SHOWN IN: INCHES
 DRAWING SCALE: NTS
 DIMENSION TOLERANCES: UNIT (+/- 1/2"); PIPING (+/- 2")
DRAWING NOT TO BE USED FOR CONSTRUCTION

Wiring Diagrams



PRODUCT DRAWING

AHU Field Wiring

MODEL:

NOT FOR CONSTRUCTION

Project Name: Rehabilitate Bathhouses – Hot Springs National Park

Location: ,

Engineer:

Contractor:

For: Page 47 of 185

Sheet:

Cust Purch Order#:

Contract#:

UNIT

TAG: **AHU-1M - Sheet 1**

Date: 4/16/2026 4:19:16 PM (UTC)

Form No.: 100.09-EG1

Dwg. Lev.: 12/03

Dwg. Scale: NTS

Serial Number:

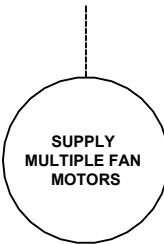
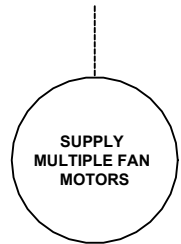
SQ Database Number:

YORKworks Release:

Dwg. Name:

Dwg. Location:





PRODUCT DRAWING

AHU Field Wiring

MODEL:

NOT FOR CONSTRUCTION

Project Name: Rehabilitate Bathhouses – Hot Springs National Park

Location: ,

Engineer:

Contractor:

For: Page 48 of 185

Sheet:

Cust Purch Order#:

Contract#:

UNIT

TAG: **AHU-2M - Sheet 1**

Date: 4/16/2026 3:31:43 PM (UTC)

Form No.: 100.09-EG1

Dwg. Lev.: 12/03

Dwg. Scale: NTS

Serial Number:

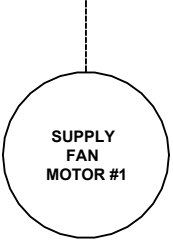
SQ Database Number:

YORKworks Release:

Dwg. Name:

Dwg. Location:





PRODUCT DRAWING
AHU Field Wiring
MODEL:
NOT FOR CONSTRUCTION

Project Name: Rehabilitate Bathhouses – Hot Springs National Park
Location: ,
Engineer:
Contractor:
For: Page 49 of 185

Serial:
Cust Purch Order#:
Contract#:
UNIT
TAG: **AHU-3M - Sheet 1**

Date: 4/16/2026 4:42:43 PM (UTC)
Form No.: 100.09-EG1
Dwg. Lev.: 12/03
Dwg. Scale: NTS

Serial Number:
SQ Database Number:
YORKworks Release:
Dwg. Name:
Dwg. Location:



Unit Specifications Text

UNIT TAG: AHU-1M

Date Created: 04/16/2026 (version: 6.0)

PACE INDOOR AIR HANDLER

UNIT SPECIFICATION

NOTE: REVIEW AND REMOVE LINES THAT DO NOT PERTAIN TO THE SELECTED UNIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Indoor air handling units and components as scheduled and shown on drawings.
- B. Motor disconnects, motor starters, and variable frequency drives.

1.02 RATINGS AND CERTIFICATIONS

- A. Unit will conform to AMCA 210 for fan performance ratings.
- B. Unit will conform to E.T.L. standards. Unit will be ETL listed.
- C. Unit will conform to AHRI 410 for capacities, pressure drops, and selection procedures of air coils.
- D. Unit will conform to ANSI/AHRI 430 for all fabrication procedures of air handling units. Unit will have airflow performance certified to ANSI/AHRI 430.
- E. Motors covered by the Federal Energy Policy Act (EPACT) will meet EPACT requirements.
- F. Damper performance will comply with AMCA 500.
- G. Unit will be ISO 9001 certified.
- H. Unit will be manufactured in an ISO 9002 certified facility.
- I. Filter media to comply with ANSI/UL 900 listed Class I or Class II.
- J. Control Wiring comply with NEC codes & ETL requirements.
- K. Unit will comply with energy use AHSRAE 90.1.

1.03 EXTRA MATERIALS

- A. Provide one set of filters for balancing, and one additional set for final turnover to owner.

1.04 WARRANTY

- A. Unit will be covered by an limited parts (18 months (12 months from start-up)) warranty from date of shipment . Warranty will cover manufacturer defects.
- B. Include factory-provided controls in the parts warranties.
- C. Parts associated with routine maintenance, such as belts and air filters will be excluded.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

- A. Air Handling Unit (AHU) will consist of a structural base, insulated casing, access doors, fans, motors, motor controls, coils, filters, dampers, controls, components, and accessories; as shown on drawings, schedules, and specifications.

B. Unit will meet the specified levels of performance for scheduled items including airflow, static pressure, cooling capacity, heating capacity, electrical characteristics, sound, casing leakage, panel deflection and casing thermal performance.

C. Unit will maintain structural integrity when wall panels are removed.

D. Internal components and accessories will be as specified and scheduled (unless noted otherwise). Components and accessories will be installed by the AHU manufacturer in an ISO-9002 certified facility.

E. Unit will be shipped in one piece or with shipping splits necessary for shipping and installation.

F. Manufacturer will provide detailed, step-by-step instructions for disassembly and reassembly.

2.02 BASE RAIL

A. Unit will be provided with a 6" structural base rail under the full perimeter of the unit, formed from mill galvanized steel.

B. Unit will be provided with base rail and lifting lug system that does not require additional support for rigging. Include base rail lifting lugs at unit corners.

2.03 CASING

A. Casing construction will not rely on the casing panels for structural integrity.

B. Casing panels will be 2" double-wall construction with thermal break. Thermal break will be between interior and exterior liner of the panel assembly, and between the panel and casing framework.

C. Provide casing with minimum thermal resistance (R-value) of 16 hr-ft²-°F/BTU. Exposed insulation is not acceptable.

D. Casing panel insulation will be injected polyurethane foam. Foam insulation will be manufactured by EcoMate®. Rigid foam board panels will not be used.

E. Casing framework downstream of cooling coil will be filled with injected polyurethane foam insulation. Foam insulation will be manufactured by EcoMate®.

F. All exterior casing panels (roof, wall, floor, access door) will be made of G90 galvanized steel. All interior casing panels (roof, wall, floor, access door) will be made of G90 galvanized steel.

G. Panel assembly will meet UL standard 60336-2-40 for fire safety. Panel insulation will comply with the requirements of NFPA 90A.

H. Insulation system provided will be resistant to mold growth in accordance with a standardized test method such as UL 181 or ASTM C 1338.

I. Encapsulate insulation with sheet metal so that air does not contact insulation. Solid lined double-walled panels insulated with injected foam will be hermetically sealed at each corner and around their entire perimeter to eliminate airflow through the panel and to eliminate microbial growth potential within the casing wall.

J. Unit will conform to ASHRAE Standard 111 Class 6 for casing leakage of no more than 1% of design airflow at 1.25 times design static pressure up to a maximum of +8 inches w.g. in positive pressure sections and -8 inches w.g. in negative pressure sections down to a minimum of 50 CFM measurable leakage at or 5,000 design CFM.

K. Unit will be provided with wall panels and access doors that deflect no more than L/240 when subjected to 1.5 times design static pressure up to a maximum of +8 inches w.g. in positive pressure sections and -8 inches w.g. in negative pressure sections. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.

L. Unit will be provided with floors and roofs that deflect no more than L/240 when subjected to a 300 lb static load at mid-span. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.

M. With ETP™ (Enhanced Thermal Performance) Condensation will not form anywhere on unit exterior at 53 °F supply air and 81 °F DB / 73 °F WB exterior ambient. Manufacturer will supply an external condensation performance line, plotted on the psychrometric chart, based on actual test data. Plot will show the exterior

conditions at which unit will sweat given the design supply air temperature. Manufacturer will clearly indicate whether the design conditions will or will not result in external condensation forming anywhere on the unit exterior. If the unit will sweat, indicate where sweating will occur. Unit exterior includes the base, base rail, roof, corners, doors, door frames, and under the cooling coil drain pan.

2.04 ACCESS DOORS

- A. Unit will be provided with double wall access door(s) that meet requirements for the AHU casing.
- B. Thermal break door(s) will incorporate a thermal break in both the door frame and the door panel.
- C. Unit will be provided with industrial-style stainless steel hinges that permit 180 degrees of door swing.
- D. Unit will be provided with latches with roller cam mechanisms that ensure a tight seal. Rotating knife-edge or "paw" latches are not acceptable.
- E. Unit will be provided with each door with a single handle linked to multiple latching points or a separate handle for each latching point. Doors serving access segments will have an interior latch handle.
- F. Unit will be provided with access doors with a locking hasp to accommodate a lockout device.
- G. Unit will be provided with double-pane viewing windows. Windows will be a non-condensing type consisting of a desiccant dehumidification layer. Minimum dimension will be 3" x 8".

2.05 COILS: HEATING AND COOLING

2.05.01 ACCEPTABLE MANUFACTURER

- A. Coil will be manufactured by the same manufacturer as the AHU manufacturer, except where noted in contract documents.

2.05.02 GENERAL DESCRIPTION

- A. Coil will meet or exceed performance scheduled on drawings.
- B. Coil will be provided with performance certified in accordance with AHRI Standard 410 for coil capacity and pressure drop, wherever applicable. Coils circuits will be designed such that the fluid velocity is within the range of certified rating conditions at design flow.
- C. Cooling coils will be provided with a maximum face velocity as scheduled. Face velocity calculations will be based on the finned area of the coil.
- D. Cooling coil will be provided with drain pan that is sufficient to contain coil condensate. Drain pan will extend a minimum of 6" downstream of the face of the coil.
- E. Coil segment casing will accommodate full-face coils as scheduled.
- F. Access doors will be located to provide clearance for pipe insulation, connectors, and accessories. Space will allow a minimum of 90 degrees of door swing.
- G. Coils will be built in their own G90 galvanized steel full perimeter frame. Tube sheets on each end will have fully drawn collars to support and protect tubes. Horizontal coil casing and support members will allow moisture to drain. Bulkhead support will be G90 galvanized steel and will not block finned area.
- H. Individual coils will be removable from the side of the AHU.
- I. Intermediate drain pan made of 304 stainless steel will be provided on stacked cooling coils or any cooling coil taller than 48 inches finned height. Intermediate drain pan will slope in a minimum of two planes toward a single drain connection. Intermediate drain pan will be provided with downspouts routed to lower drain pan.
- J. A single intermediate vertical coil support will be provided on coils with a finned length greater than 62". Two vertical supports will be provided on coils with a finned length greater than 100", and three vertical supports on coils with a finned length greater than 141". Intermediate vertical coil support will be same material as the casing.

K. Gap between coil stub out connection and AHU casing, will be insulated with a spool-shaped sleeve grommet. Adhesive rings applied to the casing walls will not be acceptable.

L. Water coils will be operable at 325 psig working pressure and up to 250 °F. Factory test water coils with 325 psig compressed air under water. Water coils will conform to Subsection 12.3, "Water-Containing Parts," of UL-207, "Standard for Safety: Refrigerant – Containing Components and Accessories, Nonelectrical."

M. Glycol coils will be operable at 325 psig working pressure and up to 250 °F. Factory test glycol coils with 325 psig compressed air under water.

N. Water coils will be provided with a tube OD of 5/8 inches. 5/8 inch tube wall thickness will be 0.025 inches. Mechanically expand tubes will form fin bond and provide burnished, work-hardened interior surface.

O. Glycol coils will be provided with a tube OD of 5/8 inches. 5/8 inch tube wall thickness will be 0.035 inches. Mechanically expand tubes will form fin bond and provide burnished, work-hardened interior surface.

P. Hairpin return bend thickness on 5/8 inch tube wall thickness will be 0.025 inches as standard. Brazed return bend thicknesses will be equal to or greater than the straight tube wall thickness.

Q. Hairpin return bend thickness on 5/8 inch tube wall thickness will be 0.035 inches as standard. Brazed return bend thicknesses will be equal to or greater than the straight tube wall thickness.

R. Water coil headers will be made of seamless copper tubing. Pipe connections will be steel threaded MPT. Header connections (tubes and piping connections) will be silver-brazed for copper and copper alloy connections and either TIG welded or silver-brazed for steel connections.

S. Glycol coil headers will be made of seamless copper tubing. Pipe connections will be steel threaded MPT. Header connections (tubes and piping connections) will be silver-brazed for copper and copper alloy connections and either TIG welded or silver-brazed for steel connections.

2.06 PRIMARY DRAIN PANS

A. Unit will be provided with a drain pan under each cooling coil.

B. Provide drain pan under the complete width and length of cooling coil sections. Drain pan will be full width, and extend a minimum of 6" downstream of cooling coil.

C. Drain pans for cooling coils will meet the requirements of ASHRAE 62.

D. Drain connection will be made of same material as drain pan. Dissimilar metals will not be used to mitigate risk of galvanic corrosion. Drain connection will be welded to the drain pan.

E. Drain pan will be double wall with an insulation R-value of 6.25 hr-ft²-°F/ (BTU-in).

F. Drain pan will have minimum of 2" of injected polyurethane foam insulation under the entire bottom surface of the drain pan. Drain pan will be foam injected as a complete assembly and will include thermal breaks at connection points to unit casing. Foam insulation will be manufactured by EcoMate®.

G. Drain pan will allow visual inspection and physical cleaning on 100% of the pan surface without removal of the coil.

H. Drain pan will be provided with a minimum of 1" clearance between the drain pan and any coil casing, coil support or any other obstruction.

I. Drain pan will allow the design rate of condensate drainage regardless of fan status.

J. Drain pan will be sloped in at least two planes by at least 1/8" per foot toward a single drain. Locate drain connection at the lowest point of the pan. Pan will have no horizontal surfaces.

2.07 FANS

2.07.01 GENERAL DESCRIPTION

A. Unit[s] will be provided with fans as shown on equipment schedule and drawings.

B. Access to the fan section will be provided via an access door on the drive side of the unit.

C. Unit will be provided with vibration isolation, as scheduled.

D. Piezometer Ring: Airflow station will be factory installed at fan inlet. The device will have a measurement accuracy of $\pm 5\%$. Tubing will be field installed.

2.07.02 MULTIPLE FANS - ARRAY OF DIRECT-DRIVE PLENUM FANS - MODEL SF (STACK FAN), MANUFACTURED BY LAU.

A. Performance: Fans will conform to AMCA test standards, 205 (fan efficiency grade), 210 (air performance) and 300 (sound performance) and will bear the AMCA certified ratings seal for both sound and air, and fan efficiency grade (FEG). Sound certification will apply to both inlet and outlet sound power levels.

B. Construction: Fans will be unhooded and incorporate a non-overloading type backward included airfoil blade wheel, heavy-gauge galvanized G90 steel frame, and front panel. The front panel will have a removable inlet cone designed for smooth airflow transition into the wheel. The motor base will be designed to endure proper alignment of the fan wheel, motor and inlet cone. The design will also ensure the structural integrity of the base to minimize vibration.

C. Wheel: Wheels will be constructed of non-overloading extruded airfoil shaped blades. Airfoil blades will be continuously welded. Wheels will have 9 blades to emphasize greater importance on efficiency. The entire wheel will be constructed of aluminum to reduce weight and vibration. Blades will be 6061-T6 extruded aluminum. Wheel hubs will be machined aluminum made from 6061-T6 bar stock. Aluminum fan wheels will not require a finish coating. Wheels will be attached to the motor shaft using taper lock bushings. The wheel and fan inlet will be matched and have precise running tolerances for maximum performance and operating efficiency.

D. Wheel: Wheels will be constructed of non-overloading extruded airfoil shaped blades. Airfoil blades will be continuously welded. Wheels will have 12 blades to emphasize the need for better sound quality, or 9 blades with staggered spacing (RTP) to gain the benefits of both. The entire wheel will be constructed of aluminum to reduce weight and vibration. Blades will be 6061-T6 extruded aluminum. Wheel hubs will be machined aluminum made from 6061-T6 bar stock. Aluminum fan wheels will not require a finish coating. Wheels will be attached to the motor shaft using taper lock bushings. The wheel and fan inlet will be matched and have precise running tolerances for maximum performance and operating efficiency.

E. Finish and Coating: Fans will be constructed of corrosion resistant galvanized steel. Aluminum components will be unpainted.

F. Motors: Motors will meet or exceed EISA 2007 (The Energy Independence and Security ACT of 2007) efficiencies. Motors will be NEMA rated 900, 1200, 1800 or 3600 RPM in 60 Hz, Open Drip Proof (ODP) with a 1.15 service factor.

G. Motors: Motors will meet or exceed EISA 2007 (The Energy Independence and Security ACT of 2007) efficiencies. Motors will be NEMA rated 900, 1200, 1800 or 3600 RPM in 60 Hz, Totally Enclosed Fan Cooled (TEFC) with a 1.15 service factor.

H. Fan Balancing: All fans prior to shipment will be run tested at the specified operating speed. Each fan will be dynamically balanced as a complete unit in accordance with ANSI/AMCA 204-20 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings will be taken electronically in the axial, vertical and horizontal directions. Records of each fan balance will be maintained and a written copy will be available upon request.

1. ISO-1940

2. "Each fan will be vibration tested before shipping, as an assembly, in accordance with AMCA 204-05. Each assembled fan will undergo a test run at the factory at the specified fan RPM. Vibration signatures will be taken on each fan bearing in the horizontal, vertical, and axial directions. The maximum allowable fan vibration level will be 0.15 in./sec. peak velocity, filter-in, at the fan RPM when the fan is rigidly mounted."

I. Fan Options: The following options will be available for multiple fans:

1. Fan Inlet Screen: Fan inlet screen will be factory installed as safety protection for limiting access to fan wheel inlet.

2. Fan Discharge Cage: Fan discharge cage will be factory installed as safety protection for limiting access to fan wheel discharge.

3. Piezometer Ring: Airflow station will be factory installed in each fan inlet. The device will have a measurement accuracy of $\pm 5\%$. Field-installed tubing will be manifolded so that the measurement is representative of all fans in the array.

4. Backdraft Damper: Backdraft dampers will be available for automatic isolation of individual fans.

5. Fan Array Motor Control: Common VFD operation

a. All fan motors will be factory-wired to individual manual motor protection [MMP] device which will consist of a motor overload relay with adjustable current rating and an on-off disconnect switch for power isolation. Field wiring of MMP's to fan motors will not be permitted.

b. MMP's will be contained in a single control panel [MMP panel] and will be mounted on the exterior wall panel of the fan array section.

c. MMP panel will have a single point of connection for input power wiring and will feed power individual MMP's through a common busbar. Independent wiring of input power to individual MMP's will not be permitted.

2.08 ELECTRICAL MOTORS

A. Fan motors will be built in accordance and comply with the latest standards of the NEMA and IEEE.

B. AHU and fan motors will comply with ASHRAE 90.1.

C. Fan motors will be provided with the following characteristics:

1. Voltage, Frequency and Phase, as scheduled.

2. Motor RPM, as scheduled

3. Minimum service factor of 1.15

4. Premium efficiency, or as required to meet ASHRAE 90.1

5. NEMA design ball bearing type

6. Rated for continuous duty at full load in a 104°F [40°C] ambient

7. Suitable for use in variable frequency application, per NEMA MG-1 Part 30

2.09 FACTORY INSTALLED ELECTRICAL ACCESSORIES

A. In addition to motor power terminals, unit(s) will be provided with an independent power terminal for convenience receptacles and lights.

B. All switches will be provided as shown on drawings.

C. Unit[s] will be provided with integral LED (light emitting diode) lights in segments as scheduled or shown on drawings.

D. On supply fan segment 120V convenience receptacle will be provided.

2.10 FILTERS

A. Unit[s] will be provided with filter segments consisting of filters and frames as scheduled.

B. Class 2 or Class 1 filter media will be provided per U.L. 900 and as required by local codes.

C. Filter types, efficiencies, and nominal depths will be as follows:

1. Rigid filters – 4" MERV 11 MiniPleat filters, as scheduled.

D. Flush mounted, factory installed differential pressure gauge on the drive side of unit will be provided to measure pressure drop across filters. Manufacturer will provide fully functional gauges, complete with tubing.

2.11 DAMPERS

A. Control Dampers: Will be Ruskin Model CD50IF.

1. Type: Parallel-blade.
2. Tested according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating."
3. Leakage: Class 1A. Leakage Rate: Not exceeding 3 cfm/sq. ft. (15 L/s· m²) at 1 inch w.g. (249.09 Pa) pressure differential.
4. Damper Blades: Extruded-aluminum airfoil-shaped, single-piece with flexible metal compressible jamb seals, extruded Ruskiprene blade edge seals, and stainless-steel sleeve bearings mounted in a single extruded-aluminum] frame.
5. Axles: Hexagonal. Positively locked into the damper blade.
6. Dampers are to be provided with a jackshaft.

2.12 UVC FIXTURES

A. Fixtures have been tested, listed and labeled as UL/C-UL under Category Code ABQK (Accessories, Air Duct Mounted), UL Standards: 153, 1598 & 1995 respectively.

B. Fixtures meet the "UL" drip proof design and each fixture is equipped with an electrical interlock.

C. Each lamp contains no more than 5.5 milligrams of mercury consistent with current environmental practices while producing the specified output at 500 fpm in temperatures of 55-135° F.

D. Useful lamp life will be 9000 hours with no more than a 20% output loss at the end of one year of continuous use. They are constructed with UVC proof metal bases and will not produce ozone.

2.13 AIR BLENDERS

A. Multiple-blade, air-mixer assembly will mix air to prevent stratification.

A. Air blenders will be of the rotary turbulating design consisting of radially extending blades. Units will be completely fixed devices, with no moving parts.

A. Static air mixers material will be .080" thick aluminum. Static air mixers will be welded.

A. Static air mixers material will be .125" thick aluminum. Static air mixers will be welded.

A. When multiple air blenders are used, they will impart a counter rotational mixing of the airstreams relative to each other. Simple mixing devices that do not produce expanding discharge with counter rotational mixing will not be acceptable.

A. The air blenders will be installed such that the blender will be capable of providing a minimum mixing effectiveness of 75% and ± 6 °F standard deviation when mixing 50% OA with 50% RAS at 50 °F inlet temperature differential, and minimum mixing effectiveness of 80% and ± 5 °F standard deviation when mixing 30% OA with 70% RAS at 50 °F inlet temperature differential.

2.14 APPURTENANCES

A. Safety grates over bottom openings will be provided, as shown on drawings. Safety grates will be capable of supporting a 300 lb. center load.

B. Lifting lugs will be provided where required.

2.15 EXTERIOR FINISHES

A. Unpainted air-handling units constructed of galvanized steel will show a breakdown of less than 1/8" on either side of a scribed line when subjected to ASTM B117 220 hour, 5% salt spray conditions. This is equivalent to an ASTM D1654 rating of '6.' Also, per ASTM D610, degree of rusting to meet #8-G and per ASTM D714 degree of blister to meet #6 medium.

2.16 LIGHTS AND OUTLETS

A. Lights

1. Factory will provide integral LED lighting fixture located in segments and quantity as indicated on the drawings.
2. Factory will wire all light fixtures to a common 120v switch located on the supply fan segment.

B. Outlets

1. Factory will provide a 15A GFI duplex outlet mounted in a weatherproof enclosure in segments and quantity as indicated on the drawings.

END OF SECTION

UNIT TAG: AHU-2M

Date Created: 04/16/2026 (version: 6.0)

PACE INDOOR AIR HANDLER

UNIT SPECIFICATION

NOTE: REVIEW AND REMOVE LINES THAT DO NOT PERTAIN TO THE SELECTED UNIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Indoor air handling units and components as scheduled and shown on drawings.
- B. Motor disconnects, motor starters, and variable frequency drives.

1.02 RATINGS AND CERTIFICATIONS

- A. Unit will conform to AMCA 210 for fan performance ratings.
- B. Unit will conform to E.T.L. standards. Unit will be ETL listed.
- C. Unit will conform to AHRI 410 for capacities, pressure drops, and selection procedures of air coils.
- D. Unit will conform to ANSI/AHRI 430 for all fabrication procedures of air handling units. Unit will have airflow performance certified to ANSI/AHRI 430.
- E. Motors covered by the Federal Energy Policy Act (EPACT) will meet EPACT requirements.
- F. Damper performance will comply with AMCA 500.
- G. Unit will be ISO 9001 certified.
- H. Unit will be manufactured in an ISO 9002 certified facility.
- I. Filter media to comply with ANSI/UL 900 listed Class I or Class II.
- J. Control Wiring comply with NEC codes & ETL requirements.
- K. Unit will comply with energy use AHSRAE 90.1.

1.03 EXTRA MATERIALS

- A. Provide one set of filters for balancing, and one additional set for final turnover to owner.

1.04 WARRANTY

- A. Unit will be covered by an limited parts (18 months (12 months from start-up)) warranty from date of shipment . Warranty will cover manufacturer defects.
- B. Include factory-provided controls in the parts warranties.
- C. Parts associated with routine maintenance, such as belts and air filters will be excluded.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

- A. Air Handling Unit (AHU) will consist of a structural base, insulated casing, access doors, fans, motors, motor controls, coils, filters, dampers, controls, components, and accessories; as shown on drawings, schedules, and specifications.

B. Unit will meet the specified levels of performance for scheduled items including airflow, static pressure, cooling capacity, heating capacity, electrical characteristics, sound, casing leakage, panel deflection and casing thermal performance.

C. Unit will maintain structural integrity when wall panels are removed.

D. Internal components and accessories will be as specified and scheduled (unless noted otherwise). Components and accessories will be installed by the AHU manufacturer in an ISO-9002 certified facility.

E. Unit will be shipped in one piece or with shipping splits necessary for shipping and installation.

F. Manufacturer will provide detailed, step-by-step instructions for disassembly and reassembly.

2.02 BASE RAIL

A. Unit will be provided with a 6" structural base rail under the full perimeter of the unit, formed from mill galvanized steel.

B. Unit will be provided with base rail and lifting lug system that does not require additional support for rigging. Include base rail lifting lugs at unit corners.

2.03 CASING

A. Casing construction will not rely on the casing panels for structural integrity.

B. Casing panels will be 2" double-wall construction with thermal break. Thermal break will be between interior and exterior liner of the panel assembly, and between the panel and casing framework.

C. Provide casing with minimum thermal resistance (R-value) of 16 hr-ft²-°F/BTU. Exposed insulation is not acceptable.

D. Casing panel insulation will be injected polyurethane foam. Foam insulation will be manufactured by EcoMate®. Rigid foam board panels will not be used.

E. Casing framework downstream of cooling coil will be filled with injected polyurethane foam insulation. Foam insulation will be manufactured by EcoMate®.

F. All exterior casing panels (roof, wall, floor, access door) will be made of G90 galvanized steel. All interior casing panels (roof, wall, floor, access door) will be made of G90 galvanized steel.

G. Panel assembly will meet UL standard 60336-2-40 for fire safety. Panel insulation will comply with the requirements of NFPA 90A.

H. Insulation system provided will be resistant to mold growth in accordance with a standardized test method such as UL 181 or ASTM C 1338.

I. Encapsulate insulation with sheet metal so that air does not contact insulation. Solid lined double-walled panels insulated with injected foam will be hermetically sealed at each corner and around their entire perimeter to eliminate airflow through the panel and to eliminate microbial growth potential within the casing wall.

J. Unit will conform to ASHRAE Standard 111 Class 6 for casing leakage of no more than 1% of design airflow at 1.25 times design static pressure up to a maximum of +8 inches w.g. in positive pressure sections and -8 inches w.g. in negative pressure sections down to a minimum of 50 CFM measurable leakage at or 5,000 design CFM.

K. Unit will be provided with wall panels and access doors that deflect no more than L/240 when subjected to 1.5 times design static pressure up to a maximum of +8 inches w.g. in positive pressure sections and -8 inches w.g. in negative pressure sections. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.

L. Unit will be provided with floors and roofs that deflect no more than L/240 when subjected to a 300 lb static load at mid-span. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.

M. With ETP™ (Enhanced Thermal Performance) Condensation will not form anywhere on unit exterior at 53 °F supply air and 81 °F DB / 73 °F WB exterior ambient. Manufacturer will supply an external condensation performance line, plotted on the psychrometric chart, based on actual test data. Plot will show the exterior

conditions at which unit will sweat given the design supply air temperature. Manufacturer will clearly indicate whether the design conditions will or will not result in external condensation forming anywhere on the unit exterior. If the unit will sweat, indicate where sweating will occur. Unit exterior includes the base, base rail, roof, corners, doors, door frames, and under the cooling coil drain pan.

2.04 ACCESS DOORS

- A. Unit will be provided with double wall access door(s) that meet requirements for the AHU casing.
- B. Thermal break door(s) will incorporate a thermal break in both the door frame and the door panel.
- C. Unit will be provided with industrial-style stainless steel hinges that permit 180 degrees of door swing.
- D. Unit will be provided with latches with roller cam mechanisms that ensure a tight seal. Rotating knife-edge or "paw" latches are not acceptable.
- E. Unit will be provided with each door with a single handle linked to multiple latching points or a separate handle for each latching point. Doors serving access segments will have an interior latch handle.
- F. Unit will be provided with access doors with a locking hasp to accommodate a lockout device.
- G. Unit will be provided with double-pane viewing windows. Windows will be a non-condensing type consisting of a desiccant dehumidification layer. Minimum dimension will be 3" x 8".

2.05 COILS: HEATING AND COOLING

2.05.01 ACCEPTABLE MANUFACTURER

- A. Coil will be manufactured by the same manufacturer as the AHU manufacturer, except where noted in contract documents.

2.05.02 GENERAL DESCRIPTION

- A. Coil will meet or exceed performance scheduled on drawings.
- B. Coil will be provided with performance certified in accordance with AHRI Standard 410 for coil capacity and pressure drop, wherever applicable. Coils circuits will be designed such that the fluid velocity is within the range of certified rating conditions at design flow.
- C. Cooling coils will be provided with a maximum face velocity as scheduled. Face velocity calculations will be based on the finned area of the coil.
- D. Cooling coil will be provided with drain pan that is sufficient to contain coil condensate. Drain pan will extend a minimum of 6" downstream of the face of the coil.
- E. Coil segment casing will accommodate full-face coils as scheduled.
- F. Access doors will be located to provide clearance for pipe insulation, connectors, and accessories. Space will allow a minimum of 90 degrees of door swing.
- G. Coils will be built in their own G90 galvanized steel full perimeter frame. Tube sheets on each end will have fully drawn collars to support and protect tubes. Horizontal coil casing and support members will allow moisture to drain. Bulkhead support will be G90 galvanized steel and will not block finned area.
- H. Individual coils will be removable from the side of the AHU.
- I. Intermediate drain pan made of 304 stainless steel will be provided on stacked cooling coils or any cooling coil taller than 48 inches finned height. Intermediate drain pan will slope in a minimum of two planes toward a single drain connection. Intermediate drain pan will be provided with downspouts routed to lower drain pan.
- J. A single intermediate vertical coil support will be provided on coils with a finned length greater than 62". Two vertical supports will be provided on coils with a finned length greater than 100", and three vertical supports on coils with a finned length greater than 141". Intermediate vertical coil support will be same material as the casing.

K. Gap between coil stub out connection and AHU casing, will be insulated with a spool-shaped sleeve grommet. Adhesive rings applied to the casing walls will not be acceptable.

L. Water coils will be operable at 325 psig working pressure and up to 250 °F. Factory test water coils with 325 psig compressed air under water. Water coils will conform to Subsection 12.3, "Water-Containing Parts," of UL-207, "Standard for Safety: Refrigerant – Containing Components and Accessories, Nonelectrical."

M. Glycol coils will be operable at 325 psig working pressure and up to 250 °F. Factory test glycol coils with 325 psig compressed air under water.

N. Water coils will be provided with a tube OD of 5/8 inches. 5/8 inch tube wall thickness will be 0.025 inches. Mechanically expand tubes will form fin bond and provide burnished, work-hardened interior surface.

O. Glycol coils will be provided with a tube OD of 5/8 inches. 5/8 inch tube wall thickness will be 0.035 inches. Mechanically expand tubes will form fin bond and provide burnished, work-hardened interior surface.

P. Hairpin return bend thickness on 5/8 inch tube wall thickness will be 0.025 inches as standard. Brazed return bend thicknesses will be equal to or greater than the straight tube wall thickness.

Q. Hairpin return bend thickness on 5/8 inch tube wall thickness will be 0.035 inches as standard. Brazed return bend thicknesses will be equal to or greater than the straight tube wall thickness.

R. Water coil headers will be made of seamless copper tubing. Pipe connections will be steel threaded MPT. Header connections (tubes and piping connections) will be silver-brazed for copper and copper alloy connections and either TIG welded or silver-brazed for steel connections.

S. Glycol coil headers will be made of seamless copper tubing. Pipe connections will be steel threaded MPT. Header connections (tubes and piping connections) will be silver-brazed for copper and copper alloy connections and either TIG welded or silver-brazed for steel connections.

2.06 PRIMARY DRAIN PANS

A. Unit will be provided with a drain pan under each cooling coil.

B. Provide drain pan under the complete width and length of cooling coil sections. Drain pan will be full width, and extend a minimum of 6" downstream of cooling coil.

C. Drain pans for cooling coils will meet the requirements of ASHRAE 62.

D. Drain connection will be made of same material as drain pan. Dissimilar metals will not be used to mitigate risk of galvanic corrosion. Drain connection will be welded to the drain pan.

E. Drain pan will be double wall with an insulation R-value of 6.25 hr-ft²-°F/ (BTU-in).

F. Drain pan will have minimum of 2" of injected polyurethane foam insulation under the entire bottom surface of the drain pan. Drain pan will be foam injected as a complete assembly and will include thermal breaks at connection points to unit casing. Foam insulation will be manufactured by EcoMate®.

G. Drain pan will allow visual inspection and physical cleaning on 100% of the pan surface without removal of the coil.

H. Drain pan will be provided with a minimum of 1" clearance between the drain pan and any coil casing, coil support or any other obstruction.

I. Drain pan will allow the design rate of condensate drainage regardless of fan status.

J. Drain pan will be sloped in at least two planes by at least 1/8" per foot toward a single drain. Locate drain connection at the lowest point of the pan. Pan will have no horizontal surfaces.

2.07 FANS

2.07.01 GENERAL DESCRIPTION

A. Unit[s] will be provided with fans as shown on equipment schedule and drawings.

B. Access to the fan section will be provided via an access door on the drive side of the unit.

C. Unit will be provided with vibration isolation, as scheduled.

D. Piezometer Ring: Airflow station will be factory installed at fan inlet. The device will have a measurement accuracy of $\pm 5\%$. Tubing will be field installed.

2.07.02 MULTIPLE FANS - ARRAY OF DIRECT-DRIVE PLENUM FANS - MODEL SF (STACK FAN), MANUFACTURED BY LAU.

A. Performance: Fans will conform to AMCA test standards, 205 (fan efficiency grade), 210 (air performance) and 300 (sound performance) and will bear the AMCA certified ratings seal for both sound and air, and fan efficiency grade (FEG). Sound certification will apply to both inlet and outlet sound power levels.

B. Construction: Fans will be unhooused and incorporate a non-overloading type backward included airfoil blade wheel, heavy-gauge galvanized G90 steel frame, and front panel. The front panel will have a removable inlet cone designed for smooth airflow transition into the wheel. The motor base will be designed to endure proper alignment of the fan wheel, motor and inlet cone. The design will also ensure the structural integrity of the base to minimize vibration.

C. Wheel: Wheels will be constructed of non-overloading extruded airfoil shaped blades. Airfoil blades will be continuously welded. Wheels will have 9 blades to emphasize greater importance on efficiency. The entire wheel will be constructed of aluminum to reduce weight and vibration. Blades will be 6061-T6 extruded aluminum. Wheel hubs will be machined aluminum made from 6061-T6 bar stock. Aluminum fan wheels will not require a finish coating. Wheels will be attached to the motor shaft using taper lock bushings. The wheel and fan inlet will be matched and have precise running tolerances for maximum performance and operating efficiency.

D. Wheel: Wheels will be constructed of non-overloading extruded airfoil shaped blades. Airfoil blades will be continuously welded. Wheels will have 12 blades to emphasize the need for better sound quality, or 9 blades with staggered spacing (RTP) to gain the benefits of both. The entire wheel will be constructed of aluminum to reduce weight and vibration. Blades will be 6061-T6 extruded aluminum. Wheel hubs will be machined aluminum made from 6061-T6 bar stock. Aluminum fan wheels will not require a finish coating. Wheels will be attached to the motor shaft using taper lock bushings. The wheel and fan inlet will be matched and have precise running tolerances for maximum performance and operating efficiency.

E. Finish and Coating: Fans will be constructed of corrosion resistant galvanized steel. Aluminum components will be unpainted.

F. Motors: Motors will meet or exceed EISA 2007 (The Energy Independence and Security ACT of 2007) efficiencies. Motors will be NEMA rated 900, 1200, 1800 or 3600 RPM in 60 Hz, Open Drip Proof (ODP) with a 1.15 service factor.

G. Motors: Motors will meet or exceed EISA 2007 (The Energy Independence and Security ACT of 2007) efficiencies. Motors will be NEMA rated 900, 1200, 1800 or 3600 RPM in 60 Hz, Totally Enclosed Fan Cooled (TEFC) with a 1.15 service factor.

H. Fan Balancing: All fans prior to shipment will be run tested at the specified operating speed. Each fan will be dynamically balanced as a complete unit in accordance with ANSI/AMCA 204-20 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings will be taken electronically in the axial, vertical and horizontal directions. Records of each fan balance will be maintained and a written copy will be available upon request.

1. ISO-1940

2. "Each fan will be vibration tested before shipping, as an assembly, in accordance with AMCA 204-05. Each assembled fan will undergo a test run at the factory at the specified fan RPM. Vibration signatures will be taken on each fan bearing in the horizontal, vertical, and axial directions. The maximum allowable fan vibration level will be 0.15 in./sec. peak velocity, filter-in, at the fan RPM when the fan is rigidly mounted."

I. Fan Options: The following options will be available for multiple fans:

1. Fan Inlet Screen: Fan inlet screen will be factory installed as safety protection for limiting access to fan wheel inlet.

2. Fan Discharge Cage: Fan discharge cage will be factory installed as safety protection for limiting access to fan wheel discharge.

3. Piezometer Ring: Airflow station will be factory installed in each fan inlet. The device will have a measurement accuracy of $\pm 5\%$. Field-installed tubing will be manifolded so that the measurement is representative of all fans in the array.

4. Backdraft Damper: Backdraft dampers will be available for automatic isolation of individual fans.

5. Fan Array Motor Control: Common VFD operation

a. All fan motors will be factory-wired to individual manual motor protection [MMP] device which will consist of a motor overload relay with adjustable current rating and an on-off disconnect switch for power isolation. Field wiring of MMP's to fan motors will not be permitted.

b. MMP's will be contained in a single control panel [MMP panel] and will be mounted on the exterior wall panel of the fan array section.

c. MMP panel will have a single point of connection for input power wiring and will feed power individual MMP's through a common busbar. Independent wiring of input power to individual MMP's will not be permitted.

2.08 ELECTRICAL MOTORS

A. Fan motors will be built in accordance and comply with the latest standards of the NEMA and IEEE.

B. AHU and fan motors will comply with ASHRAE 90.1.

C. Fan motors will be provided with the following characteristics:

1. Voltage, Frequency and Phase, as scheduled.

2. Motor RPM, as scheduled

3. Minimum service factor of 1.15

4. Premium efficiency, or as required to meet ASHRAE 90.1

5. NEMA design ball bearing type

6. Rated for continuous duty at full load in a 104°F [40°C] ambient

7. Suitable for use in variable frequency application, per NEMA MG-1 Part 30

2.09 FACTORY INSTALLED ELECTRICAL ACCESSORIES

A. In addition to motor power terminals, unit(s) will be provided with an independent power terminal for convenience receptacles and lights.

B. All switches will be provided as shown on drawings.

C. Unit[s] will be provided with integral LED (light emitting diode) lights in segments as scheduled or shown on drawings.

D. On supply fan segment 120V convenience receptacle will be provided.

2.10 FILTERS

A. Unit[s] will be provided with filter segments consisting of filters and frames as scheduled.

B. Class 2 or Class 1 filter media will be provided per U.L. 900 and as required by local codes.

C. Filter types, efficiencies, and nominal depths will be as follows:

1. Rigid filters – 4" MERV 11 MiniPleat filters, as scheduled.

D. Flush mounted, factory installed differential pressure gauge on the drive side of unit will be provided to measure pressure drop across filters. Manufacturer will provide fully functional gauges, complete with tubing.

2.11 DAMPERS

A. Control Dampers: Will be Ruskin Model CD50IF.

1. Type: Parallel-blade.
2. Tested according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating."
3. Leakage: Class 1A. Leakage Rate: Not exceeding 3 cfm/sq. ft. (15 L/s· m²) at 1 inch w.g. (249.09 Pa) pressure differential.
4. Damper Blades: Extruded-aluminum airfoil-shaped, single-piece with flexible metal compressible jamb seals, extruded Ruskiprene blade edge seals, and stainless-steel sleeve bearings mounted in a single extruded-aluminum] frame.
5. Axles: Hexagonal. Positively locked into the damper blade.
6. Dampers are to be provided with a jackshaft.

2.12 UVC FIXTURES

A. Fixtures have been tested, listed and labeled as UL/C-UL under Category Code ABQK (Accessories, Air Duct Mounted), UL Standards: 153, 1598 & 1995 respectively.

B. Fixtures meet the "UL" drip proof design and each fixture is equipped with an electrical interlock.

C. Each lamp contains no more than 5.5 milligrams of mercury consistent with current environmental practices while producing the specified output at 500 fpm in temperatures of 55-135° F.

D. Useful lamp life will be 9000 hours with no more than a 20% output loss at the end of one year of continuous use. They are constructed with UVC proof metal bases and will not produce ozone.

2.13 AIR BLENDERS

A. Multiple-blade, air-mixer assembly will mix air to prevent stratification.

A. Air blenders will be of the rotary turbulating design consisting of radially extending blades. Units will be completely fixed devices, with no moving parts.

A. Static air mixers material will be .080" thick aluminum. Static air mixers will be welded.

A. Static air mixers material will be .125" thick aluminum. Static air mixers will be welded.

A. When multiple air blenders are used, they will impart a counter rotational mixing of the airstreams relative to each other. Simple mixing devices that do not produce expanding discharge with counter rotational mixing will not be acceptable.

A. The air blenders will be installed such that the blender will be capable of providing a minimum mixing effectiveness of 75% and ± 6 °F standard deviation when mixing 50% OA with 50% RAS at 50 °F inlet temperature differential, and minimum mixing effectiveness of 80% and ± 5 °F standard deviation when mixing 30% OA with 70% RAS at 50 °F inlet temperature differential.

2.14 APPURTENANCES

A. Safety grates over bottom openings will be provided, as shown on drawings. Safety grates will be capable of supporting a 300 lb. center load.

B. Lifting lugs will be provided where required.

2.15 EXTERIOR FINISHES

A. Unpainted air-handling units constructed of galvanized steel will show a breakdown of less than 1/8" on either side of a scribed line when subjected to ASTM B117 220 hour, 5% salt spray conditions. This is equivalent to an ASTM D1654 rating of '6.' Also, per ASTM D610, degree of rusting to meet #8-G and per ASTM D714 degree of blister to meet #6 medium.

2.16 LIGHTS AND OUTLETS

A. Lights

1. Factory will provide integral LED lighting fixture located in segments and quantity as indicated on the drawings.
2. Factory will wire all light fixtures to a common 120v switch located on the supply fan segment.

B. Outlets

1. Factory will provide a 15A GFI duplex outlet mounted in a weatherproof enclosure in segments and quantity as indicated on the drawings.

END OF SECTION

UNIT TAG: AHU-3M

Date Created: 04/16/2026 (version: 6.0)

PACE INDOOR AIR HANDLER

UNIT SPECIFICATION

NOTE: REVIEW AND REMOVE LINES THAT DO NOT PERTAIN TO THE SELECTED UNIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Indoor air handling units and components as scheduled and shown on drawings.
- B. Motor disconnects, motor starters, and variable frequency drives.

1.02 RATINGS AND CERTIFICATIONS

- A. Unit will conform to AMCA 210 for fan performance ratings.
- B. Unit will conform to E.T.L. standards. Unit will be ETL listed.
- C. Unit will conform to AHRI 410 for capacities, pressure drops, and selection procedures of air coils.
- D. Unit will conform to ANSI/AHRI 430 for all fabrication procedures of air handling units. Unit will have airflow performance certified to ANSI/AHRI 430.
- E. Motors covered by the Federal Energy Policy Act (EPACT) will meet EPACT requirements.
- F. Damper performance will comply with AMCA 500.
- G. Unit will be ISO 9001 certified.
- H. Unit will be manufactured in an ISO 9002 certified facility.
- I. Filter media to comply with ANSI/UL 900 listed Class I or Class II.
- J. Control Wiring comply with NEC codes & ETL requirements.
- K. Unit will comply with energy use AHSRAE 90.1.

1.03 EXTRA MATERIALS

- A. Provide one set of filters for balancing, and one additional set for final turnover to owner.

1.04 WARRANTY

- A. Unit will be covered by an limited parts (18 months (12 months from start-up)) warranty from date of shipment . Warranty will cover manufacturer defects.
- B. Include factory-provided controls in the parts warranties.
- C. Parts associated with routine maintenance, such as belts and air filters will be excluded.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

- A. Air Handling Unit (AHU) will consist of a structural base, insulated casing, access doors, fans, motors, motor controls, coils, filters, dampers, controls, components, and accessories; as shown on drawings, schedules, and specifications.

B. Unit will meet the specified levels of performance for scheduled items including airflow, static pressure, cooling capacity, heating capacity, electrical characteristics, sound, casing leakage, panel deflection and casing thermal performance.

C. Unit will maintain structural integrity when wall panels are removed.

D. Internal components and accessories will be as specified and scheduled (unless noted otherwise). Components and accessories will be installed by the AHU manufacturer in an ISO-9002 certified facility.

E. Unit will be shipped in one piece or with shipping splits necessary for shipping and installation.

F. Manufacturer will provide detailed, step-by-step instructions for disassembly and reassembly.

2.02 BASE RAIL

A. Unit will be provided with a 3" structural base rail under the full perimeter of the unit, formed from mill galvanized steel.

B. Unit will be provided with base rail and lifting lug system that does not require additional support for rigging. Include base rail lifting lugs at unit corners.

2.03 CASING

A. Casing construction will not rely on the casing panels for structural integrity.

B. Casing panels will be 2" double-wall construction with thermal break. Thermal break will be between interior and exterior liner of the panel assembly, and between the panel and casing framework.

C. Provide casing with minimum thermal resistance (R-value) of 16 hr-ft²-°F/BTU. Exposed insulation is not acceptable.

D. Casing panel insulation will be injected polyurethane foam. Foam insulation will be manufactured by EcoMate®. Rigid foam board panels will not be used.

E. Casing framework downstream of cooling coil will be filled with injected polyurethane foam insulation. Foam insulation will be manufactured by EcoMate®.

F. All exterior casing panels (roof, wall, floor, access door) will be made of G90 galvanized steel. All interior casing panels (roof, wall, floor, access door) will be made of G90 galvanized steel.

G. Panel assembly will meet UL standard 60336-2-40 for fire safety. Panel insulation will comply with the requirements of NFPA 90A.

H. Insulation system provided will be resistant to mold growth in accordance with a standardized test method such as UL 181 or ASTM C 1338.

I. Encapsulate insulation with sheet metal so that air does not contact insulation. Solid lined double-walled panels insulated with injected foam will be hermetically sealed at each corner and around their entire perimeter to eliminate airflow through the panel and to eliminate microbial growth potential within the casing wall.

J. Unit will conform to ASHRAE Standard 111 Class 6 for casing leakage of no more than 1% of design airflow at 1.25 times design static pressure up to a maximum of +8 inches w.g. in positive pressure sections and -8 inches w.g. in negative pressure sections down to a minimum of 50 CFM measurable leakage at or 5,000 design CFM.

K. Unit will be provided with wall panels and access doors that deflect no more than L/240 when subjected to 1.5 times design static pressure up to a maximum of +8 inches w.g. in positive pressure sections and -8 inches w.g. in negative pressure sections. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.

L. Unit will be provided with floors and roofs that deflect no more than L/240 when subjected to a 300 lb static load at mid-span. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.

M. With ETP™ (Enhanced Thermal Performance) Condensation will not form anywhere on unit exterior at 53 °F supply air and 81 °F DB / 73 °F WB exterior ambient. Manufacturer will supply an external condensation performance line, plotted on the psychrometric chart, based on actual test data. Plot will show the exterior

conditions at which unit will sweat given the design supply air temperature. Manufacturer will clearly indicate whether the design conditions will or will not result in external condensation forming anywhere on the unit exterior. If the unit will sweat, indicate where sweating will occur. Unit exterior includes the base, base rail, roof, corners, doors, door frames, and under the cooling coil drain pan.

2.04 ACCESS DOORS

- A. Unit will be provided with double wall access door(s) that meet requirements for the AHU casing.
- B. Thermal break door(s) will incorporate a thermal break in both the door frame and the door panel.
- C. Unit will be provided with industrial-style stainless steel hinges that permit 180 degrees of door swing.
- D. Unit will be provided with latches with roller cam mechanisms that ensure a tight seal. Rotating knife-edge or "paw" latches are not acceptable.
- E. Unit will be provided with each door with a single handle linked to multiple latching points or a separate handle for each latching point. Doors serving access segments will have an interior latch handle.
- F. Unit will be provided with access doors with a locking hasp to accommodate a lockout device.
- G. Unit will be provided with double-pane viewing windows. Windows will be a non-condensing type consisting of a desiccant dehumidification layer. Minimum dimension will be 3" x 8".

2.05 COILS: HEATING AND COOLING

2.05.01 ACCEPTABLE MANUFACTURER

- A. Coil will be manufactured by the same manufacturer as the AHU manufacturer, except where noted in contract documents.

2.05.02 GENERAL DESCRIPTION

- A. Coil will meet or exceed performance scheduled on drawings.
- B. Coil will be provided with performance certified in accordance with AHRI Standard 410 for coil capacity and pressure drop, wherever applicable. Coils circuits will be designed such that the fluid velocity is within the range of certified rating conditions at design flow.
- C. Cooling coils will be provided with a maximum face velocity as scheduled. Face velocity calculations will be based on the finned area of the coil.
- D. Cooling coil will be provided with drain pan that is sufficient to contain coil condensate. Drain pan will extend a minimum of 6" downstream of the face of the coil.
- E. Coil segment casing will accommodate full-face coils as scheduled.
- F. Access doors will be located to provide clearance for pipe insulation, connectors, and accessories. Space will allow a minimum of 90 degrees of door swing.
- G. Coils will be built in their own G90 galvanized steel full perimeter frame. Tube sheets on each end will have fully drawn collars to support and protect tubes. Horizontal coil casing and support members will allow moisture to drain. Bulkhead support will be G90 galvanized steel and will not block finned area.
- H. Individual coils will be removable from the side of the AHU.
- I. Intermediate drain pan made of 304 stainless steel will be provided on stacked cooling coils or any cooling coil taller than 48 inches finned height. Intermediate drain pan will slope in a minimum of two planes toward a single drain connection. Intermediate drain pan will be provided with downspouts routed to lower drain pan.
- J. A single intermediate vertical coil support will be provided on coils with a finned length greater than 62". Two vertical supports will be provided on coils with a finned length greater than 100", and three vertical supports on coils with a finned length greater than 141". Intermediate vertical coil support will be same material as the casing.

K. Gap between coil stub out connection and AHU casing, will be insulated with a spool-shaped sleeve grommet. Adhesive rings applied to the casing walls will not be acceptable.

L. Water coils will be operable at 325 psig working pressure and up to 250 °F. Factory test water coils with 325 psig compressed air under water. Water coils will conform to Subsection 12.3, "Water-Containing Parts," of UL-207, "Standard for Safety: Refrigerant – Containing Components and Accessories, Nonelectrical."

M. Glycol coils will be operable at 325 psig working pressure and up to 250 °F. Factory test glycol coils with 325 psig compressed air under water.

N. Water coils will be provided with a tube OD of 5/8 inches. 5/8 inch tube wall thickness will be 0.035 inches. Mechanically expand tubes will form fin bond and provide burnished, work-hardened interior surface.

O. Glycol coils will be provided with a tube OD of 5/8 inches. 5/8 inch tube wall thickness will be 0.035 inches. Mechanically expand tubes will form fin bond and provide burnished, work-hardened interior surface.

P. Hairpin return bend thickness on 5/8 inch tube wall thickness will be 0.035 inches as standard. Brazed return bend thicknesses will be equal to or greater than the straight tube wall thickness.

Q. Water coil headers will be made of seamless copper tubing. Pipe connections will be steel threaded MPT. Header connections (tubes and piping connections) will be silver-brazed for copper and copper alloy connections and either TIG welded or silver-brazed for steel connections.

R. Glycol coil headers will be made of seamless copper tubing. Pipe connections will be steel threaded MPT. Header connections (tubes and piping connections) will be silver-brazed for copper and copper alloy connections and either TIG welded or silver-brazed for steel connections.

A. Drain pan will have minimum of 2" of injected polyurethane foam insulation under the entire bottom surface of the drain pan. Drain pan will be foam injected as a complete assembly and will include thermal breaks at connection points to unit casing. Foam insulation will be manufactured by EcoMate®.

2.06 FANS

2.06.01 GENERAL DESCRIPTION

A. Unit[s] will be provided with fans as shown on equipment schedule and drawings.

B. Access to the fan section will be provided via an access door on the drive side of the unit.

C. Unit will be provided with vibration isolation, as scheduled.

D. Unit will be provided with horizontal thrust restraints between AHU casing and fan housings with end discharge. This requirement applies to the following cases:

E. Piezometer Ring: Airflow station will be factory installed at fan inlet. The device will have a measurement accuracy of $\pm 5\%$. Tubing will be field installed.

2.06.02 DIRECT-DRIVE FANS (SINGLE 1x1) MODEL EPFN, MANUFACTURED BY TWIN CITY FAN & BLOWER

A. Plenum (SWSI) Fan

1. Plenum fan wheel will be single-width, single-inlet, with 9 blades.

1. Plenum fan blades will be aluminum backward-inclined airfoil.

2. Plenum fan will be direct-driven.

2.07 ELECTRICAL MOTORS

A. Fan motors will be built in accordance and comply with the latest standards of the NEMA and IEEE.

B. AHU and fan motors will comply with ASHRAE 90.1.

C. Fan motors will be provided with the following characteristics:

1. Voltage, Frequency and Phase, as scheduled.
2. Motor RPM, as scheduled
3. Minimum service factor of 1.15
4. Premium efficiency, or as required to meet ASHRAE 90.1
5. NEMA design ball bearing type
6. Rated for continuous duty at full load in a 104°F [40°C] ambient
7. Suitable for use in variable frequency application, per NEMA MG-1 Part 30

2.08 FACTORY INSTALLED ELECTRICAL ACCESSORIES

A. In addition to motor power terminals, unit(s) will be provided with an independent power terminal for convenience receptacles and lights.

B. All switches will be provided as shown on drawings.

C. Unit[s] will be provided with integral LED (light emitting diode) lights in segments as scheduled or shown on drawings.

D. On supply fan segment 120V convenience receptacle will be provided.

2.09 FILTERS

A. Unit[s] will be provided with filter segments consisting of filters and frames as scheduled.

B. Class 2 or Class 1 filter media will be provided per U.L. 900 and as required by local codes.

C. Filter types, efficiencies, and nominal depths will be as follows:

1. Rigid filters – 4" MERV 11 MiniPleat filters, as scheduled.

D. Flush mounted, factory installed differential pressure gauge on the drive side of unit will be provided to measure pressure drop across filters. Manufacturer will provide fully functional gauges, complete with tubing.

2.10 DAMPERS

A. Control Dampers: Will be Ruskin Model CD50IF.

1. Type: Parallel-blade.
2. Tested according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating."
3. Leakage: Class 1A. Leakage Rate: Not exceeding 3 cfm/sq. ft. (15 L/s· m²) at 1 inch w.g. (249.09 Pa) pressure differential.
4. Damper Blades: Extruded-aluminum airfoil-shaped, single-piece with flexible metal compressible jamb seals, extruded Ruskiprene blade edge seals, and stainless-steel sleeve bearings mounted in a single extruded-aluminum] frame.
5. Axles: Hexagonal. Positively locked into the damper blade.
6. Dampers are to be provided with a jackshaft.

2.11 UVC FIXTURES

A. Fixtures have been tested, listed and labeled as UL/C-UL under Category Code ABQK (Accessories, Air Duct Mounted), UL Standards: 153, 1598 & 1995 respectively.

B. Fixtures meet the "UL" drip proof design and each fixture is equipped with an electrical interlock.

C. Each lamp contains no more than 5.5 milligrams of mercury consistent with current environmental practices while producing the specified output at 500 fpm in temperatures of 55-135° F.

D. Useful lamp life will be 9000 hours with no more than a 20% output loss at the end of one year of continuous use. They are constructed with UVC proof metal bases and will not produce ozone.

2.12 APPURTENANCES

A. Safety grates over bottom openings will be provided, as shown on drawings. Safety grates will be capable of supporting a 300 lb. center load.

B. Lifting lugs will be provided where required.

2.13 EXTERIOR FINISHES

A. Unpainted air-handling units constructed of galvanized steel will show a breakdown of less than 1/8" on either side of a scribed line when subjected to ASTM B117 220 hour, 5% salt spray conditions. This is equivalent to an ASTM D1654 rating of '6.' Also, per ASTM D610, degree of rusting to meet #8-G and per ASTM D714 degree of blister to meet #6 medium.

2.14 LIGHTS AND OUTLETS

A. Lights

1. Factory will provide integral LED lighting fixture located in segments and quantity as indicated on the drawings.

2. Factory will wire all light fixtures to a common 120v switch located on the supply fan segment.

B. Outlets

1. Factory will provide a 15A GFI duplex outlet mounted in a weatherproof enclosure in segments and quantity as indicated on the drawings.

END OF SECTION

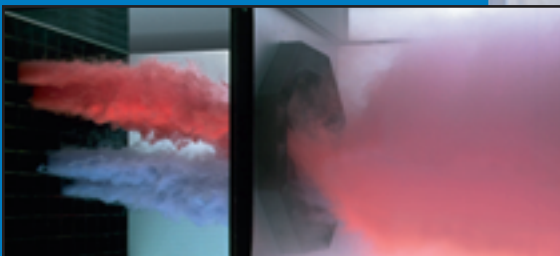
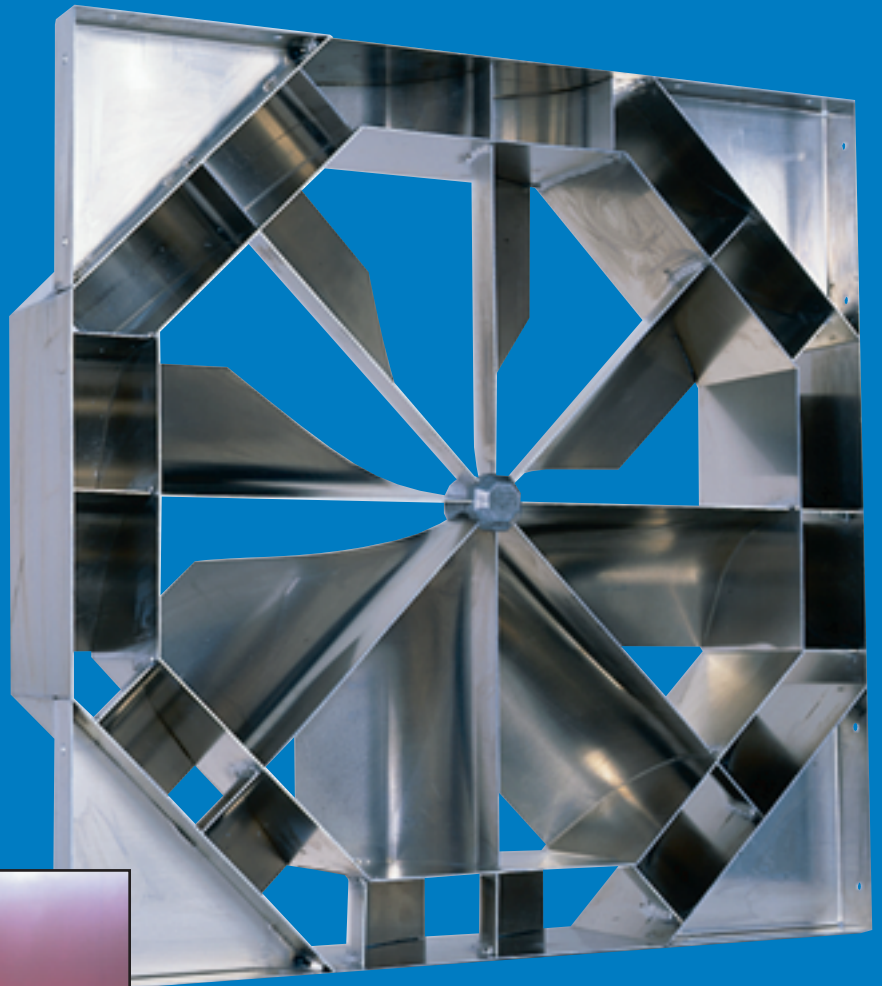
Additional Data Sheets

SERIES IV AIR BLENDER®

Static Air Mixer Designed to Mix Stratified Air Streams

BENEFITS:

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



Blender Products, Inc.

Engineered Air Mixing Systems and Equipment

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

© 2001 Blender Products, Inc.
S-IV 11/01

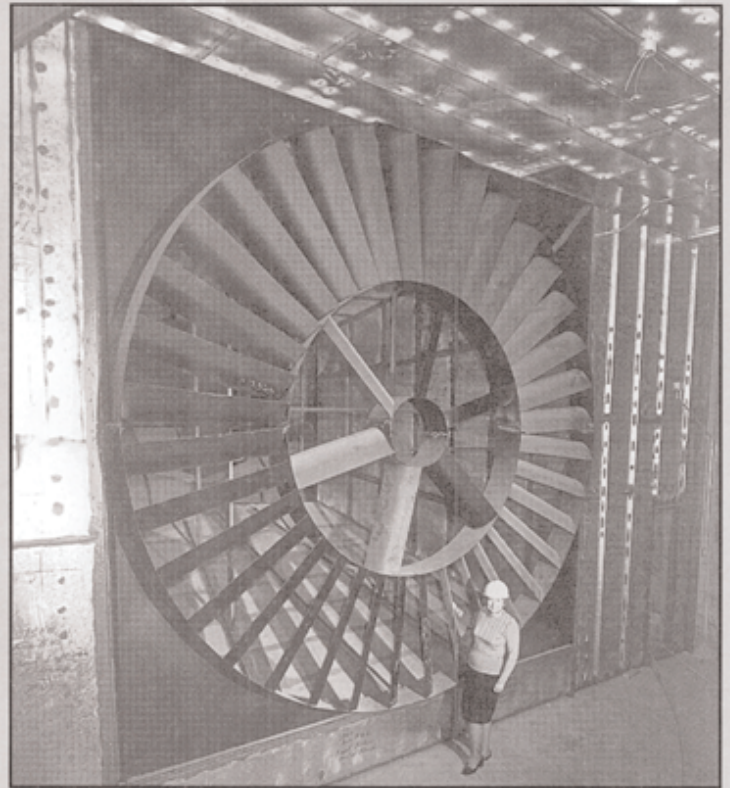
T

HE ORIGINAL *Series I* AIR BLENDER® mixing device was developed in 1962 to provide a means of providing a pre-manufactured product to help eliminate the nuisance tripping of Freeze stats and the inevitable frozen coil. Many of these units sold in the early 60's are still on the job providing the needed frozen coil protection. With every cold morning startup the AIR BLENDER® mixer is there doing its duty. The *Series II* mixer was a minor redesign of the original AIR BLENDER® unit.

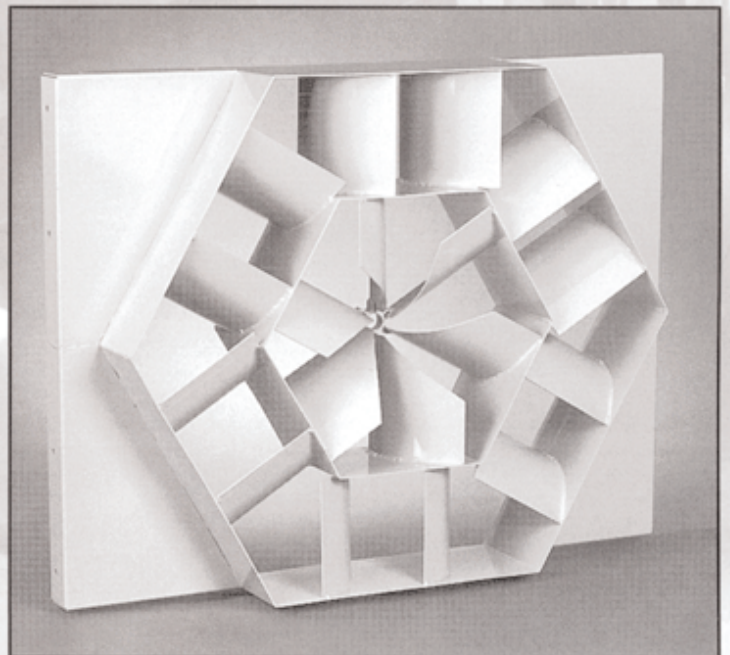
The *Series III* AIR BLENDER® static mixer was developed in 1984 after a renewed research and development program to introduce a new static mixer. About this same time a controls revolution started in the HVAC industry known as DDC. This new system of control required much higher precision of sensor reading and required the AIR BLENDER® device to provide a higher level of mixing to enhance the control system operation.

Shortly after the *Series III* unit was introduced a line of mixing systems were introduced to provide ease of application for the HVAC industry. The Blender Box® mixing box provided the first complete mixing system incorporating a damper section with the AIR BLENDER® device. Next, a Blender Section® flanged mixing housing around an AIR BLENDER® mixing device was developed. Both products were designed to fit up to standard air handler equipment.

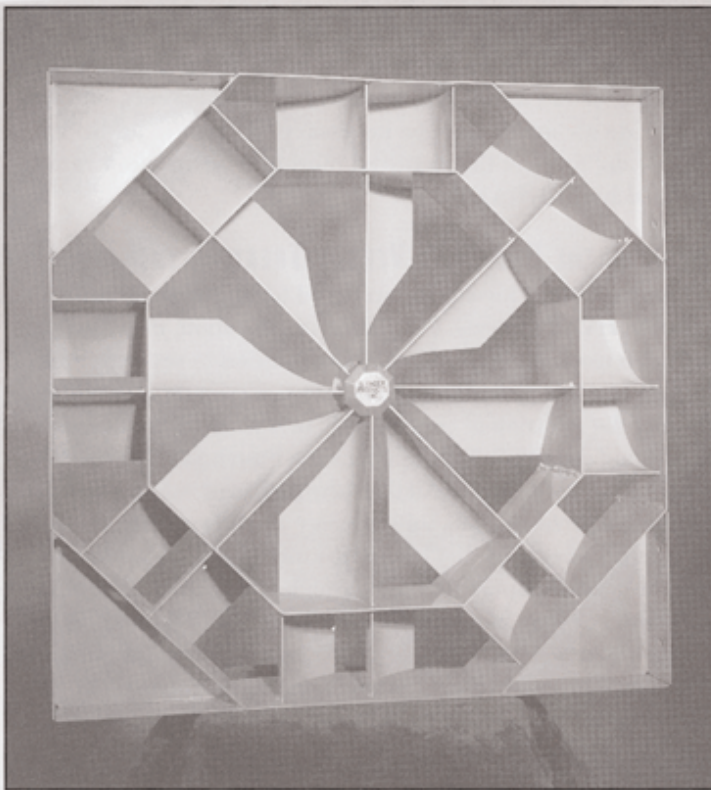
Soon thereafter The Blendercone® fan diffuser was introduced to mix and diffuse air flow at the fan discharge before blowing through filters and coils.



SERIES I



SERIES III



SERIES IV

N

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

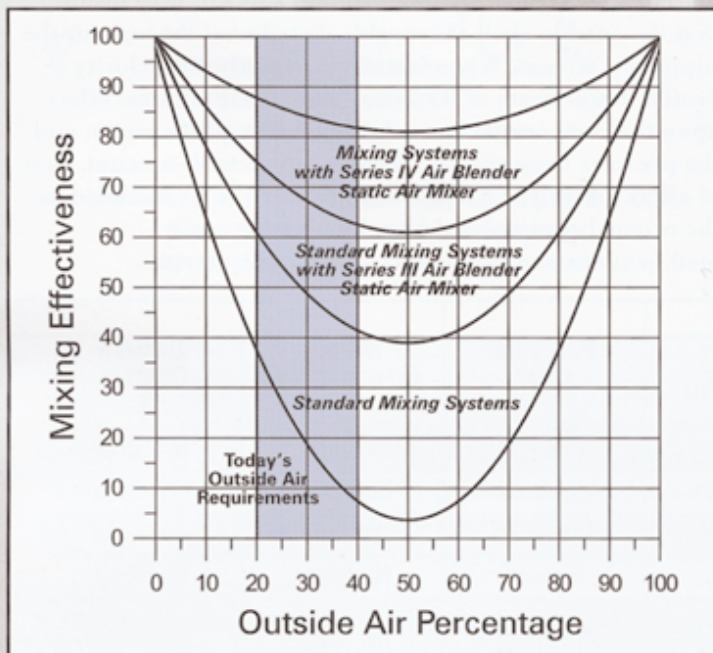
The *Series IV* has been redesigned to incorporate geometric, dynamic, and kinematic scaling, the same factors which govern the design of fans. By using proper scaling a designer can be assured that the performance of a smaller mixer is consistent with the full range of mixer sizes. No other static mixer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

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

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

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

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



THE NEED FOR MIXING

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

TEMPERATURE CONCERNS

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

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

INDOOR AIR QUALITY CONCERNS

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

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

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

MASKING THE PROBLEMS VERSUS TREATING THE CAUSE

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

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

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

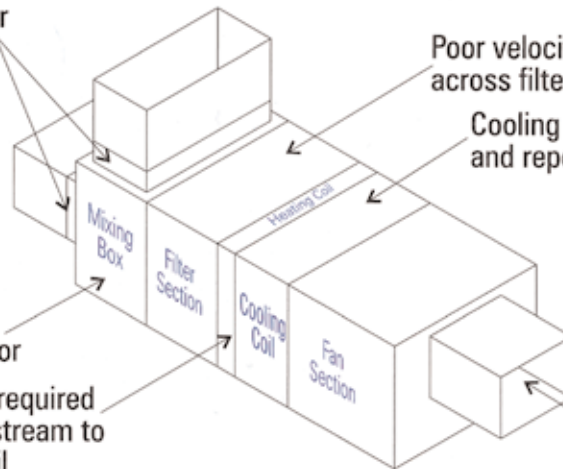
Without Series IV AIR BLENDER® static air mixer:

Control dampers must be selected for mixing, not for proper control of airstreams

Poor control due to large mixed air temperature error
Excessive energy required to heat mixed air stream to protect cooling coil

Poor velocity distribution across filter bank and coil
Cooling coil freezeups and repeated Freeze-Stat trips

Unknown distribution of Outside Air within supply ducts requires increased outside air



With Series IV AIR BLENDER® static air mixer:

Control dampers may be selected for proper control not for mixing

Improved control due to reduced mixed air temperature error

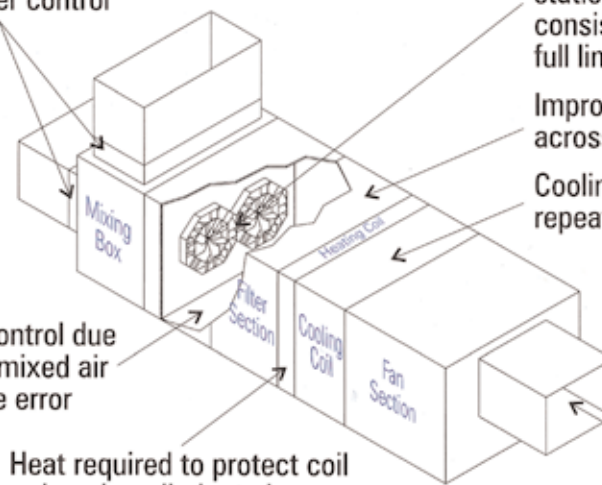
Heat required to protect coil reduced or eliminated

Geometrically similar Series IV Air Blender static mixers provide consistent performance across the full line of mixer sizes

Improved velocity distribution across filter bank and coil

Cooling coil freezeups and repeated Freeze-Stat trips eliminated

Known distribution of Outside Air within supply duct



THE SERIES IV AIR BLENDER® static air mixer applied using the new selection procedure also provides the designer and building owner with the following features and benefits.

- Each model is carefully scaled to provide consistent performance across the full line of mixer sizes.
- Square symmetrical shape and new mounting methods make layout and installation easier.
- The new improved selection procedure ensures you that the AIR BLENDER® model selected is the right unit for the job by accurately predicting the mixing effectiveness and pressure drop based on the mixer-to-plenum area ratio and plenum approach velocity.
- The *Mixing Effectiveness Design Guide* can be used to determine the mixing effectiveness required to eliminate nuisance freeze stat trips and frozen coils, reduce sensor error, and to enhance the mixing of outdoor air into the supply air stream to help meet IAQ requirements.

MIXING EFFECTIVENESS

The performance of mixing devices such as mixing boxes and static air mixers is rated using the concept of mixing effectiveness. This rating system, which was first developed by the National Bureau of Standards (now the NIST), compares the spread of a temperatures downstream of a mixing device to the spread of temperatures upstream of a mixing device in order to provide a convenient method for determining the amount of mixing performed by a mixing device. The mixing effectiveness of a mixing box and a static mixer may be determined using the following equation:

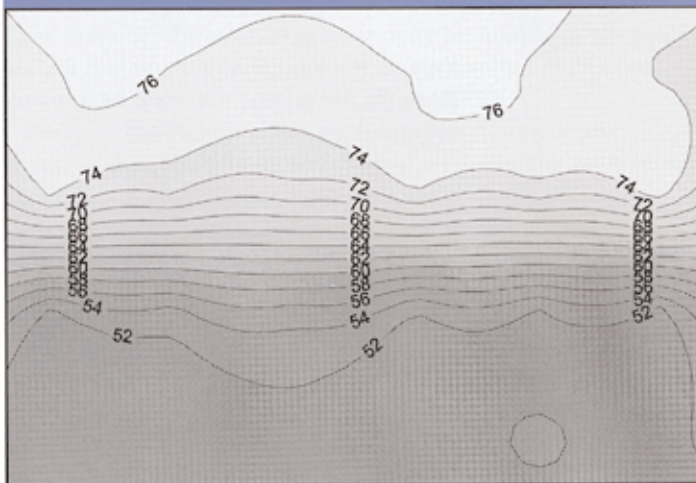
$$E = 1 - \frac{\text{Range}_{\text{Downstream}}}{\text{Range}_{\text{Upstream}}}$$

WHERE — $\text{Range}_{\text{Downstream}}$ = Temperature Range downstream of mixing device
 $\text{Range}_{\text{Upstream}}$ = Temperature Range upstream of mixing device

The mixing effectiveness for the AIR BLENDER® static air mixer has been determined from a large number of tests, both in actual installations and in the laboratory. The stated values for mixing effectiveness have been determined using a fully stratified air handling unit in order to prevent overestimating the performance of the static mixer. Figures 1 & 2 show typical temperature patterns for the system used to determine the performance of the AIR BLENDER® static mixer. These figures clearly indicate that the mixing in the system is solely due to the static mixer and not to the mixing box. Because the mixing box provides negligible mixing, the mixing effectiveness of the static mixer may be calculated using the following equation:

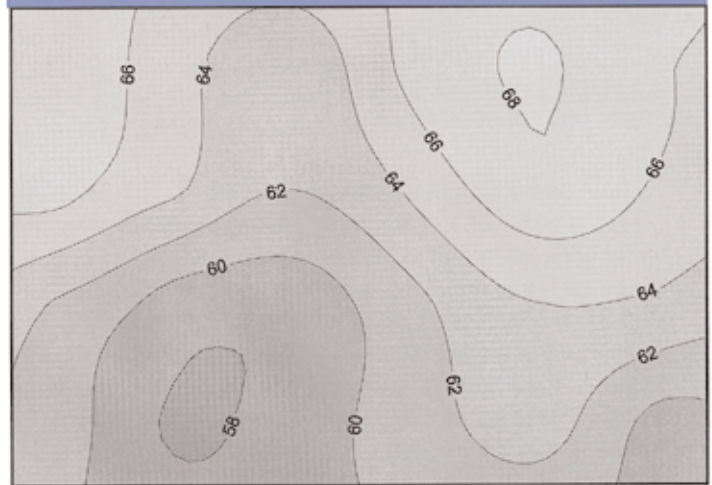
$$E = 1 - \frac{\text{Range}_{\text{Downstream}}}{t_{\text{RA}} - t_{\text{OA}}}$$

Figure 1 – Without Series IV AIR BLENDER® static air mixer.



t_{Mix} : 63.2°F t_{Max} : 76.0°F $t_{\text{RA}} - t_{\text{OA}}$: 26.8°F
 %OA: 53% t_{Min} : 50.7°F E_{RDT} : 6%
 %RA: 47% Range: 25.3°F

Figure 2 – With Series IV AIR BLENDER® static air mixer.



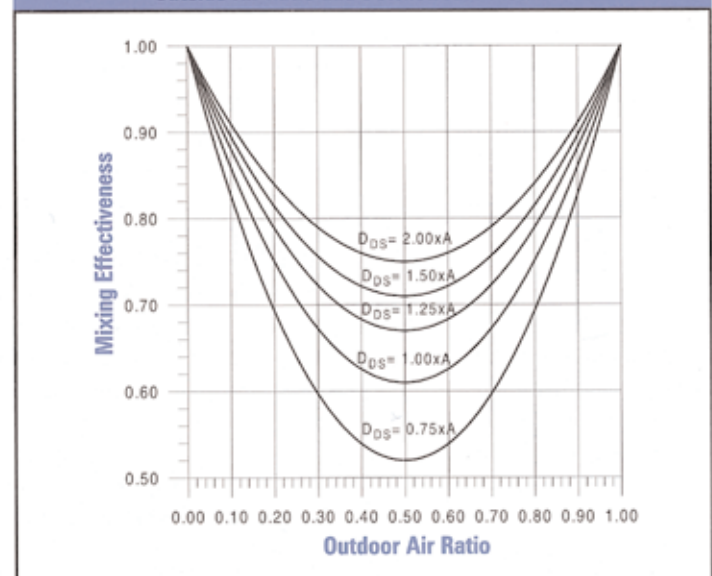
t_{Mix} : 63.2°F t_{Max} : 68.3°F $t_{\text{RA}} - t_{\text{OA}}$: 26.8°F
 %OA: 53% t_{Min} : 57.5°F E_{RDT} : 60%
 %RA: 47% Range: 10.8°F

DISTANCE

The amount of mixing provided by a static mixer is largely determined by how much distance is downstream of the static mixer and the amount of outside air being introduced into the system. By changing the amount of distance between the static mixer and the nearest downstream component, the amount of mixing can be altered to fit the mixing requirements of any system. Chart 1 shows the mixing effectiveness for several different downstream distances.

Many designers choose to use a downstream distance equal to the "A" dimension of the selected static mixer. This distance provides sufficient mixing in many applications. However, the mixing provided by the static mixer should be checked using the information contained in booklet *Mixing Effectiveness Design Guide* in order to insure that the mixing system provides the required level of mixing for each particular system.

Chart 1 – Mixing Effectiveness vs. Outside Air Ratio and Downstream Distance



PRESSURE DROP

The pressure drop across a static mixer is a function of the velocity of the air upstream of the mixer and the ratio of the area of the mixer to the area of the plenum or duct in which it is mounted. This ratio, the Mixer Area Ratio (β), is determined using the following equation:

$$\beta = \frac{\text{Area}_{\text{Mixer}}}{\text{Area}_{\text{Plenum}}}$$

This ratio should be used with the calculated approach velocity and Chart 2 in order to determine the pressure drop across a static mixer when it is installed in a system. Table 1 presents the recommended values of β for applications which require short distance, low pressure drop, or the best combination of distance and pressure drop.

For VAV systems, the pressure drop should be determined for the full flow condition. The turndown ratio for the system should be calculated and located on Chart 2. The operating point at the full flow condition should lie above the correct turndown line in Chart 2 in order to insure that the velocity through the mixers is at least 400 FPM at the minimum supply flow rate.

Table 1 – Recommended Area Ratios

PRIMARY CONSTRAINT	RECOMMENDED AREA RATIO (β)
Shortest Distance	0.36
Best Selection	0.43
Lowest ΔP	0.50

Chart 3 – Pressure Loss Coefficient for Series IV AIR BLENDER® static mixer for plenum/duct velocities



AREA RATIO (β)	LOSS COEFFICIENT (C_{MIXER})
0.3	29.1
0.4	13.7
0.5	7.6
0.6	4.7
0.7	3.1
0.8	2.2

$$\Delta P_{\text{Mixer}} = C_{\text{Mixer}} \times P_{\text{Vel}}$$

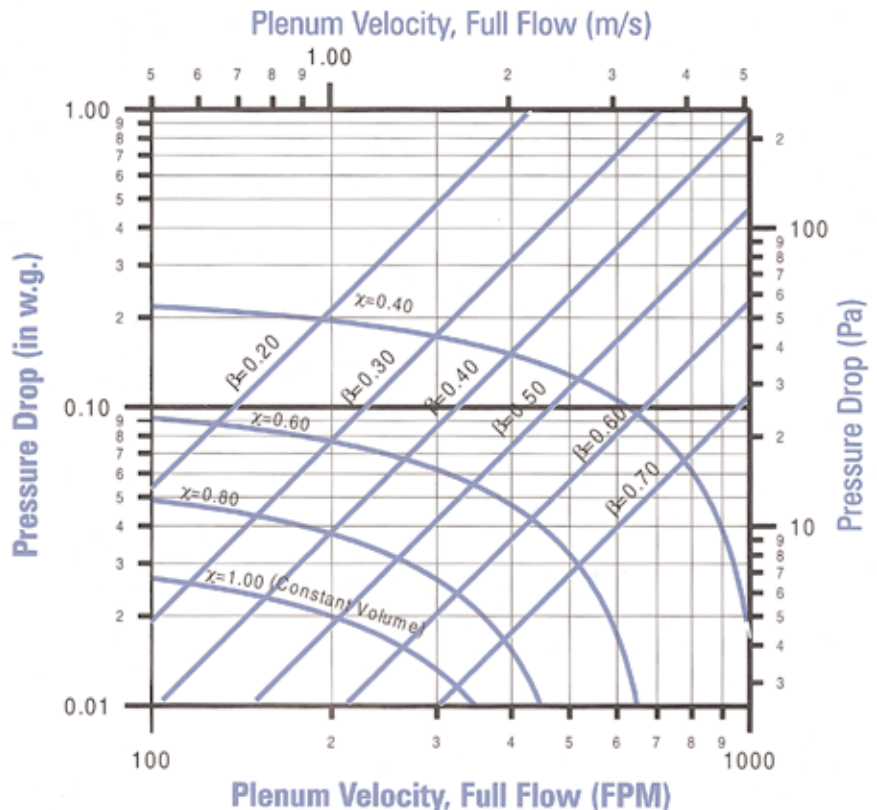
(P_{Vel} = Duct velocity pressure)

Chart 2 – Pressure Drop for Series IV AIR BLENDER® static mixer mounted in air handling unit

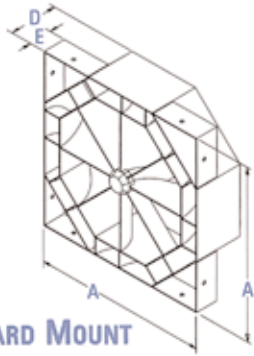
NOTES:

- Recommended Area Ratios:
Shortest Distance: 0.36
Best Selection: 0.43
Lowest Pressure Loss: 0.50
- Operating point should lie above the turndown ratio line for the system.
- Area ratios below 0.35 should not be used unless absolutely necessary.
- The turndown ratio (χ) is the minimum flow rate divided by the maximum flow rate of the system. For constant volume systems, the turndown ratio is 1.00.

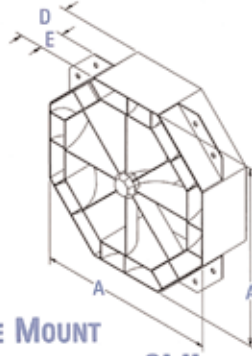
$$\chi = \frac{\text{Supply}_{\text{Minimum}}}{\text{Supply}_{\text{Maximum}}}$$



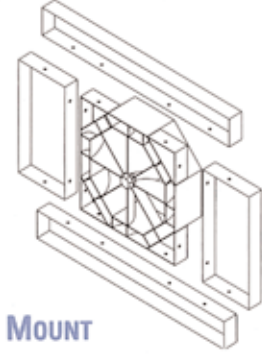
Series IV AIR BLENDER® static air mixer Product Data Sheet



**STANDARD MOUNT
I-P UNITS**



FLANGE MOUNT



PANEL MOUNT

SI UNITS

MODEL	A Inches	D Inches	E Inches	AREA Sq. Ft.	WEIGHT Lbs.
8	8	1.94	1.5	0.4	2
9	9	2.30	1.5	0.5	2
10	10	2.30	1.5	0.6	2
11	11	2.48	1.5	0.7	3
12	12	2.48	1.5	0.8	3
13	13	2.88	2	1.0	4
14	14	2.88	2	1.1	4
15	15	3.38	2	1.3	6
16	16	3.38	2	1.5	7
18	18	3.94	2	1.9	8
20	20	3.94	2	2.3	9
22	22	4.81	2	2.8	11
24	24	4.81	2	3.3	12
26	26	5.56	2	3.9	15
28	28	5.56	2	4.5	16
30	30	5.56	2	5.2	18
32	32	6.56	2	5.9	22
34	34	6.56	2	6.7	23
36	36	6.56	2	7.5	25
38	38	6.56	2	8.3	30
40	40	8.00	2	9.2	32
42	42	8.00	2	10.14	34
44	44	8.00	2	11.1	36
46	46	8.00	2	12.14	38
48	48	8.00	2	13.25	40
52	52	9.31	2.5	15.6	61
56	56	10.39	2.5	18.0	73
60	60	10.75	2.5	20.7	81
66	66	11.65	2.5	25.1	97
72	72	12.55	2.5	29.8	114
78	78	13.63	2.5	35.0	134
84	84	14.89	2.5	40.6	157
90	90	15.79	2.5	46.6	184
96	96	16.88	4	53.0	252
102	102	17.75	4	59.9	262
108	108	19.00	4	67.1	324
114	114	20.13	4	74.8	360
120	120	21.00	4	82.8	391
132	132	22.81	4	100.2	477
144	144	25.13	4	119.3	569
156	156	26.94	4	140.0	660
168	168	28.75	4	162.4	766

MODEL	A Millimeters	D Millimeters	E Millimeters	AREA Sq. M.	WEIGHT Kg
8	203	49	38	0.04	0.8
9	229	58	38	0.05	0.9
10	254	58	38	0.06	1.0
11	279	63	38	0.07	1.4
12	305	63	38	0.08	1.5
13	330	73	51	0.09	1.8
14	356	73	51	0.10	1.8
15	381	86	51	0.12	2.7
16	406	86	51	0.14	3.2
18	457	100	51	0.18	3.6
20	508	100	51	0.21	4.1
22	559	122	51	0.26	5.0
24	610	122	51	0.31	5.4
26	660	141	51	0.36	6.8
28	711	141	51	0.42	7.3
30	762	141	51	0.48	8.2
32	813	167	51	0.55	10.0
34	864	167	51	0.62	10.4
36	914	167	51	0.67	11.3
38	965	167	51	0.77	13.6
40	1016	203	51	0.85	14.5
42	1067	203	51	0.94	15.4
44	1118	203	51	1.03	16.3
46	1168	203	51	1.13	17.2
48	1219	203	51	1.23	18.1
52	1321	236	64	1.45	27.7
56	1422	264	64	1.67	33.1
60	1524	273	64	1.92	36.7
66	1676	296	64	2.33	44.0
72	1829	319	64	2.77	51.7
78	1981	346	64	3.25	60.8
84	2134	378	64	3.77	71.2
90	2286	401	64	4.33	83.5
96	2438	429	102	4.92	114.3
102	2591	451	102	5.56	118.8
108	2743	483	102	6.23	147.0
114	2896	511	102	6.95	163.3
120	3048	533	102	7.69	177.4
132	3353	579	102	9.31	216.4
144	3658	638	102	11.08	258.1
156	3962	684	102	13.01	299.4
168	4267	730	102	15.09	347.5

NOTES:

1. Mixers may be supplied with either standard, flange or panel mounting systems.
2. Standard construction of models 96-168 is split into 2 pieces.
3. Standard construction is 5052-H34 aluminum. Other materials available. Consult local representative for other materials.

APPLICATION NOTES

In order to properly select and properly apply an AIR BLENDER® static mixer in an air handling unit, several factors need to be considered:

1. The quantity of mixers to use depends on how the return and outside air streams enter the static mixer. The safest way to use a static mixer is to use a single mixer. However, if relatively equal amounts of both air streams enters each mixer, multiple mixers may be used. This condition is generally satisfied if both air inlets are the same width and extend the full width of the air handling unit. Any time multiple mixers are used, they should be arranged in a single line, not as an array.

(Note: There are a few exceptions to this rule. Contact factory or representative if you have questions about the use of multiple mixers.)

2. The size of mixer to use depends on the quantity of mixers to be used and the size of the plenum or duct in which the mixer is to be mounted. Once the applicability of using multiple mixers has been determined, the Quick Selection chart on the next two pages may be used to select the correct size and quantity of mixer to use. If desired, the models shown in this table may be changed to achieve a better selection. If the models are changed, the new area ratio, required distances and pressure drop should be determined. If a plenum size is not listed on the Quick

Selection chart, the recommended area ratios in Table 1 on page 7 should be used to determine the mixer area required.

3. The distance required upstream of the mixer depends upon the mixer(s) selected and the size of the plenum in which the mixer is to be mounted. The distance required upstream of a mixer is based on how much the air streams have to contract in the process of entering the static mixer. This entrance angle should be kept in the range of 90°–120° to avoid creating excessive pressure drop (*Application Detail 1 on page 12*).
4. The distance downstream of the mixer depends on the amount of mixing desired. The Quick Selection chart assumes a downstream distance equal to the “A” dimension of the mixer. If more mixing is required, the downstream distance should be increased. If necessary, this downstream distance may be shortened, but it should never be less than 0.75 times the “A” dimension of the mixer. Chart 1 on page 6 may be used to determine the relationship between downstream distance and mixing effectiveness. *The Mixing Effectiveness Design Guide (MEDG 3/00)* should be consulted to determine the amount of mixing required for each system.

Following the procedure outlined above will help insure that the mixers selected will provide the correct amount of mixing without an excessive pressure drop.

How Many Mixers?

Determining the Proper Quantity and Layout of Mixers to Use Based on Air Stream Entrance Conditions.

The use of multiple mixers depends upon the pattern of stratification which is present in the system. In order for multiple mixers to be used, it is necessary for portions of both the hot and cold air streams to pass through each mixer. Ideally, the relative amounts of hot and cold air passing through each mixer will be equal. If these relative amounts vary through each mixer, there will be a different mixed air temperature downstream of each mixer, resulting in a higher level of stratification. The figure below shows the proper use of multiple air mixers in a system.

Incorrect

Single or Multiple mixers may be used. (Mixers must be in horizontal line and damper blades should extend full width of unit. Recommended inlet arrangement.)

Correct

The pattern of stratification is largely dependent upon the inlet arrangement of the air streams. The figure below shows typical stratification patterns developed by common inlet arrangements.

Use Single Mixer (This inlet condition Not Recommended.)

Single or Multiple mixers may be used. (Multiple mixers must be in vertical line and damper blades should extend full height of unit. Usually results in higher pressure drop and longer distances.)

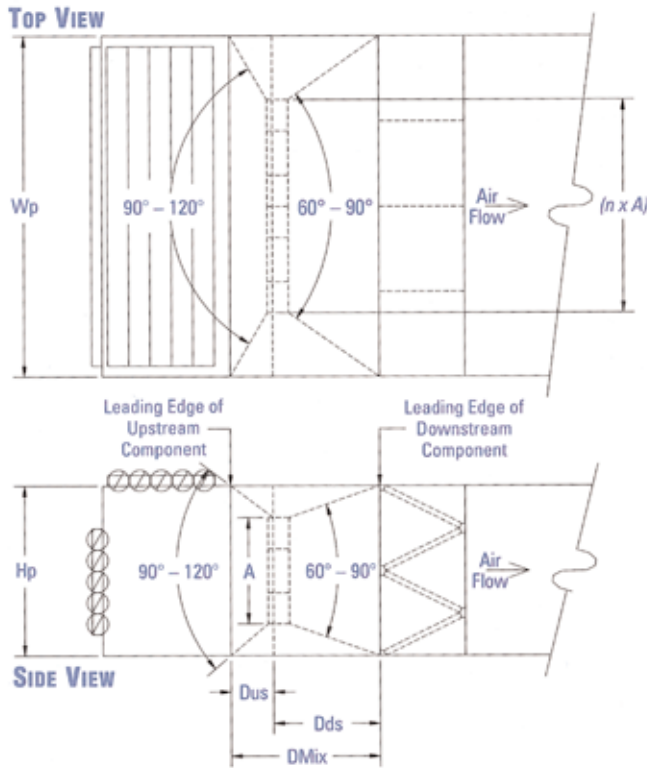
NOTES:

1. Any time a minimum outside air damper is used with multiple mixers, it should extend the full width of the mixers being used.
2. Any time multiple static mixers are used, care should be taken to insure that the flow rate is uniformly distributed in each inlet. For example, if a duct approaches the mixing box the side and an elbow is used to introduce the air into the top of the unit, turning vanes should be used to insure even flow across the inlet.

Quick Selection Guide for the Series IV Air Blender® Static Air Mixer

Plenum Height	Plenum Area (ft²)	Plenum Height (inches)	CFM	Model	Quantity	Plenum Width (inches)	Downstream Distance (inches)	Upstream Distance (inches)	Plenum Width												
3.00	1 AB14 4/14 0.27	3.75	1 AB16 5/16 0.21	4.50	1 AB18 6/18 0.18	7.00	1 AB22 7/22 0.21	8.00	1 AB24 8/24 0.20	11.25	1 AB28 9/28 0.21	12.50	1 AB30 10/30 0.19	16.50	1 AB34 11/34 0.20	18.00	1 AB36 12/36 0.19	22.75	1 AB40 13/40 0.21		
1500	2 AB10 3/10 0.21	1875	2 AB12 2/12 0.18	2250	2 AB14 4/14 0.29	3500	2 AB16 4/16 0.18	4000	2 AB18 5/18 0.25	5625	2 AB20 5/20 0.20	6250	2 AB22 7/20 0.27	8250	2 AB24 6/24 0.21	9000	2 AB26 8/24 0.27	11375	2 AB28 8/28 0.22		
3 AB 8 4/8 0.21	3 AB 9 3/9 0.21	3 AB 10 5/10 0.28	3 AB 12 4/12 0.21	3 AB 14 4/14 0.20	3 AB 16 5/16 0.28	3 AB 18 6/18 0.28	3 AB 20 6/20 0.24	3 AB 22 7/22 0.26	3 AB 24 8/24 0.24	3 AB 26 8/26 0.28	3 AB 28 8/28 0.28	3 AB 30 9/30 0.24	3 AB 32 9/32 0.33	3 AB 34 10/34 0.24	3 AB 36 10/36 0.28	3 AB 38 11/38 0.24	3 AB 40 12/40 0.28	3 AB 42 12/42 0.28	3 AB 44 12/44 0.24	3 AB 46 13/46 0.24	
4.00	1 AB16 3/16 0.25	5.00	1 AB18 4/18 0.24	6.00	1 AB20 4/20 0.27	8.75	1 AB22 5/22 0.26	10.00	1 AB24 6/24 0.25	13.50	1 AB26 6/26 0.23	15.00	1 AB28 6/28 0.22	19.25	1 AB30 6/30 0.24	21.00	1 AB32 7/32 0.21	24.00	1 AB34 7/34 0.21	26.00	1 AB36 8/36 0.24
2000	2 AB12 4/12 0.21	2500	2 AB13 4/13 0.21	3000	2 AB14 4/14 0.27	4375	2 AB16 5/16 0.32	5000	2 AB18 4/18 0.24	6750	2 AB20 5/20 0.24	7500	2 AB22 5/22 0.19	9500	2 AB24 6/24 0.25	10500	2 AB26 6/26 0.21	12000	2 AB28 7/28 0.25	13000	2 AB30 8/30 0.21
3 AB 8 4/8 0.45	3 AB 9 3/9 0.45	3 AB 10 5/10 0.28	3 AB 12 4/12 0.21	3 AB 14 4/14 0.20	3 AB 16 5/16 0.28	3 AB 18 6/18 0.28	3 AB 20 6/20 0.24	3 AB 22 7/22 0.26	3 AB 24 8/24 0.24	3 AB 26 8/26 0.28	3 AB 28 8/28 0.28	3 AB 30 9/30 0.24	3 AB 32 9/32 0.33	3 AB 34 10/34 0.24	3 AB 36 10/36 0.28	3 AB 38 11/38 0.24	3 AB 40 12/40 0.28	3 AB 42 12/42 0.28	3 AB 44 12/44 0.24	3 AB 46 13/46 0.24	
5.00	1 AB18 4/18 0.24	6.25	1 AB20 4/20 0.27	7.50	1 AB22 5/22 0.26	10.50	1 AB24 6/24 0.25	12.00	1 AB26 6/26 0.23	16.50	1 AB28 7/28 0.25	18.00	1 AB30 8/30 0.24	22.00	1 AB32 8/32 0.21	24.00	1 AB34 9/34 0.21	27.00	1 AB36 10/36 0.23	32.50	1 AB40 13/40 0.21
2500	2 AB12 6/12 0.38	3125	2 AB15 5/15 0.19	3750	2 AB16 5/16 0.21	4375	2 AB18 6/18 0.28	5000	2 AB20 6/20 0.24	6750	2 AB22 7/22 0.21	7500	2 AB24 8/24 0.19	9500	2 AB26 8/26 0.21	10500	2 AB28 8/28 0.21	12000	2 AB30 9/30 0.24	13000	2 AB32 9/32 0.21
6.00	1 AB20 6/20 0.24	7.50	1 AB22 5/22 0.26	9.00	1 AB24 4/24 0.27	10.50	1 AB26 5/26 0.18	12.00	1 AB28 5/28 0.18	16.50	1 AB30 6/30 0.24	18.00	1 AB32 6/32 0.19	22.00	1 AB34 7/34 0.18	24.00	1 AB36 7/36 0.18	27.00	1 AB38 8/38 0.18	32.50	1 AB42 14/42 0.24
3000	—	3750	2 AB15 7/15 0.31	4500	2 AB18 6/18 0.18	5250	2 AB18 6/18 0.18	6000	2 AB20 6/20 0.24	8250	2 AB22 7/22 0.21	9000	2 AB24 8/24 0.20	11000	2 AB26 8/26 0.23	12000	2 AB28 7/28 0.20	13000	2 AB30 8/30 0.24	14625	2 AB32 8/32 0.21
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.00	—	—	—	—	—</																

Application Detail 1



The distance upstream of a static mixer should be great enough that the angle at which the air stream must contract is between 90° – 120° . If the contraction angle is greater than 120° , the pressure drop of the mixer will be greater than shown in the catalog. In addition, the pressure drop of any component located immediately upstream of the mixer will increase and the efficiency of that component will decrease.

The distance downstream of a mixer is usually governed by the required mixing. However, the downstream distance should be large enough so that the discharge angle is between 60° – 90° . If the discharge angle is more than 90° , the velocity profile across the component located immediately downstream of the mixer will be affected. Typically, this results in decreased performance and increased pressure drop for the downstream component. (n = number of mixers)

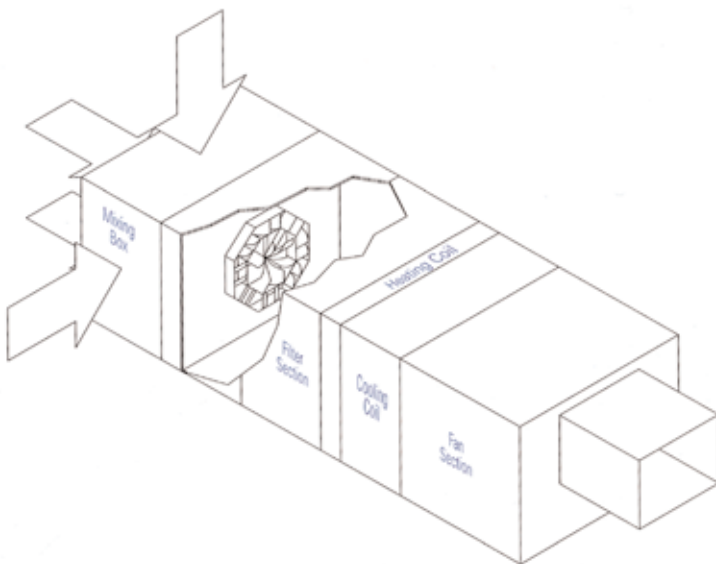
D_{US} = the greater of

$$\frac{W_{Plenum} - (n \times A)}{3}$$

or

$$\frac{H_{Plenum} - A}{3}$$

Application Detail 2

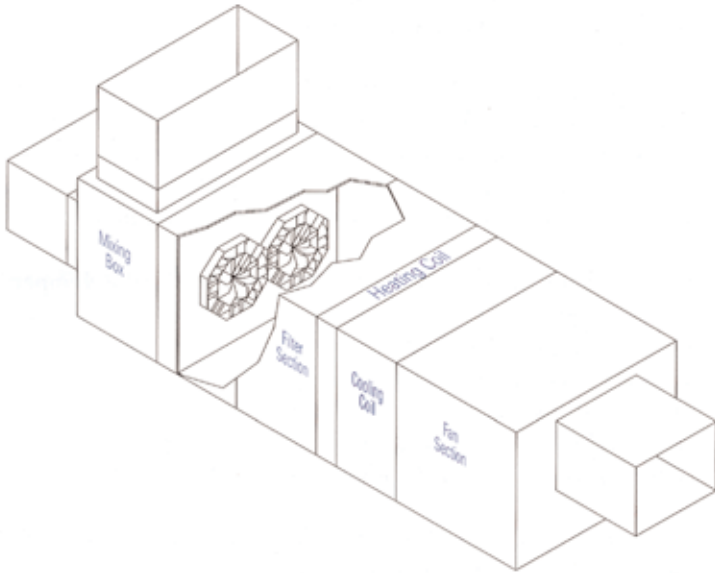


The use of a single AIR BLENDER® static mixer is the safest way to apply a static mixer and provides the system designer with an almost unlimited variety of inlet arrangements.

If the required upstream and downstream distances are too great with a single mixer, the use of multiple mixers may be considered. However, if multiple mixers are used, it is necessary that the same relative amounts of outside and return air pass through each mixer. In most cases, this means that the air inlets and control damper blades should extend the full width of the air handling unit.

If there is a question whether or not the use of multiple mixers is advisable, please contact the factory or your local sales representative.

Application Detail 3

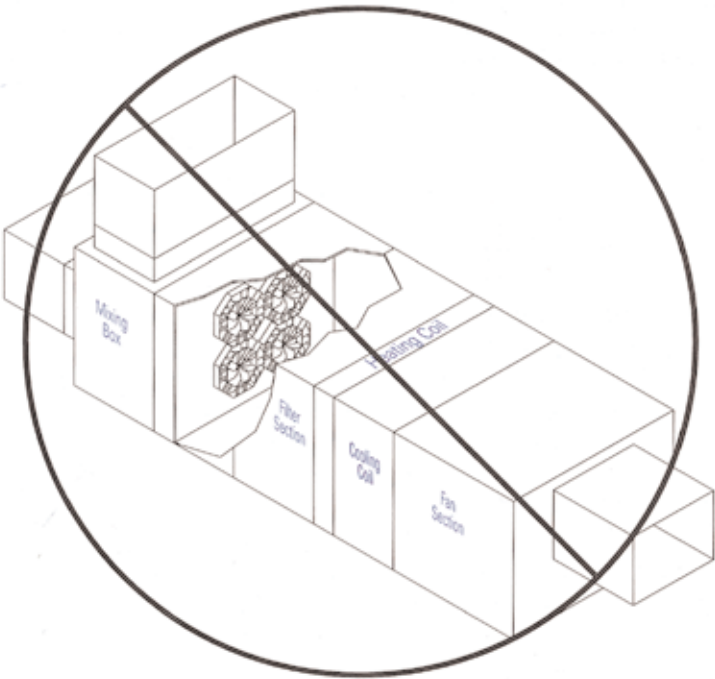


The use of multiple static mixers can provide a substantial savings in mixing distance and pressure drop. However, when using multiple static mixers, the inlet arrangement of the two air streams is critical. There must be the same relative amounts of outside and return air passing through each mixer in order for the system to work correctly. If this condition is not true, the mixers may not reduce the stratification. This condition is generally satisfied when both the return and outside air inlets and control damper blades extend the full width of the air handling unit.

If there is an elbow located just before the inlet and the ducts enter from the side of the unit, turning vanes should be used to insure that the air is evenly distributed across the entire inlet.

If both inlets and damper blades extend the full height of the unit, it may be possible to stack the static mixers in a vertical line. As previously mentioned, all mixers must have the same relative amounts of air passing through them to be effective.

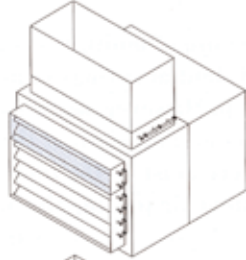
Application Detail 4



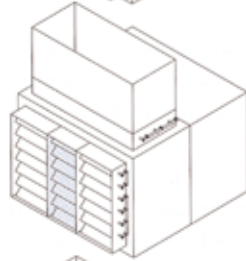
The desire to save space may lead to the decision to use an array of mixers rather than a single line. This practice is rarely acceptable due to the uneven amount of return and outside air which pass through each mixer. Please contact factory before designing a system using an array of static mixers.

Application Detail 5

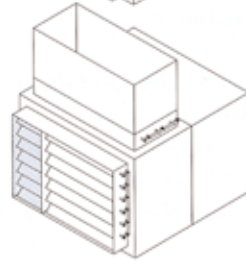
BEST ARRANGEMENT
Full Width Min. OA
Damper; Multiple Mixers



O.K. ARRANGEMENT
Centered, Partial Width
Min. OA Damper,
Max. of 2 Mixers



POOR ARRANGEMENT
Offset, Partial Width
Min. OA Damper
Use Single Mixer



The performance of multiple static mixers depends upon how the air enters the air handling unit.

The safest arrangement for the minimum outside air damper is to extend the damper the full width of the unit. If a partial width min. OA damper is used, it should be centered and a maximum of two mixers should be used. If the min. OA damper is not centered, a single static mixer should be used.

The best arrangement for control dampers is for the damper blades to extend the full width of the unit. This arrangement allows a horizontal line of multiple mixers to be used. If necessary, the damper may extend the full height of the unit. This arrangement allows a vertical line of multiple mixers to be used. But in many cases, this results in longer mixing distances and higher pressure drops.

In general, the use of a side inlet should be avoided unless a specially designed mixing box is used.

Sample Selection Using Quick Selection Chart

Series IV AIR BLENDER® static mixers are to be installed in an air handling unit with inside dimensions of 90" wide and 56" high. The system is to use a standard mixing box with inlets which extend the full width of the air handling unit. The plenum velocity will be 450 FPM. What mixers should be used and how much distance and pressure drop is required for these mixers?

SOLUTION:

Since the inlets extend the full width of the unit, we may use multiple mixers. The Quick Selection chart suggests the following mixers:

		$W_p = 90$		
$H_p = 54$	33.75	..... 1 AB48	..... 14/48	..... 0.22
	16875	..... 2 AB34	..... 8/34	..... 0.22
		..... 3 AB28	..... 9/28	..... 0.21
		..... 4 AB22	..... 11/22	..... 0.35

If pressure drop is more important than distance, two AB34 mixers may be used with 8" upstream and 34" downstream. The pressure drop for this selection will be:

$$\Delta P_{\text{Mixer}} = 0.22 \left(\frac{450}{500} \right)^2 = 0.18 \text{ in. w.g.}$$

If pressure drop is not as important as distance, four AB22 mixers may be used with 11" upstream and 22" downstream of the mixers. The plenum velocity is approximately 450 FPM, so the pressure drop will be:

$$\Delta P_{\text{Mixer}} = 0.35 \left(\frac{450}{500} \right)^2 = 0.28 \text{ in. w.g.}$$

Selection Procedure without Using Quick Selection Chart

A 120" x 120" air handling unit is to have AIR BLENDER static mixers installed after the mixing box. The system is to have a maximum flow rate of 50000 CFM and a minimum flow rate of 30000 CFM. What mixers should be used in this system?

SOLUTION:

The first step is to determine the area of the plenum. In this case, it is $120" \times 120"/144 = 100 \text{ ft}^2$. The plenum velocity at maximum flow is 500 FPM and 300 FPM at minimum flow. The next step is to select an area ratio from Table 1 on page 7. For most applications, an area ratio of 0.43 will provide the best selection. Calculate the mixer area required to achieve the desired area ratio:

$$\begin{aligned} \text{Area}_{\text{Mixer}} &= \beta \times \text{Area}_{\text{Plenum}} \\ &= .43 \times 100 = 43 \text{ft}^2 \end{aligned}$$

Use the Product data sheet on page 8 to select the possible mixers based on area.

QUANTITY	MODEL	AREA	ACTUAL β	WIDTH	HEIGHT
1	AB84	40.6	0.41	84.0"	84.0"
2	AB60	41.4	0.41	120.0"	60.0"
3	AB48	39.9	0.39	144.0"*	48.0"
4	AB40	27.6	0.28**	120.0"	40.0"

Note: *Selection too wide to fit within unit. **Area ratio below recommended minimum of 0.35.

From this chart, the best selection will be two AB60 static mixers. If distance is at a premium, the next smaller size mixer (two AB56) may be used instead. The upstream distance and pressure drop will increase with the use of these smaller mixers.

The distance upstream of the mixer needs to be great enough to keep the contraction angle between 90–120° (see application detail 1 on page 12). The difference in the horizontal and vertical directions:

$$\Delta \text{Width} = 120 - (60 \times 2) = 0 \quad \Delta \text{Height} = 120 - 60 = 60$$

The upstream distance can be determined from the larger of the ΔHeight and ΔWidth using the following equation:

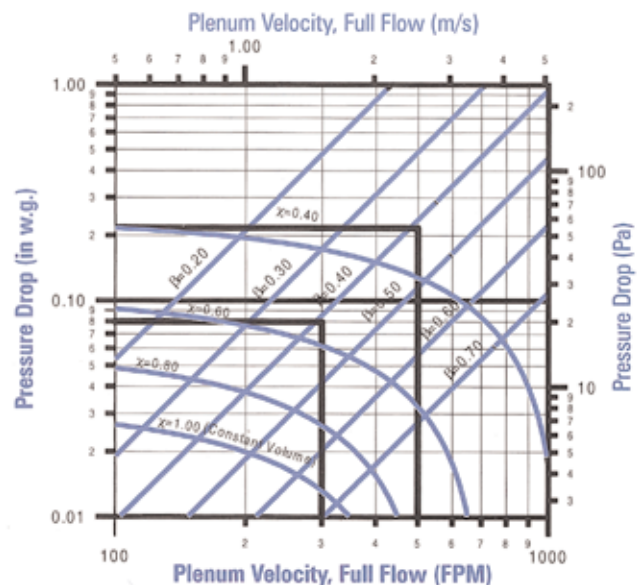
$$D_{US} = \frac{\Delta \text{Height}}{3} = \frac{60}{3} = 20$$

The downstream distance is 60". The total distance required for mixing is: $20" + 60" = 80"$

The turndown ratio (χ) for the system is

$$\chi = \frac{30000}{50000} = 0.60$$

Plotting the actual area ratio and the maximum plenum velocity on pressure drop chart 2, page 7 yields a pressure drop of approximately 0.21" w.g. at the maximum flow and 0.08" w.g. at the minimum flow rate. Since the plotted point lies above the 0.60 turndown line, the selection will provide mixing throughout the operating range of the system.



Static Air Mixer Specifications

The air mixer will be a Series IV Air Blender® mixing device. The air mixer or mixers shall be constructed of a minimum .030" thick aluminum. Mixer shall be welded construction with a mechanically fastened center. The mixing device shall impart a counter rotational mixing of entering air streams. Each mixer model shall be geometrically scaled to ensure proper performance across the full range of sizes. Mixers that do not use counter rotational mixing or are not geometrically scaled are not acceptable.

The performance of the mixing equipment shall be stated in terms of Range Mixing Effectiveness. Mixing Effectiveness calculated using the standard deviation is not acceptable. Mixing equipment shall be geometrically similar for all sizes.

The pressure drop of mixers shall include mixer area ratio so that the "orifice effect" is included. If not geometrically similar, then each different size must be tested for mixing performance and pressure drop. Detailed documentation of performance testing shall be made available

Air Handling Unit mixing equipment shall have a Range Mixing Effectiveness as shown in the AHU schedule when the system is operating under the conditions in the AHU schedule.

Acceptable Manufactures and Products: Blender Products, Inc., Series IV Air Blender® static mixer or approved equal prior to bidding.

STATIC AIR MIXER SCHEDULE

UNIT I.D.	SYSTEM SERVED	AIRFLOW CFM	MAXIMUM PRESSURE DROP (IN. WG)	PLENUM WIDTH IN.	PLENUM HEIGHT IN.	DISTANCE UPSTREAM OF MIXER IN.	DISTANCE DOWNSTREAM OF MIXER IN.	MODEL NUMBER	OUTSIDE AIR PERCENTAGE	MIXING EFFECTIVENESS REQUIRED



Blender Products, Inc.

Engineered Air Mixing Systems and Equipment

5010 Cook Street • Denver, Colorado 80216

Phone: 303.295.6111 • Fax: 303.296.1520

Toll-free: 800-523-5705

E-mail: INFO@airblender.com

Internet: www.airblender.com



STACK FAN

PART# 0601700001_rev_A

INSTALLATION, OPERATION & MAINTENANCE MANUAL

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain this product. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

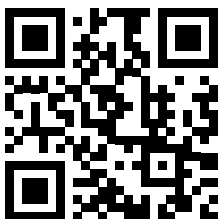


TABLE OF CONTENTS

Introduction	1
General Safety Information.....	2
Shipping, Receiving & Handling	3
Storage	4
Short Term	
Long Term	
Storage Procedures	
Bases	
Unit Start-Up	5
Maintenance	6
Structural	
Motor	
Troubleshooting Guidelines	7
Installation.....	8
Radial Gap, Overlap, Impeller Alignment	9
Fan Spacing	10
Piezometer Ring Data	11

INTRODUCTION

This Installation Manual is provided as a guide for the installation of fans manufactured by Lau. It is the responsibility of the purchaser to provide qualified personnel experienced in the installation, operation, and maintenance of air moving equipment. Instructions given in this manual are general in nature and apply to a variety of models manufactured by Lau. Read this Installation Manual completely before installing the fan. Additional product and engineering information is available at www.Laufan.com. Always follow good safety practices when installing, maintaining and operating air moving equipment.

GENERAL SAFETY INFORMATION

Only qualified personnel should install the fan. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards.

Some important Guidelines:

- Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA), where applicable. In Canada, follow the Canadian Electric Code (CEC).
- The rotation of the impeller is critical. It must be free to rotate without striking or rubbing any stationary objects.
- Motor must be securely mounted and adequately grounded.
- Do not operate fan impeller faster than max catalogued fan rpm. Adjustments to fan speed significantly effects motor load. If the fan speed is changed, the motor current should be checked to be sure it is not exceeding the motor nameplate amps.
- Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces, or chemicals. Replace power cable immediately if damaged.
- Verify that the power source is compatible with the equipment.



When servicing the fan, the motor may be hot enough to cause pain or injury. Allow motor to cool before servicing



Always disconnect power before working on or near a fan. Lock and tag the disconnect switch



Precaution should be taken in explosive atmospheres

SHIPPING & RECEIVING

All Lau products are carefully constructed and inspected before shipment to insure the highest standards of quality and performance. Compare all components with the bill of lading or packing list to verify that the proper unit was received. Check each unit for any damage that may have occurred in transit. Any damage should be reported immediately to the carrier and the necessary damage report filed.

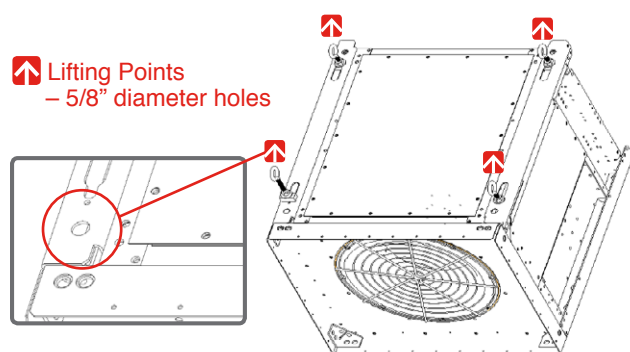
HANDLING

Handling of all air moving equipment should be conducted by trained personnel and be consistent with safe handling practices. Verify the lift capacity and operating condition of handling equipment. Maintain handling equipment to avoid serious personal injury. Units shipped completely assembled may be lifted with slings and spreader bars. Lift the fan in a fashion that protects the fan and fan coating from damage. Never lift a fan by the inlet or discharge flange, shafting or drives, impeller, motor, motor base, or in any other manner that may bend or distort parts.

Lifting Instructions

Fans are designed to be lifted and moved as a single module. Lau does not recommend lifting connected fan modules unless the fan module(s) is supported on a common base.

1. Carefully remove any crate and packing materials.
2. Place the bottom fans onto the mounting structure using the recommended lifting points as shown. Lift each fan individually into position.



Lifting methods



Preferred

A Eyebolt, washers & nut



Alternate

B Clevis hook

Maximum Fan Weight Specifications

Fan Size	Max. Total Fan Weight (lbs.)
SF 10	240
SF 12	270
SF 13	300
SF 15	340
SF 16	430
SF 18	476
SF 20	528
SF 22	815
SF 25	890
SF 27	975
SF 30	1249
SF 33	1331
SF 36	2027
SF 40	2110

SHORT TERM STORAGE

If fan installation is delayed, store the unit in a protected area. Protect the fan and motor bearings from moisture and vibration (or shock loading).

LONG TERM STORAGE

If a fan is to be stored for any length of time and the bearings are re-greasable, the motor bearings should immediately be filled with grease while rotating the fan and then the bearings should be re-greased and rotated monthly. This will prevent moisture, which condenses within the bearing, from corroding the raceways.

STORAGE PROCEDURES

Fans should be stored indoors whenever possible where control over temperature, humidity, shock and dust is reasonably maintained. If units are to be stored outside, they should be covered with a water-resistant material. Stored equipment should be on a clean, dry floor or blocked up off the ground to prevent unit from setting directly on the ground.

Periodic Check

On a monthly interval, the equipment should be checked to ensure that it has remained in an acceptable stored condition. The fan and motor should be rotated several times by hand. The fan impeller should be left at approximately 180 degrees from that of the previous month to prevent damaging the motor bearings.

BASES (Foundation and Isolation)

Critical to every fan installation is a strong, level foundation. Structural bases must be sturdy enough to prevent flexing and vibration. Lau recommends using a spring isolated inertia base for all Stack Fan applications. Design, fabrication, and installation of the isolation base are the customers responsibly.

After the fan, isolation base, and isolators are installed, the entire assembly must be leveled. Floor mounted fans should be installed on a flat, level, rigid foundation.

Fans mounted to or within a structure should be placed as close as possible to a rigid member such as a wall or column. The structure must be designed for rotating equipment; static design for strength is not sufficient to insure proper operation. Structural resonance should be at least 20% above the maximum fan operating speed.

Any ducting should have independent support; do not use the fan to support ducting. Isolating the fan from ductwork with flex connections eliminates transmission of vibration.

UNIT START UP

When the unit is removed from storage, all grease should be purged and replenished with fresh grease. The following check list should be adhered to insure proper operation:

Operation Check List

Verify that proper safety precautions have been followed:

- Electrical power must be locked off.

Check fan mechanism components:

- System connections are properly made and tightened.
- Impeller and fan surfaces are clean and free of debris.
- Rotate the impeller by hand to verify it has not shifted in transit.

Check fan electrical components:

- Motor is wired for proper supply voltage.
- Motor was properly sized for power
- Motor is properly grounded.
- All leads are properly insulated.

Trial “bump”:

- Turn on power just long enough to start assembly rotating.
- Check rotation for agreement with rotation arrow.

Perform checklist again until unit is operating properly. Verify fastener tightness. These may have loosened during shipment or installation.

- Bushing set screw torque
- Bolts on inlet funnel.
- Motor bolt torque
- Nuts holding housing frame to base and base to ground (customer specifications)
- Bushing fastener torque
- Ensure piezo ring tubing will not contact the impeller

C Bushing Fastener Torque

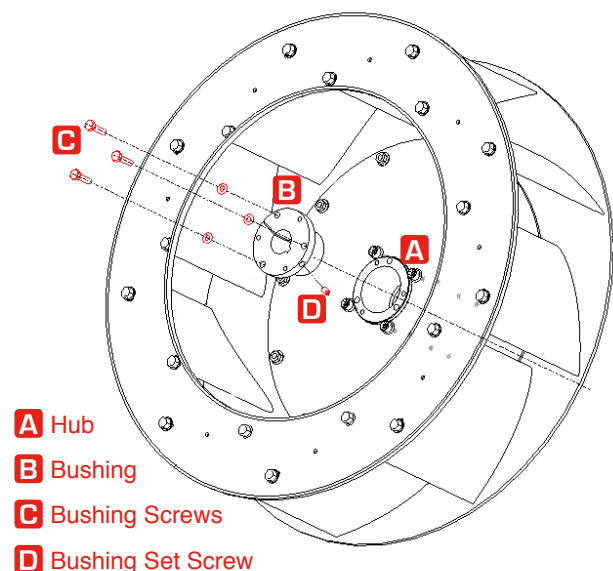
Bushing Type	Screw Size	Recommended Torque
JA	10-24	60 in-lbs.
SD/SDS	¼-20	108 in-lbs.
SK	5/16-18	180 in-lbs.
SF	3/8-16	360 in-lbs.

D Bushing Set Screw Torque

Bushing Type	Screw Size	Recommended Torque
SD/SDS	¼-20	60 in-lbs.
SK	5/16-18	110 in-lbs.
SF	3/8-16	200 in-lbs.

Motor Bolt Torque

NEMA Frame	Bolt Size (Grade 5)	Washers Size (Top and Bottom)	Recommended Torque(ft-lb)
56-145T	5/16	5/16	18
182-215T	3/8	3/8	31
254U-286TS	1/2	1/2	75
324T-365T	5/8	5/8	150
404T-405T	3/4	3/4	267



MOTOR MAINTENANCE

The three basic rules of motor maintenance are: keep the motor clean, dry and properly lubricated. Keeping motors and windings clean is important because dirt and dust can cause heat to be trapped causing overheating and/or premature failure. Blow dust and dirt out of windings and off the motor periodically. Use low pressure (50 psi) airstream to prevent winding damage. Keep the areas surrounding the motor clear so the air can circulate through the motor cooling fan.

Motors should be kept dry to avoid electrical short circuits. Motors kept in storage for long periods of time can have moisture condense on the windings. Be certain the motor is dry before using.

Some smaller motors are permanently lubricated. Motor bearing lubrication, if required, must follow a rigorous schedule. Motors less than 10 hp running eight hours a day in a clean environment should be lubricated once every five years; motors 15 to 50 hp, every 3 years; and motors 50 to 150 hp, yearly. See motor manufacturer specifications for recommended greases. For motors in a dusty or dirty environment or running 24 hours a day, divide the service interval by 2. If the environment is very dirty or high temperatures exist, divide the service interval by 4. Lubrication requirements are normally attached to the motor. Do not over-lubricate.

The major cause of motor bearing failure is contamination of grease, insufficient grease, over lubrication, and incompatibility of grease. If a fan is to be stored for any length of time and the bearings are re-greasable, the motor bearings should immediately be filled with grease while rotating the fan and then the bearings should be re-greased and rotated monthly. This will prevent moisture, which condenses within the bearing, from corroding the raceways.

STRUCTURAL MAINTENANCE

All structural components or devices used to support or attach the fan to the isolation base, or other structure should be checked at regular intervals. Vibration isolators, bolts, foundations, etc, are subject to failure from corrosion, erosion, and other causes. Improper mounting can lead to poor operation characteristics, fan fatigue, and failure. Check components for corrosion, cracks, or other signs of stress.

TROUBLESHOOTING GUIDELINES

Use safety practices when investigating fan or system performance problems.

General safe practices and performance troubleshooting guidelines can be found in AMCA Publication 410: Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans, and AMCA Publication 202-98 (R2011): Troubleshooting. Fan application and field measurement procedures can be found in AMCA Publication 201-02 (R2011): Fans and Systems and AMCA Publication 203-90 (R2011): Field Performance Measurement of Fan Systems.

Troubleshooting Performance Problems:

The lists below indicate possible areas to check when air or sound values do not meet expectations. Most fan problems can be pinpointed to one of these common causes.

Air Capacity Problems:

1. **Resistance of system not at design rating.**
If resistance is lower than expected airflow can be higher and horsepower can be lower. If resistance is higher than anticipated, air volume will be down.
2. **Fan speed is not at design speed.**
3. **Air density not at design values.** Also check air performance measurement techniques / procedures.
4. **Mechanical air devices (e.g. dampers), are closed or plugged.** Also check filters.
5. **Impeller mounted improperly or is rotating in reverse.**
6. **Parts of system or fan have been damaged or need cleaning.**

Noise Problems:

1. **Fan is not at design point of operation.**
Fan forced to operate in an unstable flow region.
2. **Bearing failure.** Check bearings.
3. **Supply voltage high or inconsistent supply frequency.** Adjustable frequency controllers can generate motor noise.
4. **Objects which are installed in a high velocity airstream can generate noise.** This includes flow sensors, turning vanes, etc.
5. **Non-uniform fan inlet conditions.**
6. **Acoustics or sound measurement procedure incorrect.**

Vibration Problems:

1. **Misalignment of drive components.**
2. **Poor foundations (isolation base) or mounting structure (resonances).**
3. **Foreign object trapped in rotating components.**
4. **Damaged rotating components (bearings, shaft, fan, impeller).**
5. **Broken, loose or missing setscrews.**
6. **Loose bolts.**
7. **Vibration transmitted by another source.**
8. **Water accumulating in airfoil blades.**
9. **Fan is operating in stall or unstable flow region.**

NOTE: All fans manufactured by Lau are factory balanced prior to shipment. Improper handling and movement of the fan during shipment may cause the rotating assembly to shift out of alignment. Balance should be checked once the fan is installed. If a final trim balance is required, it is the end user's responsibility to bring the fan back to factory specifications. Final trim balancing is not the responsibility of Lau.



Intake Side



Supply Side

INSTALLATION

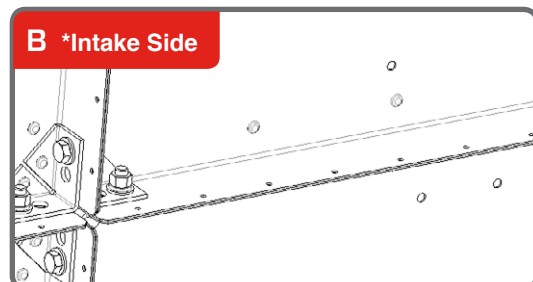
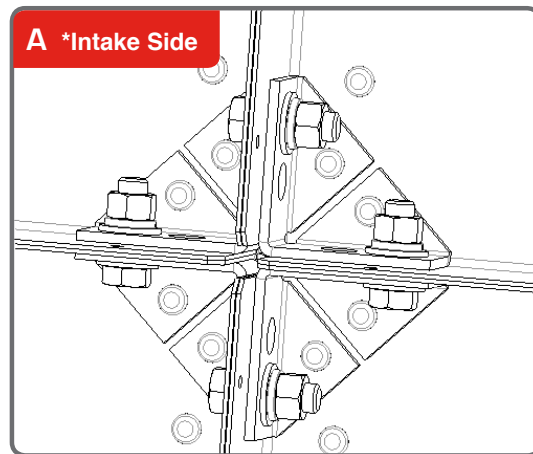
Bolt the fan to the isolation base, or other structure, and adjacent fans using the inlet and outlet mounting flanges. The first row of fans should be securely installed before installing the second row of fans. **Lau does not recommend lifting and moving assembled Stack Fan modules, as this may cause bending, distortion, and lead to component misalignment.**

A Top, Bottom and Side Connections *Intake Side Shown

- 1/2-13 x 1.00 Grade 5 Hex Head Cap Screw (or equivalent) 4 required (1 in each corner)
- 1/2 Flat Washer, 8 required (2 in each corner)
- 1/2-13 Hex Nut (or equivalent), 4 required (1 in each corner). Recommended torque setting of 18 (ft-lb)
- Split Lock Washer (or equivalent), 4 required (1 in each corner)

B Middle Connections *Intake Side Shown

- **Intake Side Panel Connection:** A series of .22" diameter holes, 3" on center are provide to connect the front panel of the fan assembly to the customer's equipment. The holes are sized for 1/4" sheet metal screws.
- All installation hardware supplied by end user.



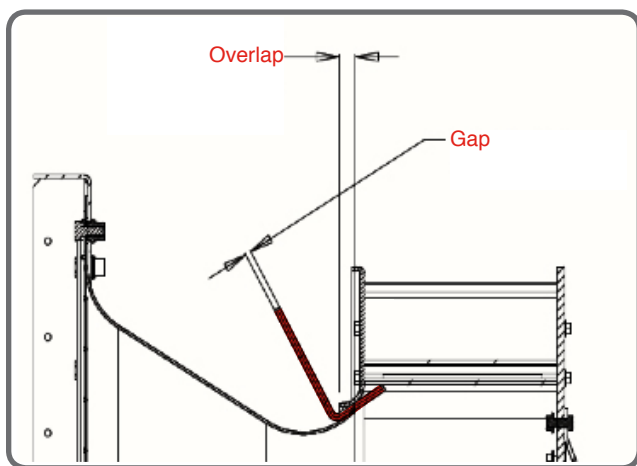
RADIAL GAP, OVERLAP AND IMPELLER ALIGNMENT

Efficient fan performance can be maintained by having the correct gap and overlap between the impeller and inlet funnel. These items should be checked at installation, after the fan has been in operation for 24 hours, and after the unit has been serviced.

Gap– distance between the OD of the funnel and the ID of the impeller concentricity.

Overlap– distance the funnel and impeller overlap one another.

This sketch shows both the gap and overlap dimensions for all sizes.



Gap is adjusted by loosening the inlet funnel bolts and centering the funnel on the impeller.

Caution: Never loosen the motor attachment bolts to make adjustments to the impeller-to-funnel gap.

Overlap is adjusted by loosening the impeller hub from the shaft and moving the impeller to the desired position along the shaft. The transition between the inlet funnel and impeller should be as shown; there is a smooth feel to the profile when moving from one component to the other.

Gap / Overlap Dimensions

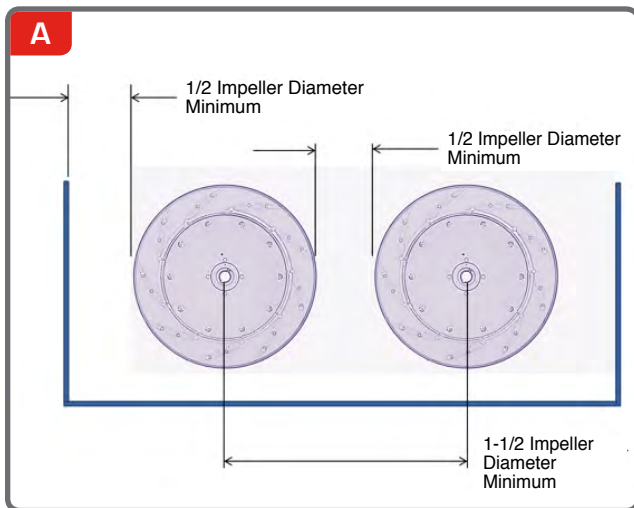
Model	Minimum Overlap (Inches)	Maximum Overlap (Inches)	Minimum Gap (Inches)
105	0.12	0.29	0.06
122	0.12	0.32	0.07
135	0.12	0.35	0.07
150	0.19	0.41	0.09
165	0.25	0.47	0.11
182	0.31	0.5	0.11
200	0.38	0.57	0.12
222	0.44	0.63	0.14
245	0.5	0.69	0.17
270	0.56	0.76	0.20
300	0.62	0.88	0.24
330	0.75	0.96	0.26
365	0.81	1.13	0.27
402	0.88	1.23	0.31

FAN SPACING

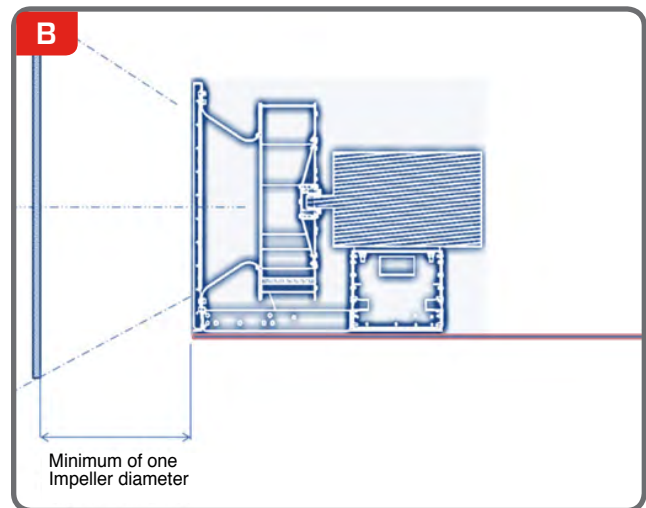
Location and Placement of Plenum Fans in Air Handlers

- Center the fan inlets in both the horizontal and vertical planes.
- **A** Shows guidelines for spacing two or more fans side by side in the plenum. Fans should not be closer than one-half the wheel diameter.
- For inlet clearance, see **B**. A minimum of one fan impeller diameter clearance is recommended.

Fan spacing with two or more fans



Recommended Inlet Spacing



Location and Placement of Plenum Fans in Air Handlers

- Center the fan inlets in both the horizontal and vertical planes.
- **A** shows guidelines for spacing two or more fans side by side in the plenum. Fans should not be closer than one-half the wheel diameter.
- For inlet clearance, see **B**. A minimum of one fan impeller diameter clearance is recommended.

PIEZOMETER DATA

HOW IT WORKS

The Piezo system is based on the principle of a flow nozzle. The inlet funnel of the fan is used as the flow nozzle, and the flow can be calculated by measuring the static pressure drop through the inlet funnel. The pressure drop is measured from the tap located on the face of the inlet funnel to the piezometer in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer is connected to the low-pressure side (see diagram below).

Measurement of Airflow

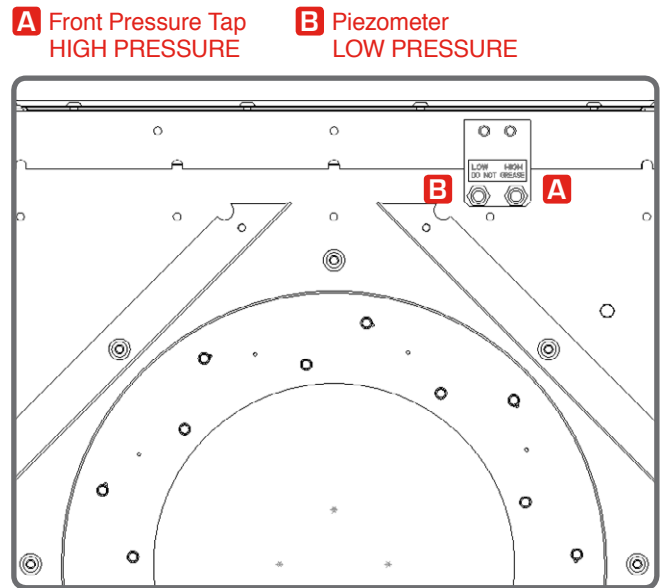
***Note- please contact Lau if fan has multiple tap locations on funnel.**

Several factors affect the accuracy of this method of determining flow. The equations below assume the following:

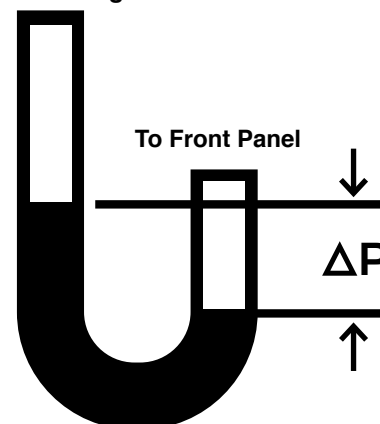
- There are no vanes or other obstructions in or near the inlet
- Flow entering the funnel (no pre-swirl)
- Impeller to inlet funnel overlap
- Accurate determination of air density at the inlet

K Factor

Fan Size	iCorus & Corus DDP	Stack Fan
105	592	592
122	842	842
135	963	963
150	1147	1147
165	1450	1450
182	1671	1671
200	2087	2087
222	2458	2458
245	2941	2941
270	3597	4156
300	4641	4810
330	5352	5748
365	6629	7072
402	7943	8609



To Piezo Ring



Calculation when using the Piezo Meter

For standard air ($\rho = 0.075 \text{ lb/ft}^3$):

$$(\text{CFM}) = K \text{ Factor} * \sqrt{(\text{delta pressure})}$$

- K Factor = value from chart
- Delta Pressure (ΔP) = The differential in static pressure from the piezometer and the front pressure tap (inches w.g.)



STACK FAN

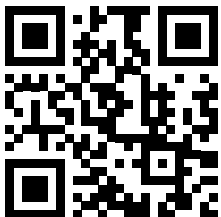
PART# 0601700001_rev_A

INSTALLATION, OPERATION & MAINTENANCE MANUAL



For more information visit LauFan.com. Call 937-476-6500

 Follow Lau @LauOEM



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

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

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

Measurement of Airflow

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

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

Non-Standard Density Method

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

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

where: A = Actual inlet funnel throat area (square feet) - from tables on pages 2 and 3

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

ρ = Air density (pounds mass/cubic foot)

C1 = Value from Table 1 below

Standard Density Method

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

For standard air ($\rho = 0.075 \text{ lb/ft}^3$):

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

where: F = factor from tables on pages 2 and 3

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

Table 1: C1 Values

Product	C1	C1*
	Free Inlet	Ducted Inlet
EPFN/EPQN (Arr. 1 or 4), Sizes 122-165 EPLFN/EPLQN, Sizes 122-165	753.06	794.06
EPFN/EPQN (Arr. 1 or 4), Sizes 182-982 EPLFN/EPLQN, Sizes 182-982 MPLFN/MPLQN,MPLFS/MPLQS	692.03	740.14
EPF/EPQ (Arr. 3), Sizes 122-165	726.39	765.94
EPF/EPQ (Arr. 3), Sizes 182-982	667.52	713.93
MPQN, Sizes 122-165	753.06	794.06
MPQN, Sizes 182-490	692.03	740.14
APF/APQ	753.06	794.06
BC/BCS/BAF SWSI	735.42	786.56
BC/BCS/BAF DWDI	1470.84	1573.12
TSL/TFE	735.42	753.56
QSL/QFE/QIFE/TVIFE	696.00	735.83
BAE-SW **	720.40	735.80
BAE-DW**	1440.80	1471.60
RB (Std. Inlet Bell)	913.33	997.49
HIB/RTF	727.94	785.07
HAF	790.17	760.92
VBC/VAF	1414.00	NA

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

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

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

Size	EPF/EPQ Free Inlet F	EPFN/EPQN EPL-Series Free Inlet F	EPF/EPQ Ducted Inlet F	EPFN/EPQN EPL-Series Ducted Inlet F	A
122	911.46	944.92	961.07	996.36	0.344
150	1163.68	1206.40	1227.04	1272.08	0.439
165	1464.80	1518.58	1544.56	1601.26	0.552
182	1757.39	1821.92	1879.58	1948.58	0.721
200	2108.38	2185.80	2254.97	2337.76	0.865
222	2617.81	2713.93	2799.81	2902.60	1.074
245	3168.67	3285.02	3388.97	3513.39	1.300
270	3856.03	3997.61	4124.12	4275.53	1.582
300	4770.07	4945.21	5101.71	5289.01	1.957
330	5757.23	5968.62	6157.51	6383.56	2.362
365	7032.01	7290.21	7520.92	7797.03	2.885
402	8555.41	8869.55	9150.23	9486.16	3.510
445	10444.42	10827.92	11170.58	11580.68	4.285
490	12669.80	13135.01	13550.69	14048.16	5.198
542	15541.11	16111.75	16621.62	17231.84	6.376
600	19004.71	19702.52	20326.03	21072.24	7.797
660	22994.79	23839.12	24593.53	25496.41	9.434
730	28128.04	29160.84	30083.67	31188.11	11.54

Table 3: BC/BCS/BAF

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

Table 4: APF/APQ

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

Table 5: QSL/QFE/QIFE/TVIFE

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

Table 6: TSL/TFE

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

Table 7: BAE-SW/BAE-DW

Size	SWSI Free Inlet F	DWDI Free Inlet F	SWSI Ducted Inlet F	DWDI Ducted Inlet F	A
182	1896.61	3793.22	1937.16	3874.31	0.721
200	2275.41	4550.82	2324.05	4648.10	0.865
222	2825.19	5650.38	2885.58	5771.16	1.074
245	3419.69	6839.38	3492.79	6985.58	1.300
270	4161.50	8322.99	4250.46	8500.91	1.582
300	5147.95	10295.89	5257.99	10515.99	1.957
330	6213.31	12426.62	6346.13	12692.26	2.362
365	7589.08	15178.15	7751.31	15502.62	2.885
402	9233.16	18466.31	9430.53	18861.07	3.510
445	11271.82	22543.63	11512.77	23025.55	4.285
490	13673.49	27346.98	13965.79	27931.57	5.198
542	16772.25	33544.50	17130.79	34261.59	6.376
600	20510.23	41020.47	20948.68	41897.36	7.797
660	24816.41	49632.82	25346.91	50693.82	9.434
730	30356.30	60712.61	31005.23	62010.46	11.540
807	37116.76	74233.52	37910.21	75820.42	14.110
890	45139.88	90279.75	46104.83	92209.66	17.160
982	55056.97	110113.94	56233.92	112467.85	20.930

(Sizes smaller than 182 use
Table 3: BC\BCS\BAF)

Table 8: MPQN

Size	Free Inlet F	Ducted Inlet F	A
122	944.92	996.36	0.344
150	1206.40	1272.08	0.439
165	1518.58	1601.26	0.552
182	1821.92	1948.58	0.721
200	2185.80	2337.76	0.865
222	2713.93	2902.60	1.074
245	3285.02	3513.39	1.300
270	3997.61	4275.53	1.582
300	4945.21	5289.01	1.957
330	5968.62	6383.56	2.362
365	7290.21	7797.03	2.885
402	8869.55	9486.16	3.510
445	10827.92	11580.68	4.285
490	13135.01	14048.16	5.198

Table 11: HAF

Size	Free Inlet F	Ducted Inlet F	A
220	3097.65	2982.99	1.074
240	3751.56	3612.69	1.300
270	4564.01	4395.06	1.582
300	5645.17	5436.20	1.957
330	6814.93	6562.66	2.362
360	8324.78	8016.62	2.885
400	10136.79	9761.55	3.513
450	12364.13	11906.44	4.285
490	15006.24	14450.75	5.201
540	18395.67	17714.71	6.376
600	22497.31	21664.52	7.797
660	27220.44	26212.81	9.434
730	33299.14	32066.49	11.541

Note: Pressure tap locations for the HAF do not follow TCF&B convention. Consult factory for locations.

Table 9: HIB/RTF

Size	Free Inlet F	Ducted Inlet F	A
180	1917.29	2067.76	0.721
200	2297.97	2478.32	0.865
220	2853.70	3077.66	1.074
240	3456.11	3727.35	1.300
270	4204.57	4534.55	1.582
300	5200.59	5608.74	1.957
330	6278.22	6770.95	2.362
360	7669.16	8271.05	2.885
400	9338.47	10071.37	3.513
450	11390.39	12284.33	4.285
490	13824.42	14909.38	5.201
540	16946.91	18276.93	6.376
600	20725.53	22352.11	7.797
660	25076.69	27044.75	9.434
730	30676.66	33084.21	11.541
800	37530.69	40476.16	14.120

Table 12: VBC/VAF

Size	Free Inlet F	Ducted Inlet F	A
8	885.69	-	0.168
9	1112.13	-	0.211
10	1411.51	-	0.268
11	1853.97	-	0.352
12	2377.21	-	0.451
14	2988.43	-	0.567
16	3772.50	-	0.716
18	4647.81	-	0.882
20	5935.11	-	1.126
22	7525.35	-	1.428
25	9344.89	-	1.773
28	11907.60	-	2.260
32	15141.89	-	2.873
36	19112.86	-	3.627
40	23675.45	-	4.493

Table 10: Industrial

Size	Free Inlet F	Ducted Inlet F	A
905	410.40	448.22	0.123
907	828.77	905.13	0.249
909	1392.65	1520.97	0.418
911	2102.04	2295.74	0.630
913	2956.96	3229.43	0.887
915	3957.39	4322.05	1.187
917	5103.34	5573.59	1.530
919	6394.80	6984.06	1.917
921	7831.78	8553.45	2.348
923	9311.11	10169.10	2.792
926	11944.07	13044.67	3.581
929	14904.43	16277.82	4.469
933	19360.90	21144.93	5.805
937	24399.43	26647.75	7.316
941	30020.04	32786.27	9.001
945	36222.71	39560.50	10.861
949	43007.45	46970.43	12.896
954	51820.34	56595.39	15.538
960	64125.64	70034.58	19.228

Table 13: MPLFN/MPLFS/MPLQN/MPLQS

Size	Free Inlet F	Ducted Inlet F	A
122	793.96	849.16	0.3142
150	1189.43	1272.12	0.4707
165	1439.60	1539.68	0.5697
182	1821.92	1948.58	0.721
200	2185.80	2337.76	0.865
222	2713.93	2902.60	1.074
245	3285.02	3513.39	1.300
270	3997.61	4275.53	1.582
300	4945.21	5289.01	1.957
330	5968.62	6383.56	2.362
365	7290.21	7797.03	2.885

Transducer Sizing for Piezometer Ring

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

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

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

Example:

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

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

CD50 LOW LEAKAGE CONTROL DAMPER

High Performance Extruded Aluminum Airfoil
Class 1A Leakage Rated

APPLICATION

The CD50 is a low leak, extruded aluminum damper designed with airfoil blades for higher velocity and pressure HVAC systems. It meets the leakage requirements of the International Energy Conservation Code by leaking less than 3 cfm/sq. ft. at 1" of static pressure and is AMCA licensed as a Class 1A damper.

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.

SEALS

Ruskiprene blade edge seals and flexible metal compressible jamb seals.

BEARINGS

Molded synthetic.

LINKAGE

Concealed in frame.

AXLES

1/2" (13) plated steel hex.

MAXIMUM SIZE

Single section – 60"w x 72"h (1524 x 1829).
Multiple section assembly – Unlimited size.

MINIMUM SIZE

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

TEMPERATURE LIMITS

-72°F (-58°C) and +275°F (+135°C).

FEATURES

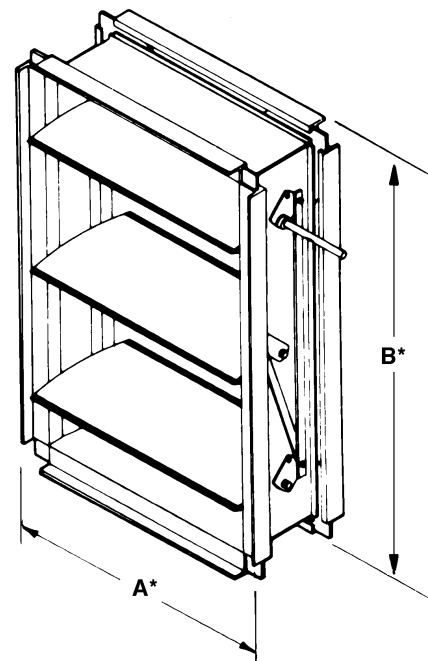
- Airfoil blade design for low pressure drop and less noise generation.
- Positive lock axles, noncorrosive bearings and shake proof linkage for low maintenance operation.
- Blade edge seals mechanically lock into the blade for superior sealing.

OPTIONS

- Factory-installed, pneumatic and electric actuators.
- Enamel and epoxy finishes.
- SP100 Switch Package to remotely indicate damper blade position.
- 16 gage galvanized steel hat channel frame.
- Front, rear or double flange frame with or without bolt holes.
- Face and bypass configurations.

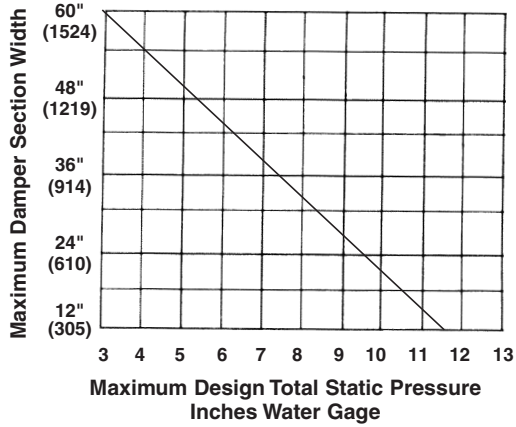
NOTE: Dimensions shown in parenthesis () indicate millimeters.

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



CD50 AMCA LICENSED PERFORMANCE DATA

CD50 PRESSURE LIMITATIONS



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

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



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

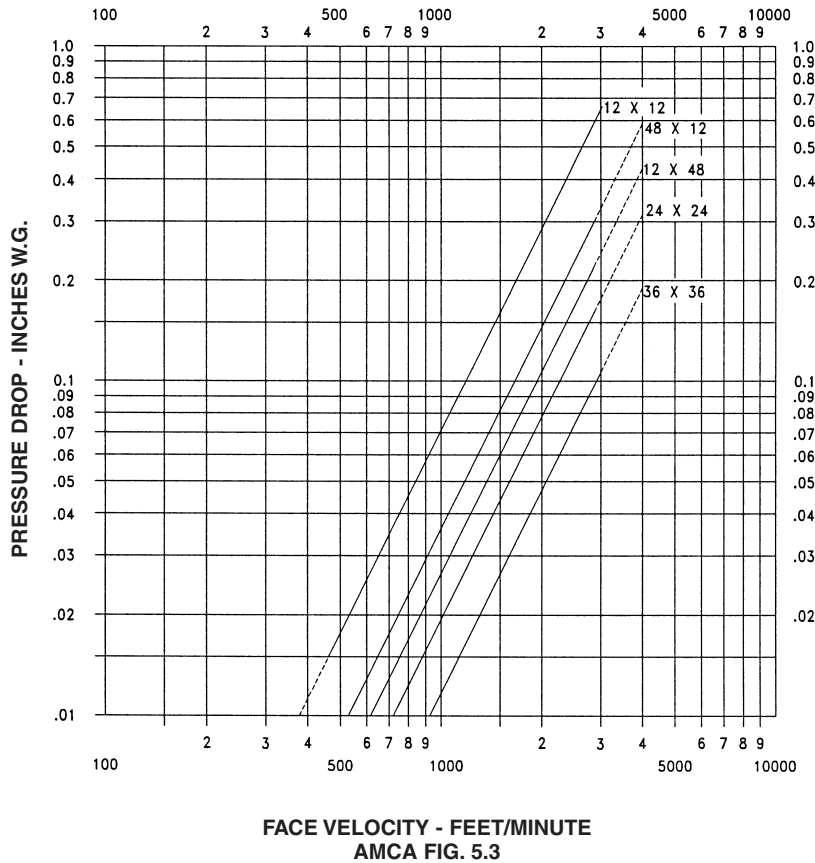
Pressure/Class	Leakage, L/s/m ² (ft ³ /min/ft ²)			
	Required Rating		Extended Ranges (Opt.)	
	1" (0.25 kPa)	4" (1.0 kPa)	8" (2.0 kPa)	12" (3.0 kPa)
1A	3 (15.2)	N/A	N/A	N/A
1	4 (20.3)	8 (40.6)	11 (55.9)	14 (71.1)
2	10 (50.8)	20 (102)	28 (142)	35 (178)
3	40 (203)	80 (406)	112 (569)	140 (711)

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

Leakage testing conducted in accordance with AMCA Standard 500-D-98. Torque applied holding damper closed, 5 in. lbs./sq. ft. on opposed blade dampers and 7 in. lbs./sq. ft. on parallel blade

dampers. Air leakage is based on operation between 50°F to 104°F. All data corrected to represent standard air density 0.075 lbs/ft³.

VELOCITY VS. PRESSURE DROP



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

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

SOUND RATINGS

CD50 SOUND RATINGS

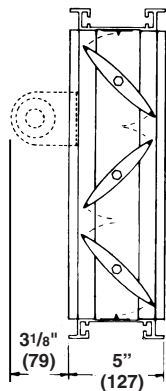
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12 (305 x 305)	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18 (457 x 457)	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125	*
	6750	43	5063	37	3375	40	1688	15
24 x 24 (610 x 610)	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.

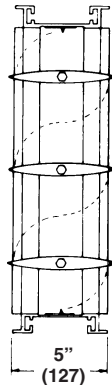
* = Less than 10 NC

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

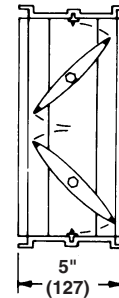
DIMENSIONAL INFORMATION



**OPPOSED
BLADE**



**PARALLEL
BLADE**



LOW PROFILE
Standard construction
for higher free area on
dampers 12" (305) high
and less.

CD50 SUGGESTED SPECIFICATION

Furnish and install, at locations shown on plans, or in accordance with schedules, Low leakage dampers shall meet the following minimum construction standards: Frames shall be 5" x 1" x .125" (minimum thickness) (127 x 25 x 3.2) 6063T5 extruded aluminum hat channel with hat mounting flanges on both sides of the frame. Each corner shall be reinforced with two die formed internal braces and machine staked for maximum rigidity. Blades shall be airfoil type extruded aluminum (maximum 6" [152] depth) with integral structural reinforcing tube running full length of each blade.

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

in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade seals are not acceptable. Bearings shall be non-corrosive molded synthetic. Axles shall be hexagonal (round not acceptable) to provide positive locking connection to blades and linkage. Linkage shall be concealed in frame. Submittal must include leakage, maximum air flow and maximum pressure ratings based on AMCA Publication 500. Damper shall be tested and licensed in accordance with AMCA 511 for Air Performance and Air Leakage. Damper widths from 12" to 60" (305 to 1524) wide shall not leak any greater than 8 cfm sq. ft. @ 4" w.g. and a maximum of 3 CFM sq. ft. @ 1" w.g. Dampers shall be in all respects equivalent to Ruskin Model CD50.

RUSKIN[®]

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

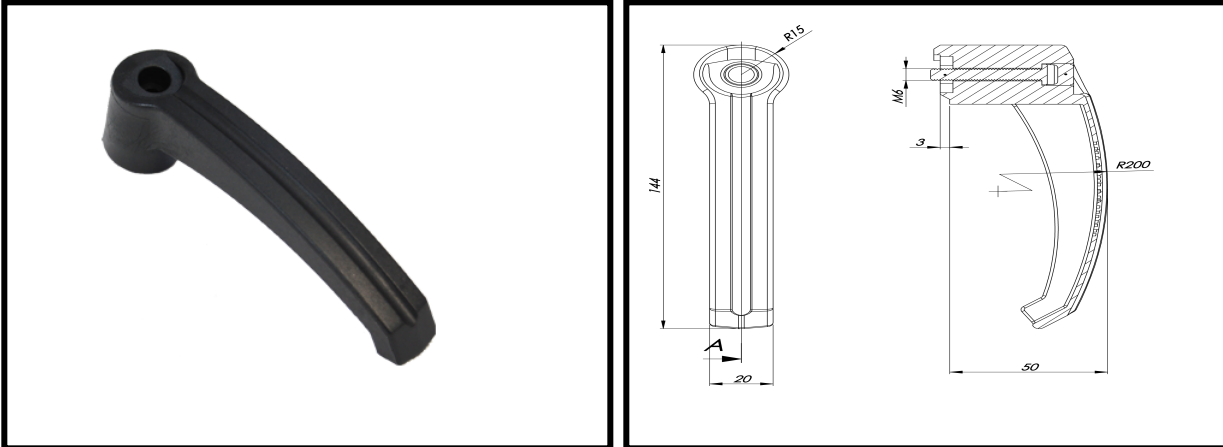
Allegis Product Detail

1-866-378-7550

Allegis Part Number: 265076-00P

Description: NON-LOCKING VENTILATION L-HANDLE

Print



- Designed for the HVAC industry
- Can be used as part of a complete latching system (KlimaFlex)
- Nylon 6 construction
- Supplied with screw and plastic cover plug
- Black finish
- **Individually Packaged**



OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A



ADVANCED DIRECT DRIVE PLENUM FANS





NO APPLICATION IS TOO BIG OR TOO SMALL.

For over 80 years, Lau has earned a reputation for delivering innovative, high-efficiency air-moving products that exceed customer, aftermarket and OEM HVAC industry requirements.

www.LauFan.com

937 476 6500

Lau

4509 Springfield Street

Dayton, Ohio 45431

SINGULAR. MODULAR. COMPACT.

STACK FAN

A Stack Fan is a direct drive plenum fan with the flexibility to be used singularly or in parallel so you can construct a multiple fan system to meet the exact performance criteria for your application.

APPLICATIONS

Systems

- High performance VAV systems
- Air Handlers
- Rooftop units
- General supply and return exhaust
- Telecom data centers
- Clean rooms

Commercial Facilities

- Hospitals & healthcare facilities
- Universities & schools
- Commercial facilities

THE STACK FAN ADVANTAGE

Fan redundancy, ensuring the system continues to perform, even with a fan in the array shut off.

Stackable, individual units allow flexibility to meet any design criteria.

Direct drive premium NEMA motor eliminates bearings, belts, and pulleys, reducing maintenance costs significantly.

Motor base optimization eliminates wasteful, costly materials not necessary.

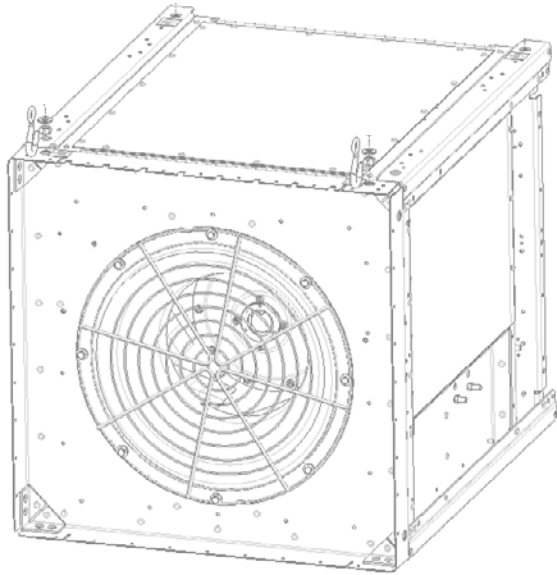
Eliminates all resonance conditions.

Lau's proprietary balance process improves on currently accepted AMCA specifications by considering the effects of the rotating mass's on the unit as well as the whole, not just the wheel.

Size offerings available for replacement through a standard door opening.

Sound panels enclose the fan and motor to reduce attenuation levels.

STACK FAN FEATURES



ROBOTICALLY WELDED ALUMINUM AIRFOIL WHEEL

Wheels available in 9-blade, 12-blade configurations. Available in wheel widths of 80%, 100% & 120%



GALVANIZED STEEL FRAME AND BASE

Assembled with high strength fasteners



INDUSTRY BEST VIBRATION PERFORMANCE

Assembly balanced to G6.3



EASY TO INSTALL

Integrated lifting points



LOW MAINTENANCE

Less time, lower costs. No belts, bearings or sheaves & fewer filter replacements.



RELIABILITY PERFORMANCE

Fans designed to perform consistently throughout the entire speed range—no resonant conditions in the operating range.



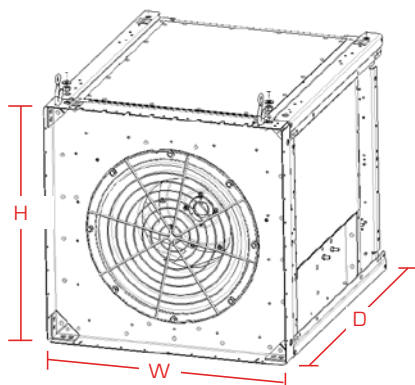
SIMPLE, STACKABLE APPLICATION

Simplified application of multiple fans. Multi-fan arrangements reduce airway length and create uniform coil coverage.

MORE STACK FAN FEATURES

- Available sizes: 10" through 25"
- 9 or 12 blade, aluminum airfoil wheel
- AMCA rated
- G90 mechanically fastened frame
- Performance: up to 10 in-wg and 76% efficiency

STACK FAN SPECIFICATIONS



STACK FAN DIMENSIONAL DATA					
WHEEL SIZE	HOUSING DIMENSIONS			MAX STACKED CUBES**	MAX MOTOR FRAME SIZE
	WIDTH (W)	HEIGHT (H)	DEPTH (D)*		
10	20.03	18.79	24.56	4	184T
12	22.66	20.89	25.81	4	184T
13	24.53	22.4	28.06	4	213T
15	26.78	24.2	30.63	3	215T
16	29.03	25.75	35.31	3	254T
18	30.41	30.00	36.77	3	256T
20	33.75	34.00	37.85	3	284T
22	37.41	37.10	39.19	2	284T
25	41.43	41.00	40.57	2	284T

*Cabinet dimension only. Overall length including motor will vary based on motor type, size, and manufacturer.

**Recommended max stacked cubes based on max hp. Higher stacks are possible with smaller hp – contact Lau engineering

STACK FAN OPTIONS

PIEZOMETER

A system for measuring pressure consisting of a pressure taps installed on the inlet cone

SHAFT GROUNDING KIT

Diverts stray voltage spikes to ground, extending motor bearing life

SPECIAL MOTORS

Lau can install most NEMA rated motors.

INLET DAMPER

Controls the air-flow to each fan or array

INLET SCREEN

A safety feature for the intake of the fan

CLOTH WRAP

Recommended for the clean-room applications to help reduce in-stream particles

OUTLET GUARD

A safety feature for the outlet area insuring no hand penetration into moving parts



SMART. RESPONSIBLE. EFFECTIVE.

STACK FAN

Stack Fan arrays offer maximum performance, reliability and efficiency. The advantages of a proven design multiplied to achieve synergy and security.

SMALLER CABINET FOOTPRINT

Stackable, individual units that allow flexibility to meet any design criteria. The Stack Fan unit design is compact and configurable.

REDUCED ECOLOGICAL FOOTPRINT

Lau's experienced design engineers and technicians utilize state of the art engineering and laboratory facilities to provide solutions to help meet the needs of the present without compromising the ability of future generations to meet their own needs.

In addition, Lau products are produced in multiple factory locations which ensures optimized logistics and freight cost savings.

REDUNDANCY / RELIABLE

Stack Fan's redundancy ensures that the system continues performing, even with a fan in the array shut off

REDUCE MAINTENANCE COSTS

The Stack Fan direct drive plenum NEMA motor eliminates bearings, belts and pulleys, thus reducing maintenance costs significantly. Also, motor base optimization eliminates wasteful and costly materials not necessary.

INDUSTRY LEADING MANUFACTURING

MOVING AIR FOR OVER 80 YEARS

Lau leads the industry as the largest manufacturer of air-moving components and fan systems in North America for the heating, ventilation, air conditioning (HVAC) and refrigeration industries.

PRECISION

Each wheel is robotically welded to ensure the best quality and consistency.

CUTTING EDGE TECHNOLOGY

Our manufacturing facilities are equipped with the latest fabrication equipment.

A BALANCED APPROACH

Lau uses state of the art balancing systems which allow us to offer precision balancing grades.

PROVEN RESULTS

Lau manufacturing is a foundation of our production philosophies resulting in measurable efficiency in every product.

CERTIFIED PERFORMANCE

Lau is certified under the ISO9001/2008 standard of performance and we pride ourselves on continuous measurable improvements and accountability.

EFFICIENT SOLUTIONS

Fans are produced in multiple factory locations which ensures optimized logistics and freight cost savings.




OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A

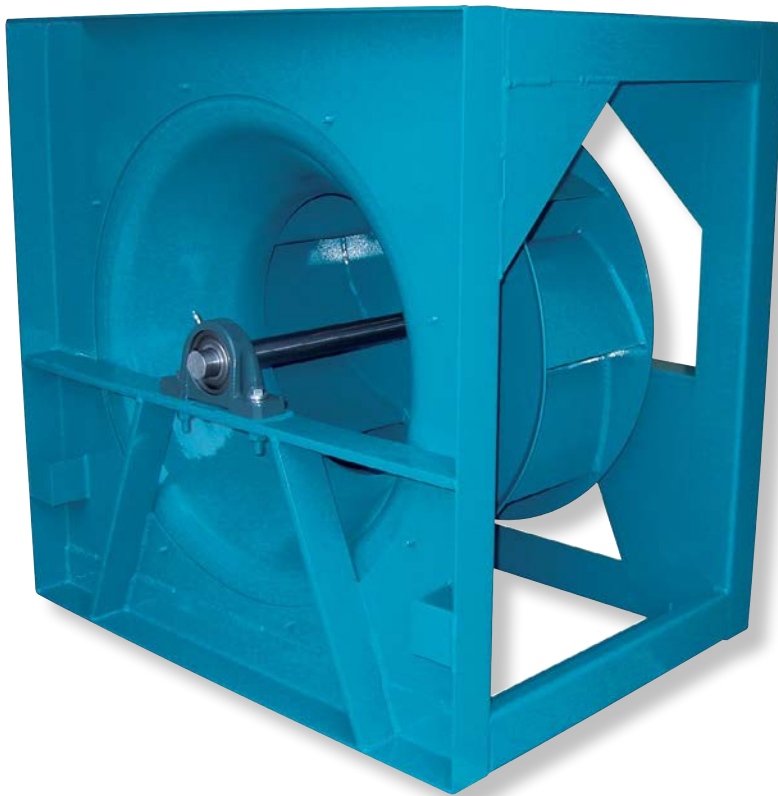
For more information visit LauFan.com.
Call 937-476-6500

 Follow Lau @LauOEM

Fans & Blowers

Twin City

Air Moving Solutions.



E-SERIES PLENUM FANS

EPF | EPFN | EPQ | EPQN

PlenumFans

E-Series

EPF | EPFN | EPQ | EPQN

Twin City Fan & Blower, the world's largest supplier of plenum fans, now offers the completely redesigned E-Series, the first plenum fan to be AMCA licensed for sound and air in both an Arrangement 1 and 3 configuration.

The E-Series offers the flexibility of two plenum fan designs, with each model offering its own unique performance characteristics. While every E-Series fan is highly efficient and quiet, you can choose an E-Series design option that optimizes the performance requirements most important to your application.

Benefits of a Plenum Fan

Saves Space – There are no housings, transitions, or diffusers within the air handling unit.

Efficiency – Plenum fans can be as efficient or more efficient than scroll type fans at specific operating points towards the bottom of the fan curve.

Lower cost – Plenum fans are less expensive than scroll type fans.

Compact Designs with Performance Assurance

Space is often a key consideration in the selection of plenum fans, making the compact Arrangement 3 configuration very popular.

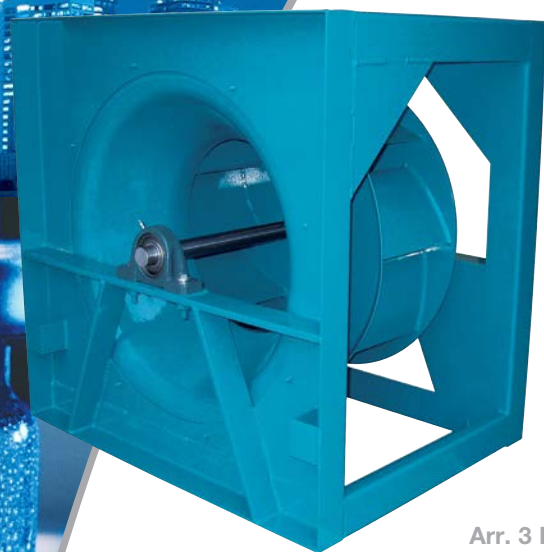
The Arrangement 3 configuration is constructed with a bearing and bearing bar in the inlet, which will affect fan performance. These performance affects should be taken into account to ensure that your system functions as designed.

Plenum fans are unhusd fans designed to operate inside of field-fabricated or factory-built air handling units.

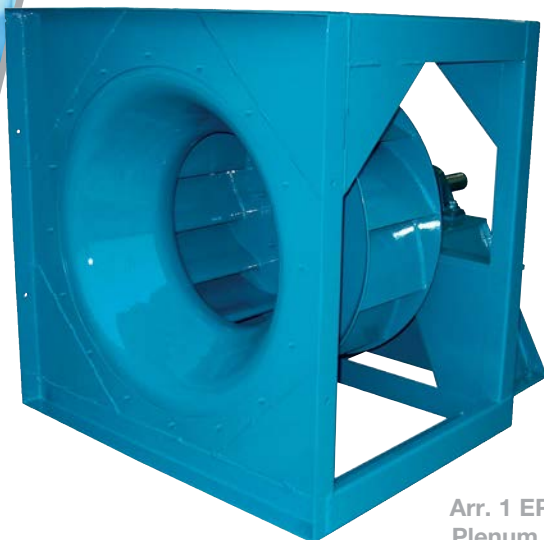
Application

The fan wheel pressurizes the entire surrounding air plenum in which the fan is installed, allowing air ducts from any direction to be directly connected to the air handling unit enclosure. This design generally saves space by eliminating the fan housing, transitions, and diffusers within the air handling unit.

Plenum fans have found a ready acceptance in the air conditioning industry. In addition, the construction versatility, adaptability in the direction of the discharges, suitability for internal isolation and application of sound panels, and generally lower cost makes it a very popular fan arrangement.



Arr. 3 EPF
Plenum Fan



Arr. 1 EPQN
Plenum Fan



Twin City Fan & Blower certifies that the Model EPF, EPFN, EPQ & EPQN Plenum Fans shown herein are 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.

Refer to Catalog 475 for sound power levels.

9-Bladed Wheels

EPF (Arr. 3)

The model EPF features a highly efficient and cost effective, nine-bladed airfoil wheel design. The high efficiency of the EPF will often allow the use of smaller fans without increasing power requirements. The EPF is an Arrangement 3 design.

EPFN (Arr. 1 and 4)

The model EPFN features the same highly efficient, nine-bladed airfoil wheel design as the EPF, but is available in Arrangement 1 or 4 designs without inlet obstructions.

Sizes

12.4" to 73.0" wheel diameters

Performance

Airflow from 1,000 to 170,000 CFM
Static pressure to 10" w.g.

Drive Configurations

Available in both direct and belt drive configurations.

Construction

Class I, II, & III



EPF/EPFN
9-Bladed Wheel

12-Bladed Wheels

EPQ (Arr. 3)

The Better Sound Quality model EPQ features a twelve-bladed airfoil wheel design that flattens the sound spectrum and reduces the dominance of pure tones. The EPQ is an Arrangement 3 design.

EPQN (Arr. 1 and 4)

The model EPQN features the same Better Sound Quality, twelve-bladed airfoil wheel design as the EPQ, but is available in Arrangement 1 or 4 without inlet obstructions.

Sizes

12.4" to 73.0" wheel diameters

Performance

Airflow from 1,000 to 170,000 CFM
Static pressure to 12" w.g.

Drive Configurations

Available in both direct and belt drive configurations.

Construction

Class I, II, & III



EPQ/EPQN
12-Bladed Wheel

Fans & Blowers
Twin City

©2012 Twin City Fan Companies, Ltd. All rights reserved throughout the world. Catalog illustrations cover the general appearance of Twin City Fan & Blower products at the time of publication and we reserve the right to make changes in design and construction at any time without notice.

EPQ/EPQN Advantage

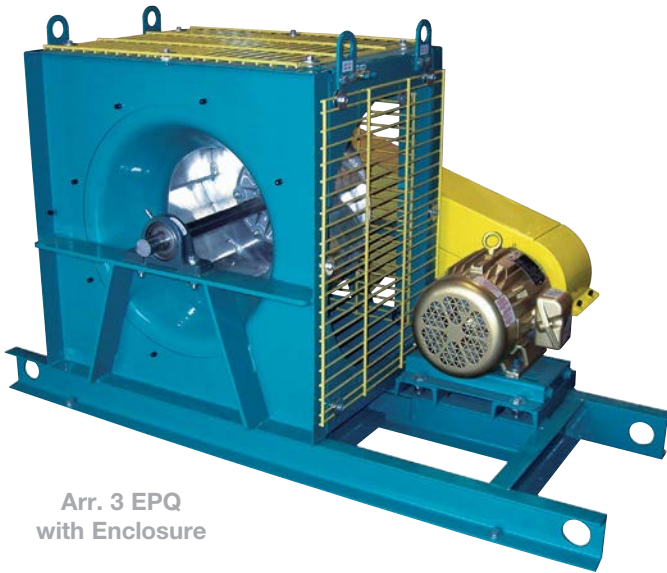
The EPQ/EPQN plenum fans offers unique performance features that are beneficial for many sound sensitive and higher pressure applications.

The EPQ/EPQN features a twelve-bladed airfoil wheel versus the nine-bladed wheel of our type EPF/EPFN plenum fans or eight- to ten-bladed wheels with most other competition. The "Q" in the EPQ/EPQN designation stands for Better Noise Quality. Noise quality is a subjective description for noise that is less objectionable.

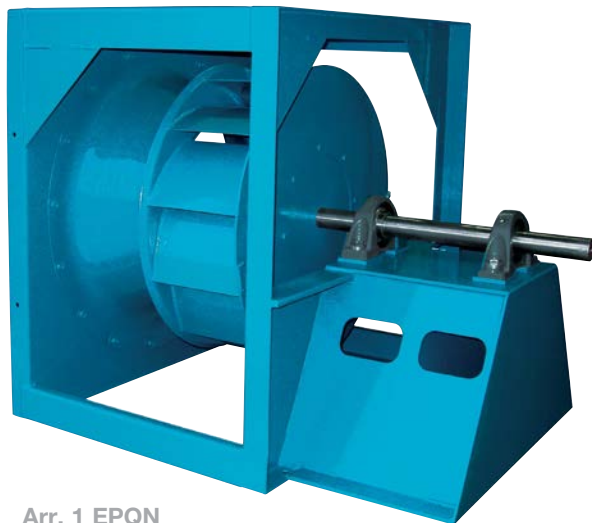
Looking at the sound comparison, you will notice that the type EPQ/EPQN offers noise (SPL) that is more equally distributed across all frequencies. This can be more pleasant to hear than the sound characteristics of a nine-bladed design. Fans are often dominated in noise by the noise occurring at the blade pass frequency. (Blade pass frequency = RPM x Number of blades/60.) Noise quality is improved by reducing the difference in amplitude between the blade pass amplitudes and the neighboring frequency amplitudes. The increased higher frequency sound power levels on the twelve-bladed wheels mask the blade pass frequency offering a better sounding fan. Although the overall A-weighted sound power levels of the nine-bladed EPF/EPFN fans are slightly lower, the sound "quality" of the twelve-bladed EPQ/EPQN fans may be desirable for the application.

A higher blade pass frequency allows for easier attenuation of the noise, especially when installed inside an air handler cabinet. In many applications, the use of the EPQ/EPQN design will move the blade pass frequency from the second octave band to the third octave band. Acoustic silencers will normally perform about 10 dB better in the third band.

In addition to sound considerations, there are also additional benefits to using the EPQ/EPQN at higher pressures. Selections over 8" wg static pressure are often near the peak pressure of the fan. The additional blades give a higher peak pressure and also add stability to the fan. Twelve smaller passages through the fan wheel are more resistant to flow disturbances on the inlet than nine larger passages. The EPQ/EPQN is thus more resistant to system effects when operating at high pressures and the higher inlet velocities that accompany these selections.



Arr. 3 EPQ with Enclosure



Arr. 1 EPQN Plenum Fan

TYPE	CFM	SP	RPM	BHP	FREQUENCY, HZ								LwA
					63	125	250	500	1000	2000	4000	8000	
EPQN – 12 Blades	20,000	3	977	13.42	86	89	90	83	81	77	69	64	87
EPFN – 9 Blades	20,000	3	967	12.92	89	94	87	79	80	74	67	63	85

NOTE: Circled figures indicate blade pass frequency.

Wheels

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

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

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

Inlet Cones

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

Structural Frame

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

Shafts

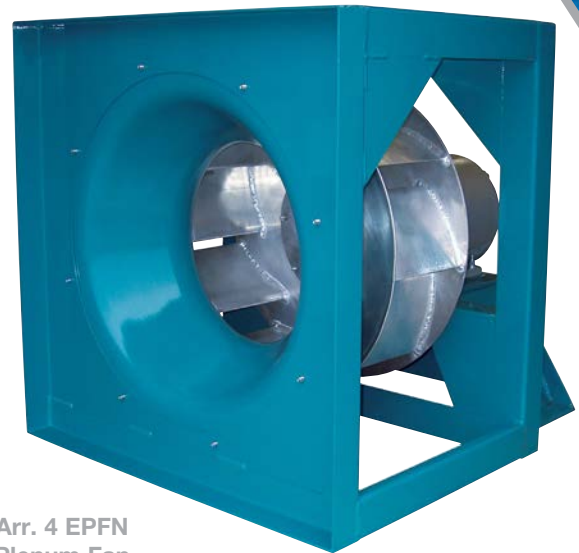
Shafts are AISI Grade 1040 or 1045 hot-rolled steel accurately turned, ground, polished, and ring-gauged for verification. Shafts are generously sized for a first critical speed of at least 1.43 times the maximum speed for the class.

Fan Bearings

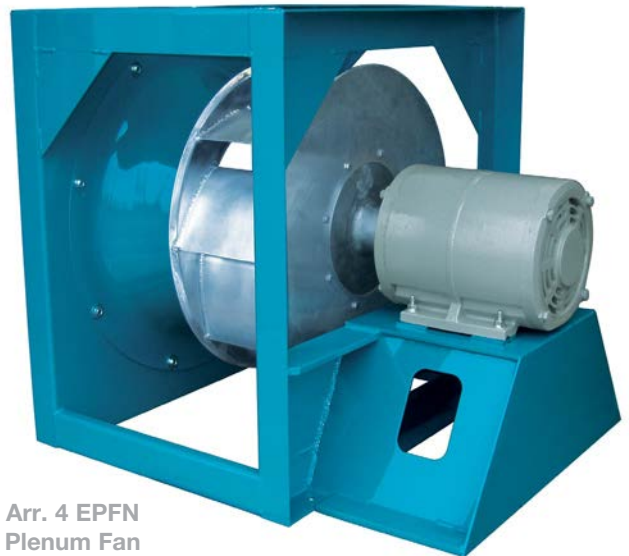
Bearings are heavy duty, grease lubricated, spherical roller or adapter mounted anti-friction ball, self-aligning, pillow block type, selected for minimum average bearing life (AFBMA L-50) in excess of 200,000 hours at the maximum fan RPM. Considering the long life offered with our standard bearing selections, we do not recommend upgrades to split-roller bearings due to their large size, especially on Arrangement 3 fans.

Inlet Collar

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



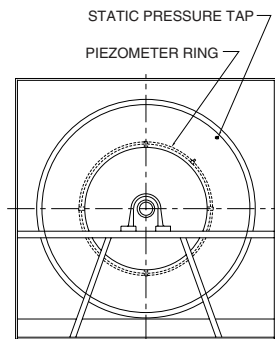
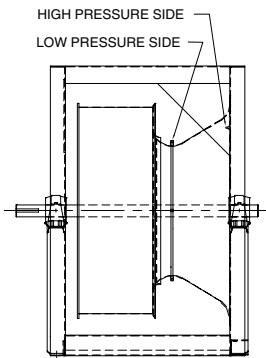
Arr. 4 EPFN
Plenum Fan



Arr. 4 EPFN
Plenum Fan

Flow Measurement System

Piezometer Ring Mounted at Throat of Inlet Cone



Piezometer Ring (Airflow Measuring System)

A piezometer ring is available on plenum fans, as well as other Twin City Fan housed fans, as part of an airflow measuring system, based on the principle of a flow nozzle. The inlet cone of the fan is used as the flow nozzle. The flow can be calculated by measuring the pressure drop through the inlet cone. No tubes or sensors are inserted in the high velocity airstream which could obstruct airflow.

The system consists of a piezometer ring mounted at the throat and a static pressure tap mounted on the face of the inlet cone. A differential pressure transducer and digital display can also be provided.

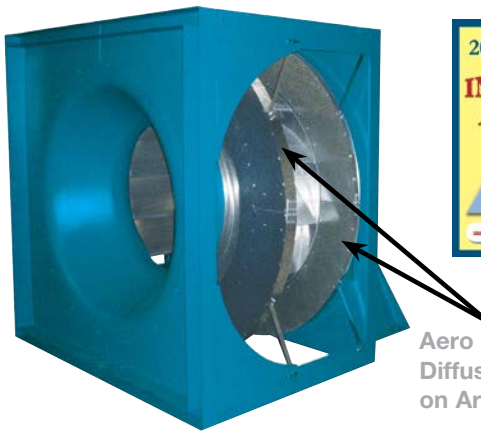
The pressure drop is measured from the tap located on the face of the inlet cone to the piezometer ring in the throat. The inlet tap is connected to the high-pressure side of the transducer and the piezometer ring is connected to the low-pressure side. See diagram on right.

Based on Twin City Fan laboratory tests, the system was determined to be accurate within +/-5%.

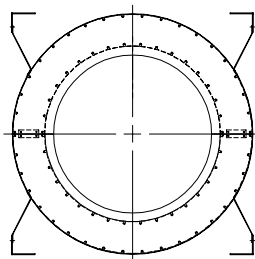
Refer to Twin City Fan Engineering Supplement ES-105.

NOTE: Twin City Fan does not recommend placement of flow measuring probes inside the fan inlet cone in the path of airflow. These devices create disturbances and unpredictable performance losses. Twin City Fan will not be responsible for loss of performance due to such devices.

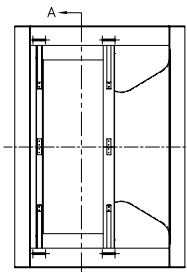
AeroAcousticDiffuser™ (U.S. Patent 8025477)



Aero Acoustic Diffuser™ mounted on Arr. 4 EPQN



SECTION A-A



ASSEMBLY

The new Aero Acoustic Diffuser™ is exclusively available on the Twin City Fan E-Series plenum fans. The patented design allows the plenum fan to discharge sound power reductions by up to 3dBA while increasing aerodynamic static efficiency by up to 4%.

The Aero Acoustic Diffuser™ features a fully galvanized construction that mount at the front and back of the fan wheel. The acoustic attenuating material is inserted within a solid housing and a perforated front-plate that directs airflow across the diffuser reducing fan noise and increasing static efficiency.

Mounting brackets constructed of galvanized steel mount directly to the framework allowing for mounting within the existing fan framework.

The Aero Acoustic Diffuser™ is available on all E-Series plenum fan sizes, both direct drive and belt drive. The diffuser is available on fans direct from the factory or as a retrofit kit to existing fans.

For more information on the Aero Acoustic Diffuser™, refer to www.tcf.com/products/plenum-and-plug-fans/aero-acoustic-diffuser-.

Accessories

Variable Inlet Vanes

Variable inlet vanes provide economical, stable, and efficient air volume control for manual or motorized operation. Blades are supported with fatigue-resistant steel shafts and two needle roller bearings riding on zone-hardened surfaces to minimize wear. Bearings are lubricated for life with high grade moisture resistant grease and protected with lip seals. The vane bearing housings are welded in position and stiffened with a welded support ring. The welded structure eliminates flutter and vibration while utilizing a cantilevered design to minimize insertion loss.

NOTE: Inlet vanes are not recommended on fans smaller than size 200 due to noise and performance loss.

Inlet Collar

The standard, square-panel design provides the means for flex connecting on all arrangements without an inlet collar.

Belt Guard

Provides protection to personnel from the moving drive parts. Both standard and OSHA totally enclosed types are available.

Protective Enclosure

Grill style protective enclosure completely encloses all sides and the back of the fan wheel. Side panels are individually removable to provide access to the wheel.

Inlet Screen

Heavy-gauge barbecue grill style inlet screen that nests in the inlet funnel for personnel protection on non-ducted inlets.



NOTE: On belt driven units, a belt guard should be used for full protection.

Optional Belt Guard & Protective Enclosure



Inlet Screen



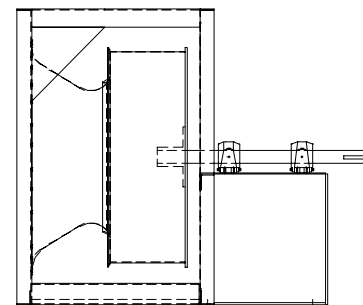
Inlet Collar

Arrangements

Arrangement 1 (EPFN and EPQN)

Arrangement 1 features an overhung wheel design suitable for V-belt drive and requires mounting of motor independent of the fan.

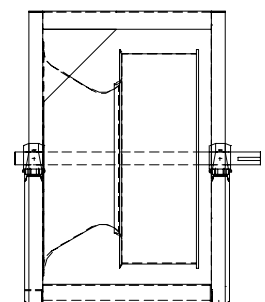
- Class I and II available in sizes 122 to 890. See dimensional drawing on page 33.
- Class III available in sizes 182 to 890. Contact factory for dimensional drawing.



Arrangement 3 (Horizontal - EPF and EPQ)

This is the most common plenum fan arrangement for use in OEM and site-built air handlers. Arrangement 3 is suitable for V-belt drive and requires mounting of the motor independently of the fan. Twin City Fan & Blower offers common unitary bases and isolation bases for the fan and motor as accessories.

- Class I and II available in sizes 122 to 890. Class III available in sizes 182 to 890. See dimensional drawing on page 34.

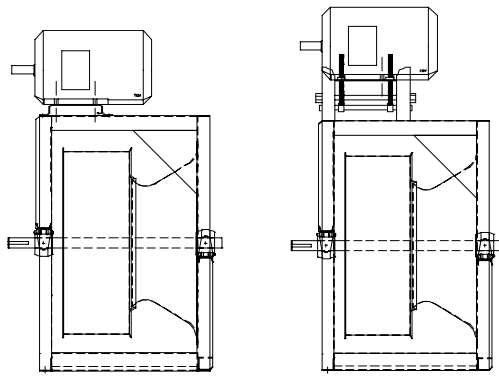


Arrangements

Arrangements 3HS and 3HA (Horizontal with Top Mounted Motor)

Arrangements 3HS and 3HA provide a means for mounting the motor on top of the unit. This design is often desirable when floor space is limited.

Available with two different motor mounting options: slide base type (Arrangement 3HS) and adjustable motor base (Arrangement 3HA). Due to limited belt center range, NEMA "slide base" option is available on sizes 182 and larger only. A heavy duty Twin City Fan & Blower designed "adjustable motor base" is available for all fan sizes.



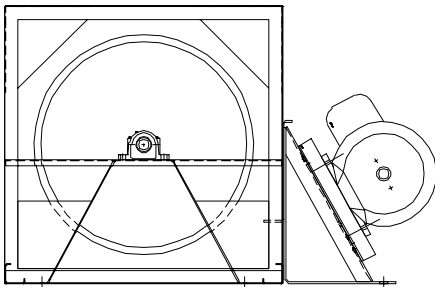
Arr. 3HS

Arr. 3HA

- Models EPF and EPQ.
- Arrangement 3HS is available in Class I and II with motor slide base for sizes 182 to 542. See dimensional drawing on page 36.
- Arrangement 3HA with pivot motor base is available in Class I and II for sizes 122 to 542. See dimensional drawing on page 36.

Arrangement 3SM (Horizontal With Side Mounted Motor)

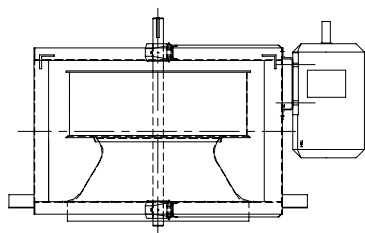
Arrangement 3SM is designed to provide an economical and space-saving means to supply plenum fans with motors mounted to the side of the fan frame. A motor slide base allows for quick and easy belt adjustments.



- Models EPF and EPQ.
- Class I and II available in sizes 165 to 600. Motor limited to maximum frame size shown on drawing. See dimensional drawing on page 35.

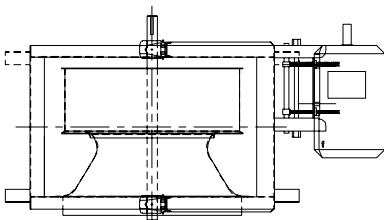
Arrangements 3VS and 3VA (Vertical with Side Mounted Motor)

Vertical Arrangement 3 is available with two different motor mounting options: slide base type (Arrangement 3VS) and adjustable motor base (Arrangement 3VA). Due to limited belt center range, NEMA "slide base" option is available on sizes 182 and larger only. A heavy duty Twin City Fan & Blower designed "adjustable motor base" is available for all fan sizes.



Arr. 3VS

Shown with optional inlet collar



Arr. 3VA

Shown with optional inlet collar

- Models EPF and EPQ.
- Arrangement 3VS is available in Class I and II with motor slide base for sizes 182 to 542. See dimensional drawing on page 37.
- Arrangement 3VA with pivot motor base is available in Class I and II for sizes 122 to 542. See dimensional drawing on page 37.
- Unless specified otherwise, units will be built for vertical up airflow.

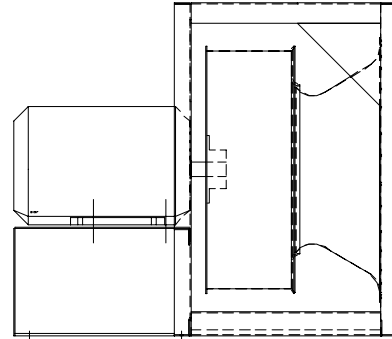
Arrangement 4 (Horizontal)

Direct drive Arrangement 4 mounts the fan wheel directly onto the motor shaft. This arrangement provides a compact fan/motor unit which eliminates belt residue and requires less maintenance than other arrangements.

For these reasons, Arrangement 4 plenum fans are widely used in cleanroom, pharmaceutical, and other critical applications.

Fans can be selected with varying wheel widths to provide desired performance at direct drive motor speeds. Performance changes in the field are usually achieved by means of variable inlet vanes or VFD.

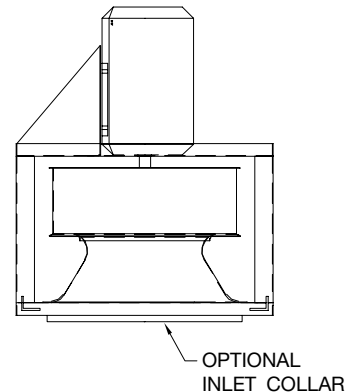
- Models EPFN and EPQN.
- Aluminum wheels using extruded aluminum blades are standard.
- Class I and II available in sizes 122 to 660. See dimensional drawing on pages 38-39.
- Class III available in sizes 182 to 660. See dimensional drawing on pages 40-41.



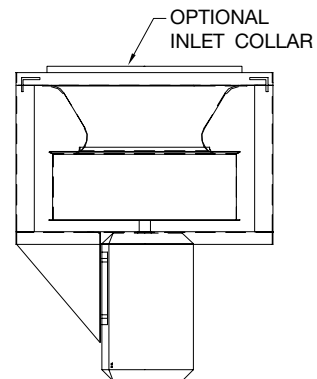
Arrangement 4 (Vertical)

Vertical Arrangement 4 is available for mounting with either vertical up airflow (inlet under the motor) or vertical down airflow (inlet above the motor).

- Models EPFN and EPQN.
- Aluminum wheels using extruded aluminum blades are standard.
- Class I and II available in sizes 182 to 490.
- Inlet flange available.
- See dimensional drawing on page 42.



Vertical Up Airflow

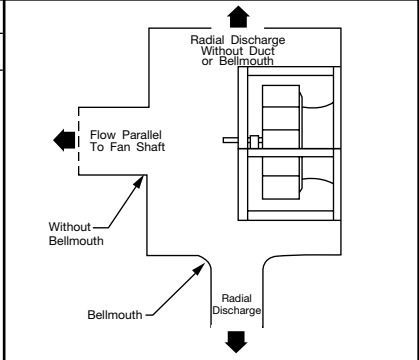


Vertical Down Airflow

Duct Entrance Losses From Plenum Cabinet

To achieve the air velocity in the discharge duct and overcome the loss associated with the air entering the ductwork, additional resistance must be added to the external static pressure (ESP) requirements of the fan. Different types of duct entrances and locations will require varying correction factors. Therefore, prior to selecting a fan, make the following correction, depending upon the type of duct and its location.

ADDITIONAL DUCT ENTRANCE LOSS TO BE ADDED TO FAN ESP	
DISCHARGE TYPE	CORRECTION FACTOR
<ul style="list-style-type: none"> ● Radial and ducted with bellmouth ● Radial and ducted without bellmouth ● Radial without duct or bellmouth ● Flow parallel to shaft and ducted with bellmouth ● Flow parallel to shaft and ducted without bellmouth ● Flow parallel to shaft without duct or bellmouth 	<ul style="list-style-type: none"> 1.1 x Duct Velocity Pressure 1.4 x Duct Velocity Pressure 1.8 x Duct Velocity Pressure 1.6 x Duct Velocity Pressure 1.9 x Duct Velocity Pressure 2.4 x Duct Velocity Pressure



Example: A system requires 30,000 CFM at 5" SP at standard air density with one 4 ft diameter duct with bell-mouth placed in a radial discharge. Determine RPM and brake horsepower:

$$\text{Duct area} = (4^2 \times \rho) \div 4 = 12.57 \text{ ft}^2$$

$$\text{Duct velocity} = 30,000 \div 12.57 = 2387 \text{ FPM}$$

$$\text{Duct velocity pressure} = (2387 \div 4005)^2 = 0.355 \text{ @ std. cond.}$$

$$\begin{aligned} \text{Entrance loss correction factor} &= 1.1 \times \text{duct velocity pressure} \\ &= 1.1 \times 0.355 = 0.39 \end{aligned}$$

$$\text{Thus, select the fan for} = 5" + 0.39" = 5.39" \text{ SP}$$

Fan Selection Recommendations

1. System effect losses (see AMCA 201) and plenum losses should be estimated and added to the required static pressure, prior to making selections. Refer to AMCA Publication 201 at www.amca.org and Twin City Fan Engineering Data Letter "Fan Performance Troubleshooting Guide" (FE-100) at www.tcf.com.
2. Fans should be selected so that the point of operation is approximately between 55% and 90% of the free delivery point on the fan curve.
3. Avoid selections over 4000 RPM. A narrow width, larger size impeller can be used to avoid this.
4. Arrangements 1 and 4 will offer the best efficiency and lowest noise as there are no inlet obstructions.
5. Where space is available, mount the fan and motor on a sub-base. The motor can be mounted on the fan on Arrangements 3HS, 3HA, 3SM, 3VS, and 3VA.
6. Use inertia-type isolation bases or rigid mounting for lowest fan vibration. Rigid mounting requires dynamic analysis (by others) of the support structure to avoid resonance.
7. Applications exceeding 10" SP are prone to high system effect losses. Use of housed fans (BAE-DWDI) should be considered.
8. Where static pressures over 8" wg are required, Model EPQ or EPQN are preferred because of lower operating speeds and improved stability. Select the fan so the design pressure is at least 10% below the peak pressure.
9. Where flow monitoring is required, use a piezometer ring or externally mounted flow measurement station. Fan performance may be substantially

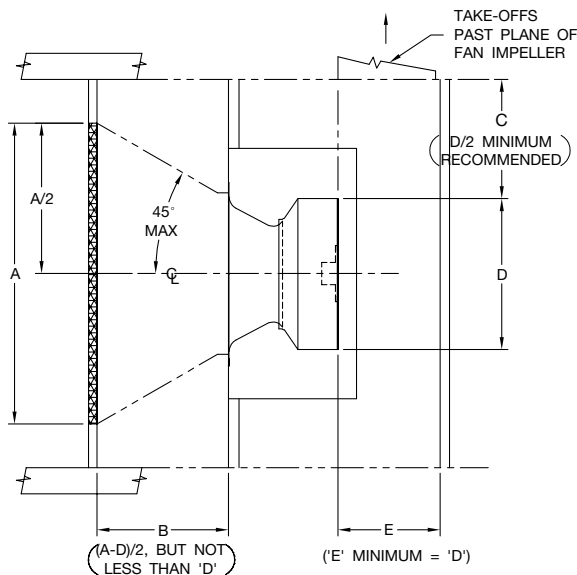
Application Guidelines

- affected by flow measurement probes mounted directly in the fan inlet cone. Refer to page 6.
10. For direct drive fans without speed control (or where speed control cannot exceed 60 Hz), select fans at 3 – 5% below the nominal speed of the motor. This will normally cover the uncertainties associated with the system and air balancer's measurements. Select motors loaded no closer than 90% of the maximum loading of the motor.
11. For multiple fans in a plenum, alternate CW and CCW rotation fans to minimize losses. If fans are not counter-rotating, install walls between each fan to create cells in the outlet plenum.
12. Add losses for duct take-offs per the chart above to pressure requirements of the fan. Bellmouth entries will always reduce losses and are recommended.
13. For highest reliability, specify the required bearing life. For example, the statement "minimum L-10 bearing life = 100,000 hours" allows for the best bearing to be put on the fan without creating other problems. Some specifications state "use split roller bearings." This can cause a number of problems, such as:
 1. On smaller fans, there may not be enough radial load to prevent roller skidding. This is especially a problem for Arrangement 3 fans.
 2. Split roller bearings are not offered in sizes smaller than 1⁷/₁₆" bore. Smaller fans use shafts smaller than this.
 3. The oversized bearing in the inlet will block some air in smaller fans (above the losses that are already included in the EPF/EPQ ratings).

Location and Placement of Fans in Air Handlers

- Center the fan inlets in both the horizontal and vertical planes.
- For inlet clearance, see Figure 1. The flow should converge at an angle not greater than 45° when approaching the opening for the fan inlet. A minimum of one fan wheel diameter clearance is recommended.
- In the fan outlet plenum, a minimum wall clearance of one-half fan wheel diameter to the periphery of the fan wheel is recommended.
- Figure 1 shows that the minimum clearance between the back of the fan wheel and the nearest component downstream (Dim. E) should be one wheel diameter. Small clearances do not allow the flow to equalize behind the fan wheel and the pressure drop of the downstream component is increased.
- When the flow enters the inlet plenum perpendicular to the fan shaft, large system effect losses can occur. See Figure 2 for a recommended flow baffle or a vortex breaker that may help preserve rated fan performance.

Figure 1. Recommended Location of Fan in Plenum



- When two or more fans are installed in a plenum, divide the plenum into imaginary cells of equal area. Center the fan inlets on each cell. See Figure 3.

Installation Recommendations

- Install the fan so the flexible connector on the inlet remains uncollapsed during operation.
- Install thrust restraints (snubbers) to maintain the axial position of the fan when it is generating pressure.
- Peripheral equipment, such as electrical components, inverters, control panels, etc., should be positioned away from the high velocity air entering or leaving the fan.
- Adjust springs on the isolation base so that spring deflection is approximately equal for all isolators.
- Follow safety, installation, start-up, and maintenance instructions supplied with each fan.

Figure 2. Flow Baffle and Vortex Spin Breaker Location

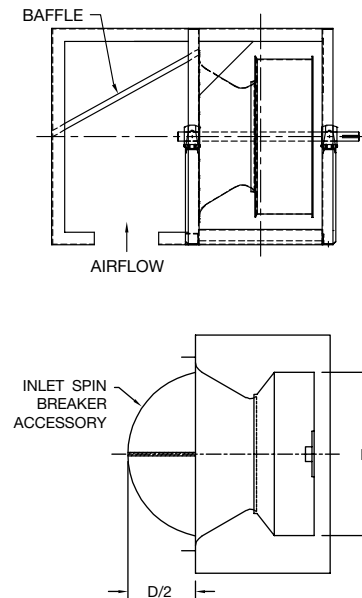
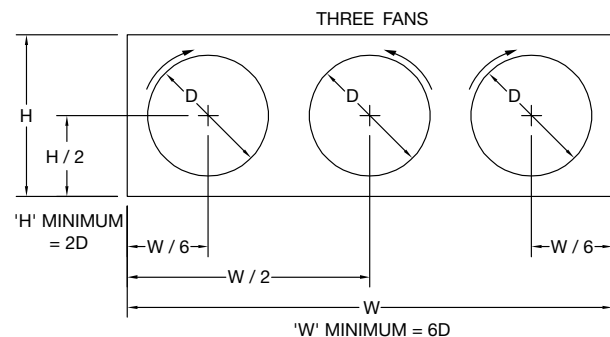
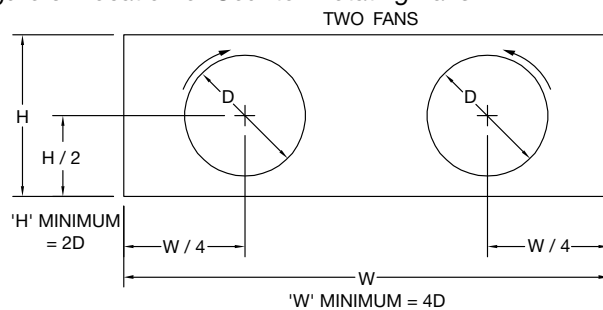


Figure 3. Location of Counter-Rotating Fans



NOTE: 'D' = Wheel diameter

Maximum RPM, Wheel Weights, & WR² – EPF and EPFN

EPF EPFN	WHEEL DIA. (IN.)	CLASS I						CLASS II				CLASS III					
		MAX. RPM (70°F)	ALUMINUM		STEEL		MAX. RPM (70°F)	ALUMINUM		STEEL		MAX. RPM (70°F)	ALUMINUM		STEEL		
		WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)
122	12.40	3388	9	0.9	N/A	N/A	4000	9	0.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
150	13.98	3006	12	1.7	N/A	N/A	3909	12	1.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
165	15.75	2668	15	2.9	N/A	N/A	3468	15	2.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
182	18.25	2302	17	6.1	N/A	N/A	2930	18	6.1	N/A	N/A	3767	21	6.2	N/A	N/A	N/A
200	20.00	2101	21	6.4	N/A	N/A	2674	21	7.4	N/A	N/A	3438	24	9.3	N/A	N/A	N/A
222	22.25	1888	30	12	N/A	N/A	2403	30	12	N/A	N/A	3090	34	15	N/A	N/A	N/A
245	24.50	1715	35	21	N/A	N/A	2183	35	21	N/A	N/A	2806	38	22	N/A	N/A	N/A
270	27.00	1556	40	29	85	84	1981	40	29	97	93	2546	47	32	131	125	125
300	30.00	1401	49	46	103	120	1783	54	51	111	128	2291	58	52	153	178	178
330	33.00	1273	62	70	136	194	1620	67	76	154	215	2083	72	77	206	294	294
365	36.50	1151	73	103	157	273	1465	79	112	179	306	1884	84	114	237	409	409
402	40.25	1044	85	151	180	376	1329	93	165	209	429	1708	98	166	310	647	647
445	44.50	944	126	233	327	880	1202	135	253	351	932	1545	142	256	470	1255	1255
490	49.00	857	164	391	366	1171	1091	164	391	395	1249	1403	174	535	535	1708	1708
542	54.25	775	227	632	513	2048	986	227	632	653	2562	1267	239	673	696	2778	2778
600	60.00	700	255	931	662	3224	891	255	931	750	3542	1146	270	991	801	3838	3838
660	66.00	637	346	1377	953	5621	810	346	1377	1099	6510	1041	371	1478	1016	5910	5910
730	73.00	576	412	2049	1076	7630	733	499	2671	1153	8058	942	550	2985	1318	9290	9290
807	80.75	488	499	3008	1288	7766	637	574	3474	1397	8451	802	N/A	N/A	1617	10610	10610
890	89.00	443	774	5652	1935	14129	578	884	6438	1940	14130	728	N/A	N/A	2353	18160	18160

Maximum RPM, Wheel Weights, & WR² – EPQ and EPQN

EPQ EPQN	WHEEL DIA. (IN.)	CLASS I						CLASS II				CLASS III					
		MAX. RPM (70°F)	ALUMINUM		STEEL		MAX. RPM (70°F)	ALUMINUM		STEEL		MAX. RPM (70°F)	ALUMINUM		STEEL		
		WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)	WT. (LB)	WR ² (LB-FT ²)
122	12.40	3388	10	2.1	N/A	N/A	4000	10	2.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
150	13.98	3006	13	3.3	N/A	N/A	3909	13	3.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
165	15.75	2668	17	5.2	N/A	N/A	3468	17	5.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
182	18.25	2302	20	7.2	N/A	N/A	2930	20	7.2	N/A	N/A	3767	23	7.4	N/A	N/A	N/A
200	20.00	2101	24	10	N/A	N/A	2674	24	8.4	N/A	N/A	3438	27	10	N/A	N/A	N/A
222	22.25	1888	34	14	N/A	N/A	2403	34	14	N/A	N/A	3090	38	17	N/A	N/A	N/A
245	24.50	1715	39	24	N/A	N/A	2183	39	24	N/A	N/A	2806	43	24	N/A	N/A	N/A
270	27.00	1556	46	35	96	94	1981	46	35	107	104	2546	53	38	142	135	135
300	30.00	1401	57	55	116	135	1783	61	59	124	144	2291	65	59	166	193	193
330	33.00	1273	72	81	151	216	1620	77	87	169	237	2083	82	88	222	316	316
365	36.50	1151	85	120	176	307	1465	91	129	199	340	1884	96	130	257	443	443
402	40.25	1044	99	176	203	425	1329	107	190	232	479	1708	112	190	345	721	721
445	44.50	944	141	274	356	955	1202	150	294	379	1007	1545	157	297	512	1367	1367
490	49.00	857	183	451	400	1281	1091	183	451	429	1359	1403	200	481	586	1872	1872
542	54.25	775	250	722	551	2213	986	250	722	716	2808	1267	262	763	759	3024	3024
600	60.00	700	290	1058	740	3573	891	290	1058	824	3891	1146	305	1118	874	4188	4188
660	66.00	637	380	1574	1047	6161	810	380	1574	1110	6450	1041	405	1675	1193	7050	7050
730	73.00	576	454	2342	1191	8438	733	541	2964	1267	8865	942	592	3278	1433	10097	10097
807	80.45	488	546	3415	1413	8837	637	645	4038	1521	9522	802	N/A	N/A	1784	12071	12071
890	89.00	443	844	6395	2120	16062	578	989	7476	2125	16063	728	N/A	N/A	2556	20320	20320

*Consult factory for fans over 4000 RPM.

Contact factory for belt driven fans above 150 HP.

Bare Fan Weights

SIZE	WHEEL DIA. (IN.)	ARR. 1 (EPQN)			ARR. 3 (EPQ)			ARR. 4 (EPQN)		
		CL I	CL II	CL III	CL I	CL II	CL III	CL I	CL II	CL III
122	12.40	93	94	N/A	79	79	N/A	83	83	N/A
150	13.98	115	117	N/A	99	101	N/A	102	102	N/A
165	15.75	133	135	N/A	114	116	N/A	120	120	N/A
182	18.25	165	169	188	143	147	164	149	150	166
200	20.00	192	192	213	167	167	186	172	172	190
222	22.25	242	246	272	209	209	238	221	221	243
245	24.50	283	288	317	245	251	277	254	254	279
270	27.00	395	412	478	342	359	429	362	374	436
300	30.00	498	506	587	432	448	524	452	461	538
330	33.00	607	633	732	526	561	654	559	578	673
365	36.50	764	804	923	670	714	811	709	732	845
402	40.25	876	915	1096	762	814	986	808	838	1016
445	44.50	1291	1326	1551	1132	1183	1431	1204	1229	1452
490	49.00	1485	1527	1776	1289	1347	1633	1383	1413	1674
542	54.25	1834	2031	2183	1628	1813	1987	1725	1899	2059
600	60.00	2086	2204	2365	1904	2036	2231	1942	2030	2200
660	66.00	2619	2724	2932	2433	2558	2810	2085	2135	2343
730	73.00	2996	3117	3428	2848	2924	3283	N/A	N/A	N/A

NOTES:

1. Arrangement 1 and 3 weights include an aluminum wheel on size 122 through 245, and a steel wheel on size 270 through 730.
2. Arrangement 4 weights include an aluminum wheel on all sizes.
3. Weights are for the 12-bladed wheel design (EPQ and EPQN). 9-bladed designs (EPF and EPFN) are slightly less and can be reduced by the difference between the wheel weights shown above.
4. Weights do not include motor, drive, motor base, or slide base.

122 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 12.38" Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1660	0.25	2151	0.54																		
1100	1734	0.28	2182	0.57																		
1200	1811	0.31	2224	0.61	2630	0.98																
1400	1966	0.38	<u>2338</u>	0.70	2693	1.08	3039	1.51														
1600	2124	0.46	2486	0.81	<u>2792</u>	1.20	3103	1.65	3406	2.14												
1800	2291	0.55	2642	0.94	<u>2924</u>	1.35	3197	1.81	3473	2.31	3744	2.86										
2000	2466	0.65	2796	1.09	3076	1.53	<u>3320</u>	2.00	<u>3568</u>	2.51	3817	3.07										
2200	2647	0.77	2953	1.25	3232	1.73	<u>3467</u>	2.22	<u>3687</u>	2.74	3913	3.31										
2400	2831	0.90	3116	1.42	3386	1.94	<u>3623</u>	2.48	3831	3.02												
2800	3204	1.22	<u>3462</u>	1.81	<u>3702</u>	2.43	3931	3.03														
3200	<u>3582</u>	1.62	<u>3824</u>	2.28																		
3600	3966	2.12																				

MAXIMUM RPM: CLASS I = 3388 CLASS II = 4000 **Outlet Area** = 1.20 ft² **Max. BHP** = 0.055 x (RPM / 1000)³

122 EPF (9-Blade, Arr. 3)

Wheel Diameter: 12.38" Fan Efficiency Grade = FEG71

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1699	0.27	2135	0.53																		
1100	1771	0.30	2189	0.58																		
1200	1848	0.33	2256	0.64	2605	0.97																
1400	2013	0.41	2392	0.76	<u>2715</u>	1.12	3013	1.50														
1600	2187	0.50	2538	0.87	2851	1.29	<u>3125</u>	1.71	3384	2.13												
1800	2367	0.60	2696	1.01	2991	1.46	3260	1.94	<u>3501</u>	2.40	3730	2.87	3968	3.39								
2000	2553	0.73	2864	1.17	3140	1.64	<u>3397</u>	2.16	3636	2.69	3854	3.20										
2200	2742	0.88	3038	1.34	3298	1.84	3542	2.39	3773	2.97	3990	3.55										
2400	2934	1.04	3216	1.55	3465	2.08	3696	2.64	3916	3.25												
2800	3326	1.44	<u>3583</u>	2.03	3814	2.62																
3200	<u>3726</u>	1.95	3962	2.62																		
3600																						

MAXIMUM RPM: CLASS I = 3388 CLASS II = 4000 **Outlet Area** = 1.20 ft² **Max. BHP** = 0.056 x (RPM / 1000)³

122 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 12.38" Fan Efficiency Grade = FEG71

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1644	0.27	2046	0.53																		
1100	1721	0.30	2106	0.58																		
1200	1799	0.34	<u>2173</u>	0.63	2494	0.96																
1400	1963	0.42	2315	0.75	2614	1.11	2886	1.49														
1600	2132	0.51	2468	0.89	2752	1.27	<u>3007</u>	1.68	3245	2.12												
1800	2302	0.61	2627	1.04	2899	1.47	3144	1.90	3370	2.37	3581	2.86	3795	3.38								
2000	2475	0.72	2792	1.20	3054	1.68	3289	2.16	<u>3507</u>	2.64	3711	3.16	3902	3.69								
2200	2654	0.86	2961	1.37	3214	1.90	<u>3441</u>	2.43	3650	2.95	3848	3.49										
2400	2839	1.01	3131	1.56	3378	2.14	3598	2.72	3802	3.30	3991	3.86										
2800	3222	1.40	3475	2.00	<u>3717</u>	2.67	3925	3.34														
3200	3616	1.91	3835	2.55																		
3600																						

MAXIMUM RPM: CLASS I = 3388 CLASS II = 4000 **Outlet Area** = 1.20 ft² **Max. BHP** = 0.062 x (RPM / 1000)³

122 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 12.38" Fan Efficiency Grade = FEG71

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1672	0.28	2076	0.55																		
1100	1752	0.31	<u>2137</u>	0.60																		
1200	1834	0.35	2206	0.66	2530	0.98																
1400	2006	0.44	2353	0.78	<u>2654</u>	1.14	2928	1.53														
1600	2185	0.54	2514	0.92	2795	1.32	<u>3053</u>	1.74	3292	2.18												
1800	2370	0.67	2681	1.08	2949	1.51	3193	1.98	<u>3421</u>	2.45	3634	2.94	3850	3.45								
2000	2560	0.82	2855	1.26	3112	1.73	3344	2.23	3561	2.74	3767	3.27	3960	3.80								
2200	2754	0.99	3034	1.47	3279	1.97	3504	2.50	3710	3.05	3907	3.62										
2400	2950	1.18	3216	1.70	3453	2.25	3668	2.81	3869	3.39												
2800	3347	1.66	3594	2.26	3811	2.88																
3200	<u>3751</u>	2.26	3981	2.96																		
3600																						

MAXIMUM RPM: CLASS I = 3388 CLASS II = 4000 **Outlet Area** = 1.20 ft² **Max. BHP** = 0.061 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 10.00" above the base on fan size 122.

150 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 14.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1433	0.30																				
1400	1529	0.35																				
1600	1637	0.42	1928	0.73																		
1800	1743	0.49	1989	0.80	2336	1.28																
			<u>2072</u>	<u>0.90</u>	2384	1.38	2689	1.94														
2200	1966	0.66	2281	1.14	2535	1.65	2791	2.22	3045	2.87	3293	3.56										
2600	2207	0.86	2495	1.42	2743	2.00	2956	2.60	3171	3.26	3388	3.98	3602	4.74	3812	5.55						
3000	2459	1.10	2716	1.75	2957	2.41	3166	3.07	3352	3.76	3535	4.49	3723	5.28								
3400	2716	1.40	2951	2.13	3173	2.87	3380	3.61	3565	4.37	3731	5.14	3892	5.94								
3800	2976	1.77	3198	2.57	3399	3.40	3595	4.22	3779	5.05												
4200	3239	2.20	3450	3.06	3637	3.98	3817	4.89														
4600	3505	2.71	3706	3.64	3883	4.62																
5000	3773	3.30																				

MAXIMUM RPM: CLASS I = 3006 CLASS II = 3909 Outlet Area = 1.54 ft² Max. BHP = 0.102 x (RPM / 1000)³

150 EPF (9-Blade, Arr. 3)

Wheel Diameter: 14.00"

Fan Efficiency Grade = FEG67

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1464	0.32																				
1400	1563	0.38	1933	0.74																		
1600	1670	0.45	2025	0.86	2323	1.28																
1800	1786	0.52	2120	0.97	2406	1.44	2667	1.92														
2200	2029	0.71	2327	1.21	2594	1.78	2835	2.36	3051	2.93	3265	3.53										
2600	2285	0.96	2558	1.53	2799	2.14	3025	2.81	3235	3.50	3427	4.17	3608	4.84	3789	5.54						
3000	2548	1.27	2801	1.90	3024	2.57	3231	3.29	3428	4.05	3615	4.85	3792	5.65								
3400	2818	1.65	3052	2.36	3262	3.09	3455	3.86	3637	4.67	3813	5.53										
3800	3092	2.10	3311	2.90	3508	3.70	3691	4.53	3862	5.40												
4200	3370	2.65	3576	3.53	3761	4.40																
4600	3650	3.28	3844	4.25																		
5000																						

MAXIMUM RPM: CLASS I = 3006 CLASS II = 3909 Outlet Area = 1.54 ft² Max. BHP = 0.104 x (RPM / 1000)³

150 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 14.00"

Fan Efficiency Grade = FEG71

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1414	0.32	1786	0.65																		
1400	1518	0.39	1859	0.74																		
1600	1627	0.46	1953	0.85	2228	1.27																
1800	1741	0.54	2052	0.97	2316	1.42	2555	1.92														
2200	1976	0.72	2266	1.25	2511	1.78	2732	2.32	2933	2.90	3128	3.51										
2600	2215	0.95	2494	1.57	2724	2.20	2930	2.82	3121	3.44	3301	4.11	3469	4.80	3634	5.52	3802	6.28				
3000	2466	1.24	2728	1.93	2948	2.65	3144	3.38	3325	4.10	3494	4.81	3657	5.55	3811	6.32						
3400	2729	1.60	2965	2.35	3180	3.16	3367	3.98	3540	4.81	3703	5.63	3856	6.43								
3800	2998	2.05	3207	2.84	3416	3.74	3598	4.64	3764	5.56												
4200	3272	2.59	3460	3.43	3652	4.38	3833	5.38														
4600			3721	4.13	3895	5.12																
5000																						

MAXIMUM RPM: CLASS I = 3006 CLASS II = 3909 Outlet Area = 1.54 ft² Max. BHP = 0.115 x (RPM / 1000)³

150 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 14.00"

Fan Efficiency Grade = FEG67

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1437	0.33																				
1400	1545	0.40	1887	0.76																		
1600	1660	0.48	1983	0.88	2261	1.31																
1800	1780	0.57	2086	1.00	2351	1.47	2593	1.96														
2200	2030	0.79	2311	1.29	2553	1.83	2774	2.41	2977	2.99	3174	3.60										
2600	2292	1.08	2550	1.65	2776	2.26	2980	2.90	3170	3.57	3351	4.25	3521	4.95	3687	5.66	3858	6.42				
3000	2561	1.44	2800	2.09	3011	2.77	3204	3.48	3383	4.22	3551	4.97	3713	5.75	3869	6.55						
3400	2835	1.89	3059	2.62	3257	3.38	3438	4.15	3608	4.95	3769	5.78										
3800	3112	2.43	3324	3.25	3510	4.08	3682	4.93	3844	5.80												
4200	3393	3.08	3593	3.99	3770	4.90																
4600	3676	3.84	3866	4.84																		
5000																						

MAXIMUM RPM: CLASS I = 3006 CLASS II = 3909 Outlet Area = 1.54 ft² Max. BHP = 0.113 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 11.31" above the base on fan size 150.

165 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 15.75" Fan Efficiency Grade = FEG71

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1268	0.37																				
1700	1333	0.43	1702	0.90																		
1900	1408	0.49	1739	0.97																		
2100	1483	0.55	1788	1.05	2087	1.66																
2500	1634	0.71	1920	1.26	2170	1.88	2422	2.60	2668	3.39												
2900	1795	0.88	2071	1.52	2293	2.18	2509	2.91	2728	3.73	2941	4.61										
3300	1966	1.09	2221	1.81	2442	2.54	2631	3.30	2821	4.13	3013	5.04	3203	6.01	3390	7.04						
3700	2142	1.33	2376	2.14	2592	2.94	2778	3.77	2945	4.62	3114	5.55	3286	6.54	3456	7.59						
4500	2504	1.95	2708	2.90	2897	3.88	3078	4.86	3243	5.86	3390	6.87										
5300	2872	2.77	3060	3.86	3226	5.01	3387	6.16														
6100	3246	3.83	3421	5.05																		
6900																						

MAXIMUM RPM: CLASS I = 2668 CLASS II = 3468 **Outlet Area** = 1.94 ft² **Max. BHP** = 0.185 x (RPM / 1000)³

165 EPF (9-Blade, Arr. 3)

Wheel Diameter: 15.75" Fan Efficiency Grade = FEG67

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1295	0.40																				
1700	1363	0.46	1698	0.90																		
1900	1437	0.52	1759	1.02	2041	1.54																
2100	1515	0.59	1825	1.13	2084	1.67																
2500	1681	0.76	1962	1.35	2212	2.02	2428	2.66	2642	3.35												
2900	1855	0.97	2114	1.62	2346	2.35	2558	3.12	2747	3.86	2929	4.63										
3300	2035	1.22	2278	1.94	2492	2.71	2692	3.56	2879	4.44	3050	5.30	3210	6.14	3370	7.03						
3700	2220	1.53	2448	2.31	2649	3.15	2836	4.04	3013	4.99	3181	5.98	3339	6.95								
4500	2599	2.30	2802	3.24	2984	4.20	3151	5.20	3309	6.25	3461	7.35										
5300	2988	3.33	3171	4.44	3336	5.54																
6100	3383	4.65																				
6900																						

MAXIMUM RPM: CLASS I = 2668 CLASS II = 3468 **Outlet Area** = 1.94 ft² **Max. BHP** = 0.187 x (RPM / 1000)³

165 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 15.75" Fan Efficiency Grade = FEG67

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1250	0.40																				
1700	1322	0.46	1630	0.90																		
1900	1398	0.54	1694	1.00	1951	1.53																
2100	1476	0.61	1761	1.11	2002	1.66																
2500	1638	0.78	1906	1.38	2133	1.98	2335	2.64	2529	3.34												
2900	1804	0.97	2060	1.67	2274	2.37	2467	3.07	2644	3.82	2811	4.60	2980	5.45								
3300	1972	1.21	2220	1.99	2425	2.79	2608	3.58	2778	4.37	2938	5.22	3087	6.09	3232	7.00	3381	7.96				
3700	2148	1.49	2385	2.35	2581	3.24	2758	4.14	2920	5.02	3072	5.90	3218	6.83	3355	7.79						
4500	2518	2.24	2718	3.21	2908	4.27	3072	5.35	3223	6.45	3366	7.54										
5300	2901	3.26	3068	4.32	3240	5.52	3401	6.78														
6100			3437	5.77																		
6900																						

MAXIMUM RPM: CLASS I = 2668 CLASS II = 3468 **Outlet Area** = 1.94 ft² **Max. BHP** = 0.207 x (RPM / 1000)³

165 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 15.75" Fan Efficiency Grade = FEG67

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1270	0.41																				
1700	1345	0.48	1654	0.92																		
1900	1425	0.55	1720	1.04	1980	1.56																
2100	1507	0.63	1789	1.15	2032	1.71																
2500	1678	0.83	1940	1.42	2165	2.05	2370	2.72	2566	3.42												
2900	1857	1.07	2102	1.73	2313	2.44	2505	3.18	2684	3.95	2852	4.73	3024	5.57								
3300	2042	1.37	2271	2.10	2471	2.87	2652	3.68	2821	4.53	2982	5.40	3133	6.28	3280	7.19	3431	8.14				
3700	2231	1.73	2446	2.54	2636	3.38	2809	4.26	2969	5.17	3121	6.11	3267	7.08	3406	8.06						
4500	2616	2.64	2810	3.61	2982	4.60	3140	5.62	3288	6.67	3428	7.75										
5300	3008	3.86	3187	5.02	3344	6.17																
6100	3407	5.46																				
6900																						

MAXIMUM RPM: CLASS I = 2668 CLASS II = 3468 **Outlet Area** = 1.94 ft² **Max. BHP** = 0.204 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 12.72" above the base on fan size 165.

182 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 18.25"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2500	1086	0.57																				
2800	1136	0.64	1426	1.27																		
3100	1190	0.73	1467	1.40																		
3400	1246	0.82	1515	1.54	1743	2.32																
4000	1368	1.05	1614	1.85	1829	2.71	2021	3.63														
4600	1495	1.30	1723	2.20	1925	3.15	2109	4.16	2276	5.20												
5200	1627	1.61	1840	2.60	2030	3.65	2205	4.74	2367	5.88	2516	7.05	2664	8.29								
5800	1763	1.97	1964	3.07	2141	4.19	2307	5.38	2463	6.61	2610	7.89	2745	9.17	2877	10.50						
7000	2044	2.86	2222	4.17	2384	5.51	2532	6.87	2673	8.27	2807	9.71	2937	11.20	3061	12.72	3180	14.27	3292	15.82		
8200	2334	4.04	2492	5.56	2640	7.11	2777	8.68	2905	10.25	3028	11.86	3147	13.52	3262	15.21	3374	16.94	3483	18.70		
9400	2631	5.56	2772	7.28	2906	9.03	3034	10.82	3154	12.62	3268	14.42	3377	16.23	3483	18.08	3587	19.98	3689	21.92		
10600			3059	9.38	3181	11.33	3299	13.33	3411	15.33	3519	17.36	3622	19.39	3721	21.42						

MAXIMUM RPM: CLASS I = 2302 CLASS II = 2930 CLASS III = 3767 Outlet Area = 2.59 ft² Max. BHP = 0.444 x (RPM / 1000)³

182 EPF (9-Blade, Arr. 3)

Wheel Diameter: 18.25"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2500	1101	0.59	1420	1.20																		
2800	1157	0.68	1449	1.32	1721	2.06																
3100	1217	0.77	1487	1.45	1742	2.22																
3400	1281	0.88	1534	1.60	1772	2.40	1998	3.29														
4000	1416	1.14	1644	1.94	1852	2.81	2054	3.76	2249	4.78	2436	5.88										
4600	1551	1.43	1767	2.34	1956	3.29	2135	4.31	2312	5.39	2484	6.53	2650	7.74	2811	9.02						
5200	1689	1.78	1899	2.81	2073	3.85	2238	4.94	2396	6.09	2553	7.30	2707	8.56	2858	9.88	3004	11.27	3147	12.71		
5800	1833	2.20	2034	3.35	2200	4.48	2353	5.66	2500	6.89	2642	8.17	2783	9.51	2922	10.88	3059	12.30	3194	13.79		
7000	2135	3.28	2306	4.61	2468	6.00	2607	7.37	2735	8.75	2861	10.20	2983	11.68	3102	13.21	3219	14.77	3335	16.38		
8200	2448	4.74	2592	6.22	2739	7.83	2876	9.46	2998	11.07	3110	12.67	3219	14.30	3327	16.00	3432	17.72	3535	19.48		
9400			2892	8.28	3019	10.04	3147	11.90	3268	13.78	3378	15.63	3479	17.45	3577	19.31	3672	21.18	3766	23.10		
10600			3201	10.84	3312	12.76	3426	14.78	3539	16.88	3648	19.00	3749	21.10								

MAXIMUM RPM: CLASS I = 2302 CLASS II = 2930 CLASS III = 3767 Outlet Area = 2.59 ft² Max. BHP = 0.443 x (RPM / 1000)³

182 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 18.25"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2500	1093	0.59	1380	1.19																		
2800	1151	0.67	1420	1.31																		
3100	1212	0.77	1468	1.45	1694	2.21																
3400	1277	0.87	1520	1.59	1735	2.39																
4000	1412	1.11	1635	1.93	1833	2.81	2014	3.74	2187	4.75												
4600	1552	1.40	1760	2.31	1944	3.28	2113	4.30	2272	5.38	2423	6.50	2574	7.68								
5200	1697	1.74	1893	2.75	2064	3.82	2223	4.93	2372	6.08	2515	7.29	2651	8.54	2783	9.82	2917	11.17				
5800	1846	2.15	2030	3.26	2192	4.42	2342	5.63	2483	6.87	2617	8.15	2747	9.48	2871	10.85	2991	12.25	3110	13.71		
7000	2155	3.18	2314	4.50	2462	5.85	2598	7.25	2725	8.68	2847	10.14	2964	11.64	3077	13.18	3187	14.75	3295	16.36	3500	19.65
8200	2472	4.56	2610	6.06	2744	7.63	2870	9.22	2988	10.84	3100	12.50	3207	14.18	3311	15.90	3412	17.64	3511	19.43	3701	23.06
9400			2917	8.04	3036	9.79	3152	11.59	3263	13.42	3368	15.27	3468	17.15	3564	19.04	3658	20.98				
10600			3231	10.47	3338	12.42	3443	14.42	3546	16.45	3645	18.51	3740	20.58								

MAXIMUM RPM: CLASS I = 2302 CLASS II = 2930 CLASS III = 3767 Outlet Area = 2.59 ft² Max. BHP = 0.458 x (RPM / 1000)³

182 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 18.25"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2500	1106	0.61	1388	1.19																		
2800	1167	0.71	1432	1.33																		
3100	1229	0.81	1482	1.48	1704	2.21																
3400	1295	0.92	1537	1.65	1749	2.42	1947	3.25														
4000	1436	1.18	1658	2.04	1852	2.89	2031	3.79	2200	4.75	2370	5.79										
4600	1588	1.51	1785	2.44	1969	3.45	2135	4.43	2292	5.46	2441	6.54	2587	7.68	2736	8.89						
5200	1746	1.93	1922	2.91	2094	4.04	2252	5.17	2397	6.27	2538	7.42	2672	8.62	2802	9.87	2931	11.16	3062	12.52		
5800	1905	2.42	2067	3.48	2223	4.66	2375	5.95	2515	7.21	2646	8.43	2773	9.70	2896	11.01	3015	12.37	3131	13.76	3363	16.69
7000	2228	3.67	2375	4.94	2506	6.23	2636	7.64	2764	9.17	2887	10.73	3003	12.24	3114	13.73	3221	15.22	3326	16.74	3530	19.92
8200	2557	5.33	2693	6.84	2812	8.32	2922	9.83	3033	11.44	3144	13.18	3252	14.99	3358	16.82	3459	18.62	3556	20.37	3741	23.84
9400			3015	9.22	3127	10.93	3229	12.63	3326	14.36	3422	16.16	3519	18.08	3615	20.09	3710	22.17				
10600			3342	12.16	3448	14.12	3544	16.04	3633	17.94	3720	19.88										

MAXIMUM RPM: CLASS I = 2302 CLASS II = 2930 CLASS III = 3767 Outlet Area = 2.59 ft² Max. BHP = 0.455 x (RPM / 1000)³

Class I = First white section

Class II = Blue shaded section

Class III = Bolded section after blue section

Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.

Power rating (BHP) does not include transmission losses.

Performance ratings do not include the effects of appurtenances (accessories).

Performance based on a shaft height of 13.00" above the base on fan size 182.

200 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 20.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	991	0.68																				
3400	1042	0.79	1305	1.54																		
3800	1096	0.90	1348	1.72																		
4200	1155	1.03	1396	1.91	1601	2.86																
4600	1216	1.17	1446	2.11	1645	3.12																
5400	1344	1.51	1554	2.56	1741	3.69	1910	4.88	2065	6.12												
6200	1477	1.91	1672	3.09	1846	4.34	2006	5.65	2155	7.02	2291	8.40										
7000	1614	2.38	1798	3.72	1959	5.07	2110	6.50	2252	7.99	2385	9.51	2509	11.07	2629	12.67						
7800	1756	2.95	1927	4.42	2080	5.91	2221	7.45	2355	9.04	2483	10.70	2605	12.39	2720	14.11	2829	15.85	2936	17.64		
9400	2047	4.38	2197	6.12	2335	7.90	2463	9.70	2583	11.52	2698	13.39	2810	15.32	2918	17.30	3022	19.30	3123	21.35		
11000	2346	6.28	2478	8.29	2603	10.36	2721	12.45	2832	14.55	2937	16.66	3038	18.80	3137	20.99	3233	23.23	3327	25.51		
12600			2767	11.01	2880	13.34	2988	15.71	3091	18.10	3190	20.51	3285	22.93	3376	25.36						

MAXIMUM RPM: CLASS I = 2101 CLASS II = 2674 CLASS III = 3438 **Outlet Area** = 3.11 ft² **Max. BHP** = 0.701 x (RPM / 1000)³

200 EPF (9-Blade, Arr. 3)

Wheel Diameter: 20.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	1004	0.71	1295	1.44																		
3400	1061	0.82	1326	1.60	1572	2.50																
3800	1123	0.96	1366	1.78	1595	2.71	1810	3.76														
4200	1189	1.11	1415	1.98	1627	2.96	1829	4.03	2021	5.21												
4600	1257	1.27	1470	2.20	1667	3.23	1858	4.34	2040	5.55	2214	6.85										
5400	1394	1.66	1592	2.72	1767	3.84	1934	5.06	2098	6.34	2258	7.70	2411	9.14	2560	10.67						
6200	1533	2.11	1725	3.34	1885	4.58	2036	5.88	2181	7.26	2325	8.71	2467	10.22	2604	11.79	2738	13.45	2869	15.17		
7000	1679	2.67	1862	4.05	2013	5.42	2152	6.84	2286	8.32	2415	9.86	2543	11.47	2670	13.13	2794	14.83	2917	16.62		
7800	1831	3.34	1999	4.85	2148	6.39	2278	7.93	2402	9.51	2523	11.17	2639	12.86	2754	14.61	2869	16.43	2982	18.28		
9400	2144	5.09	2282	6.81	2422	8.68	2548	10.54	2659	12.37	2765	14.23	2868	16.14	2970	18.12	3068	20.12	3164	22.15		
11000			2583	9.40	2703	11.48	2822	13.67	2933	15.86	3033	18.02	3126	20.15	3216	22.32	3305	24.55	3393	26.82		
12600			2895	12.71	2998	15.00	3102	17.40	3207	19.91	3307	22.44	3399	24.93								

MAXIMUM RPM: CLASS I = 2101 CLASS II = 2674 CLASS III = 3438 **Outlet Area** = 3.11 ft² **Max. BHP** = 0.700 x (RPM / 1000)³

200 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 20.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	997	0.71	1259	1.43																		
3400	1056	0.82	1300	1.59																		
3800	1119	0.95	1350	1.78	1553	2.70																
4200	1185	1.09	1403	1.97	1597	2.95	1777	4.00														
4600	1253	1.24	1462	2.20	1646	3.22	1815	4.33														
5400	1394	1.61	1586	2.69	1756	3.84	1912	5.05	2059	6.32	2198	7.65										
6200	1540	2.06	1720	3.27	1876	4.54	2022	5.87	2159	7.25	2290	8.70	2414	10.19	2535	11.72						
7000	1691	2.60	1858	3.95	2006	5.34	2142	6.80	2271	8.30	2393	9.85	2511	11.45	2624	13.09	2733	14.78	2841	16.53		
7800	1847	3.25	2001	4.73	2142	6.26	2270	7.84	2391	9.46	2507	11.13	2617	12.83	2725	14.59	2830	16.40	2931	18.24	3125	22.04
9400	2165	4.91	2297	6.65	2423	8.45	2541	10.29	2651	12.17	2755	14.08	2855	16.03	2953	18.03	3047	20.05	3139	22.11	3317	26.35
11000			2605	9.14	2716	11.20	2824	13.31	2926	15.45	3023	17.62	3116	19.84	3205	22.08	3291	24.33	3376	26.65		
12600			2922	12.29	3021	14.62	3118	16.99	3212	19.40	3303	21.85	3390	24.32								

MAXIMUM RPM: CLASS I = 2101 CLASS II = 2674 CLASS III = 3438 **Outlet Area** = 3.11 ft² **Max. BHP** = 0.724 x (RPM / 1000)³

200 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 20.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	1009	0.74	1266	1.43																		
3400	1070	0.87	1311	1.61	1529	2.46																
3800	1134	1.00	1363	1.82	1563	2.70																
4200	1202	1.15	1420	2.06	1610	2.99	1786	4.00														
4600	1273	1.32	1481	2.31	1662	3.30	1829	4.36	1989	5.50												
5400	1425	1.74	1609	2.84	1778	4.02	1931	5.18	2076	6.40	2213	7.68	2350	9.04								
6200	1584	2.28	1745	3.45	1903	4.80	2048	6.15	2181	7.47	2310	8.85	2433	10.28	2552	11.77	2671	13.33	2792	14.96		
7000	1745	2.94	1893	4.21	2035	5.64	2172	7.19	2300	8.71	2419	10.19	2535	11.71	2647	13.29	2755	14.92	2861	16.61	3071	20.12
7800	1908	3.72	2047	5.13	2175	6.61	2302	8.27	2424	10.00	2540	11.71	2648	13.35	2753	15.02	2856	16.74	2956	18.51	3148	22.17
9400	2239	5.72	2367	7.45	2478	9.15	2583	10.91	2689	12.82	2794	14.87	2896	16.97	2993	19.02	3087	21.05	3177	23.05	3351	27.07
11000	2576	8.41	2692	10.45	2796	12.46	2889	14.43	2980	16.48	3070	18.62	3161	20.91	3250	23.29	3338	25.74	3424	28.20		
12600			3022	14.25	3119	16.57	3208	18.87	3290	21.13	3369	23.43										

MAXIMUM RPM: CLASS I = 2101 CLASS II = 2674 CLASS III = 3438 **Outlet Area** = 3.11 ft² **Max. BHP** = 0.718 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 14.25" above the base on fan size 200.

222 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 22.25"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3500	856	0.76																				
4000	900	0.88																				
4500	947	1.01	1172	1.93																		
5000	998	1.16	1215	2.16	1399	3.22																
6000	1106	1.48	1305	2.66	1477	3.88	1630	5.13														
7000	1221	1.88	1403	3.22	1565	4.61	1712	6.05	1843	7.47												
8000	1340	2.36	1510	3.85	1661	5.42	1800	7.02	1929	8.66	2046	10.27	2160	11.96								
9000	1464	2.93	1622	4.58	1763	6.30	1895	8.08	2018	9.89	2134	11.73	2241	13.54	2343	15.39	2444	17.31				
10000	1590	3.61	1738	5.41	1872	7.29	1995	9.23	2112	11.20	2223	13.20	2329	15.24	2429	17.28	2524	19.32	2615	21.37		
12000	1849	5.30	1980	7.43	2100	9.62	2212	11.87	2317	14.17	2418	16.51	2515	18.87	2609	21.27	2700	23.69	2788	26.14		
14000	2114	7.54	2231	10.00	2339	12.50	2441	15.05	2538	17.65	2631	20.32	2720	23.02	2807	25.77	2891	28.52	2973	31.30		
16000			2488	13.19	2587	16.03	2681	18.90	2770	21.80	2857	24.78	2940	27.79	3020	30.84						

MAXIMUM RPM: CLASS I = 1888 CLASS II = 2403 CLASS III = 3090 Outlet Area = 3.84 ft² Max. BHP = 1.207 x (RPM / 1000)³

222 EPF (9-Blade, Arr. 3)

Wheel Diameter: 22.25"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3500	868	0.79	1130	1.61																		
4000	912	0.92	1156	1.82																		
4500	962	1.06	1191	2.03	1393	3.09																
5000	1016	1.22	1231	2.26	1422	3.40	1600	4.61														
6000	1133	1.60	1324	2.79	1498	4.07	1657	5.43	1809	6.86	1954	8.31										
7000	1256	2.07	1429	3.40	1587	4.83	1735	6.33	1874	7.91	2006	9.53	2135	11.22	2259	12.90						
8000	1383	2.64	1544	4.13	1688	5.70	1825	7.34	1955	9.06	2078	10.83	2196	12.65	2311	14.54	2424	16.47	2533	18.38		
9000	1514	3.33	1665	4.98	1798	6.69	1924	8.48	2046	10.34	2162	12.25	2274	14.23	2381	16.25	2485	18.31	2587	20.43		
10000	1647	4.14	1788	5.95	1915	7.83	2032	9.76	2145	11.76	2254	13.81	2360	15.93	2463	18.11	2562	20.33	2657	22.56		
12000	1917	6.20	2046	8.37	2159	10.55	2266	12.81	2365	15.09	2461	17.43	2555	19.83	2648	22.30	2737	24.78	2825	27.32		
14000	2192	8.92	2310	11.46	2415	14.00	2511	16.54	2604	19.16	2692	21.82	2776	24.50	2858	27.23	2939	30.02	3019	32.85		
16000			2579	15.34	2677	18.24	2767	21.14	2852	24.06	2934	27.02	3013	30.03	3088	33.04						

MAXIMUM RPM: CLASS I = 1888 CLASS II = 2403 CLASS III = 3090 Outlet Area = 3.84 ft² Max. BHP = 1.214 x (RPM / 1000)³

222 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 22.25"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3500	848	0.78																				
4000	901	0.92	1122	1.79																		
4500	956	1.06	1158	2.00	1354	3.07																
5000	1015	1.23	1204	2.24	1381	3.35																
6000	1139	1.62	1312	2.80	1463	4.02	1610	5.35	1757	6.78												
7000	1270	2.11	1427	3.43	1568	4.83	1696	6.26	1822	7.78	1948	9.40	2074	11.11								
8000	1406	2.72	1549	4.18	1680	5.73	1802	7.34	1914	8.97	2023	10.66	2134	12.46	2244	14.34	2354	16.28				
9000	1545	3.44	1677	5.06	1799	6.76	1913	8.53	2020	10.33	2121	12.16	2218	14.03	2316	15.99	2415	18.04	2512	20.14	2709	24.59
10000	1686	4.29	1810	6.10	1922	7.92	2030	9.85	2131	11.81	2229	13.83	2320	15.84	2409	17.91	2496	20.01	2584	22.20	2761	26.81
12000	1972	6.43	2084	8.64	2183	10.78	2277	12.97	2369	15.25	2456	17.57	2541	19.94	2623	22.34	2702	24.75	2778	27.18	2925	32.12
14000			2364	11.87	2455	14.40	2540	16.92	2622	19.47	2701	22.07	2778	24.73	2853	27.44	2927	30.21	2998	32.98		
16000			2649	15.90	2733	18.83	2812	21.73	2887	24.62	2959	27.51	3029	30.44								

MAXIMUM RPM: CLASS I = 1888 CLASS II = 2403 CLASS III = 3090 Outlet Area = 3.84 ft² Max. BHP = 1.287 x (RPM / 1000)³

222 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 22.25"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3500	862	0.82	1099	1.61																		
4000	917	0.96	1131	1.83																		
4500	974	1.12	1174	2.07	1358	3.09																
5000	1034	1.30	1224	2.34	1394	3.43	1557	4.60														
6000	1162	1.74	1336	2.94	1486	4.19	1628	5.50	1765	6.86	1901	8.31										
7000	1299	2.29	1454	3.63	1596	5.06	1724	6.53	1846	8.05	1965	9.60	2082	11.21	2198	12.90						
8000	1441	2.98	1580	4.46	1712	6.05	1834	7.70	1945	9.36	2053	11.08	2159	12.84	2263	14.64	2365	16.47	2467	18.39		
9000	1585	3.81	1713	5.44	1834	7.17	1949	8.99	2056	10.83	2157	12.72	2253	14.62	2349	16.60	2442	18.57	2534	20.58	2715	24.73
10000	1729	4.79	1852	6.61	1961	8.46	2069	10.43	2172	12.46	2269	14.52	2360	16.58	2448	18.69	2534	20.82	2620	23.02	2788	27.47
12000	2022	7.27	2136	9.51	2233	11.68	2325	13.90	2415	16.20	2504	18.61	2589	21.03	2672	23.51	2750	25.96	2826	28.45	2972	33.51
14000	2318	10.56	2425	13.25	2517	15.83	2599	18.35	2677	20.90	2755	23.54	2833	26.28	2909	29.08	2982	31.88	3054	34.74		
16000			2716	17.91	2804	20.93	2882	23.85	2954	26.73	3024	29.65										

MAXIMUM RPM: CLASS I = 1888 CLASS II = 2403 CLASS III = 3090 Outlet Area = 3.84 ft² Max. BHP = 1.281 x (RPM / 1000)³

Class I = First white section

Class II = Blue shaded section

Class III = Bolded section after blue section

Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.

Power rating (BHP) does not include transmission losses.

Performance ratings do not include the effects of appurtenances (accessories).

Performance based on a shaft height of 16.00" above the base on fan size 222.

245 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 24.50" Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4400	790	0.93	1021	1.92																		
5000	831	1.07	1047	2.13																		
5600	877	1.23	<u>1079</u>	<u>2.36</u>	1258	3.63																
6200	926	1.41	<u>1115</u>	<u>2.60</u>	1286	3.96	1442	5.40														
7400	1031	1.83	1200	3.18	1354	4.67	1497	6.27	1632	7.96	1759	9.73										
8600	1140	2.35	1295	3.87	1435	5.49	1567	7.23	1691	9.06	1810	10.99	1924	13.00	2034	15.08						
9800	1250	2.95	1399	4.68	1526	6.44	1648	8.33	<u>1763</u>	<u>10.30</u>	1874	12.37	1981	14.52	2084	16.74	2184	19.03	2281	21.39		
11000	1364	3.67	1506	5.61	1626	7.55	1738	9.58	1845	11.69	1949	13.89	2049	16.18	2146	18.54	2240	20.97	2332	23.48		
12200	1481	4.53	1615	6.66	1731	8.81	1835	10.99	1935	13.24	2032	15.58	<u>2126</u>	<u>18.00</u>	<u>2218</u>	<u>20.51</u>	<u>2307</u>	<u>23.08</u>	<u>2394</u>	<u>25.73</u>		
14600	<u>1720</u>	<u>6.71</u>	<u>1838</u>	<u>9.19</u>	1947	11.77	2045	14.36	2134	16.93	2219	19.55	<u>2302</u>	<u>22.25</u>	<u>2384</u>	<u>25.03</u>	<u>2464</u>	<u>27.87</u>	<u>2543</u>	<u>30.80</u>		
17000	1966	9.63	2069	12.41	2168	15.36	<u>2261</u>	<u>18.38</u>	<u>2347</u>	<u>21.40</u>	2426	24.38	2501	27.39	2574	30.45	2646	33.58	2717	36.78		
19400			<u>2307</u>	<u>16.50</u>	<u>2396</u>	<u>19.76</u>	<u>2482</u>	<u>23.15</u>	<u>2564</u>	<u>26.61</u>	<u>2641</u>	<u>30.05</u>	<u>2713</u>	<u>33.47</u>	<u>2781</u>	<u>36.87</u>						

MAXIMUM RPM: CLASS I = 1715 CLASS II = 2183 CLASS III = 2806 Outlet Area = 4.66 ft² Max. BHP = 1.88 x (RPM / 1000)³

245 EPF (9-Blade, Arr. 3)

Wheel Diameter: 24.50" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4400	804	0.99																				
5000	849	1.15	<u>1057</u>	<u>2.20</u>																		
5600	898	1.34	1094	2.49	<u>1270</u>	<u>3.71</u>																
6200	950	1.55	1135	2.79	<u>1299</u>	<u>4.10</u>																
7400	1058	2.05	1227	3.45	1376	4.98	1515	6.55	1647	8.15												
8600	1171	2.64	1328	4.26	1466	5.94	1593	7.73	1714	9.55	1828	11.35	<u>1942</u>	<u>13.28</u>								
9800	1289	3.36	1436	5.22	1564	7.05	1683	9.00	1794	11.04	1902	13.12	2004	15.16	<u>2104</u>	<u>17.25</u>	2204	19.45				
11000	1409	4.22	1546	6.30	1668	8.36	1780	10.45	1885	12.64	1985	14.93	2081	17.23	2175	19.55	<u>2266</u>	<u>21.87</u>	<u>2355</u>	<u>24.21</u>		
12200	1533	5.27	1660	7.52	1776	9.83	1882	12.11	1981	14.43	2077	16.88	2167	19.37	2255	21.93	2342	24.53	2426	27.10		
14600	<u>1787</u>	<u>7.94</u>	1896	10.51	2001	13.28	2098	16.05	<u>2189</u>	<u>18.77</u>	<u>2275</u>	<u>21.49</u>	<u>2358</u>	<u>24.28</u>	<u>2439</u>	<u>27.18</u>	<u>2516</u>	<u>30.11</u>	<u>2592</u>	<u>33.15</u>		
17000			<u>2142</u>	<u>14.43</u>	<u>2234</u>	<u>17.50</u>	<u>2324</u>	<u>20.74</u>	<u>2408</u>	<u>23.96</u>	<u>2489</u>	<u>27.18</u>	<u>2565</u>	<u>30.32</u>	<u>2639</u>	<u>33.49</u>	<u>2711</u>	<u>36.72</u>	<u>2781</u>	<u>40.01</u>		
19400			<u>2394</u>	<u>19.40</u>	<u>2477</u>	<u>22.81</u>	<u>2557</u>	<u>26.35</u>	<u>2636</u>	<u>30.05</u>	<u>2711</u>	<u>33.74</u>	<u>2783</u>	<u>37.40</u>								

MAXIMUM RPM: CLASS I = 1715 CLASS II = 2183 CLASS III = 2806 Outlet Area = 4.66 ft² Max. BHP = 1.91 x (RPM / 1000)³

245 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 24.50" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4400	779	0.96																				
5000	824	1.11	1026	2.19																		
5600	875	1.29	<u>1061</u>	<u>2.44</u>	1234	3.73																
6200	929	1.49	<u>1100</u>	<u>2.71</u>	<u>1261</u>	<u>4.07</u>																
7400	1043	1.98	1192	3.33	<u>1334</u>	<u>4.84</u>	<u>1469</u>	<u>6.46</u>	1598	8.16												
8600	1157	2.53	1299	4.11	1423	5.73	1545	7.51	1662	9.37	1774	11.31	1886	13.35								
9800	1275	3.20	1412	5.03	1524	6.79	1633	8.69	1740	10.71	1844	12.81	1944	14.97	2042	17.21	2140	19.53				
11000	1395	3.99	1525	6.05	1634	8.05	1732	10.06	1829	12.20	1924	14.43	2018	16.78	2110	19.19	2198	21.62	2285	24.13	2462	29.43
12200	1519	4.95	1640	7.20	1748	9.48	1840	11.66	1928	13.91	2015	16.26	2102	18.75	2187	21.30	2271	23.93	2353	26.61	2510	32.05
14600	<u>1770</u>	<u>7.35</u>	1877	9.98	1976	12.72	2066	15.44	2147	18.08	2222	20.70	2295	23.38	2368	26.17	2441	29.06	2514	32.06	2656	38.22
17000	2026	10.54	2121	13.55	<u>2211</u>	<u>16.67</u>	<u>2295</u>	<u>19.85</u>	<u>2374</u>	<u>23.04</u>	<u>2447</u>	<u>26.16</u>	<u>2515</u>	<u>29.24</u>	<u>2579</u>	<u>32.28</u>	<u>2642</u>	<u>35.38</u>	<u>2704</u>	<u>38.54</u>		
19400			<u>2371</u>	<u>18.05</u>	<u>2452</u>	<u>21.52</u>	<u>2530</u>	<u>25.11</u>	<u>2604</u>	<u>28.74</u>	<u>2675</u>	<u>32.41</u>	<u>2742</u>	<u>36.03</u>	<u>2804</u>	<u>39.54</u>						

MAXIMUM RPM: CLASS I = 1715 CLASS II = 2183 CLASS III = 2806 Outlet Area = 4.66 ft² Max. BHP = 2.04 x (RPM / 1000)³

245 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 24.50" Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4400	790	1.00																				
5000	838	1.17	<u>1041</u>	<u>2.25</u>																		
5600	891	1.36	<u>1074</u>	<u>2.51</u>																		
6200	947	1.59	1116	2.81	1278	4.18																
7400	1064	2.11	1213	3.51	1352	5.00	1489	6.64	1623	8.39												
8600	1185	2.76	1324	4.36	1446	6.01	1566	7.77	1683	9.63	1799	11.61										
9800	1309	3.55	1440	5.37	1552	7.19	1659	9.10	1764	11.09	1867	13.17	1970	15.38	2072	17.68	2173	20.06				
11000	1436	4.50	1558	6.52	1666	8.57	1764	10.65	1859	12.79	1952	15.00	2044	17.30	2136	19.70	2228	22.22	2318	24.78		
12200	1565	5.63	1680	7.86	1783	10.13	1876	12.40	1963	14.70	2049	17.09	2134	19.55	2217	22.04	2300	24.64	2382	27.30	2547	32.96
14600	<u>1827</u>	<u>8.50</u>	<u>1930</u>	<u>11.16</u>	<u>2022</u>	<u>13.82</u>	<u>2109</u>	<u>16.55</u>	<u>2189</u>	<u>19.25</u>	<u>2265</u>	<u>21.99</u>	<u>2337</u>	<u>24.73</u>	<u>2409</u>	<u>27.56</u>	<u>2481</u>	<u>30.47</u>	<u>2552</u>	<u>33.42</u>	<u>2691</u>	<u>39.46</u>
17000			<u>2186</u>	<u>15.41</u>	<u>2271</u>	<u>18.51</u>	<u>2350</u>	<u>21.63</u>	<u>2425</u>	<u>24.78</u>	<u>2496</u>	<u>27.93</u>	<u>2564</u>	<u>31.11</u>	<u>2629</u>	<u>34.29</u>	<u>2691</u>	<u>37.46</u>	<u>2753</u>	<u>40.72</u>		
19400			<u>2446</u>	<u>20.74</u>	<u>2524</u>	<u>24.26</u>	<u>2598</u>	<u>27.83</u>	<u>2667</u>	<u></u>												

270 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 27.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5000	705	<u>1.07</u>																				
5800	743	1.24																				
6600	787	1.44	952	2.55																		
7400	835	1.68	<u>1012</u>	<u>3.15</u>	1174	4.84																
8200	885	1.94	<u>1051</u>	<u>3.51</u>	<u>1202</u>	<u>5.27</u>	1346	7.22														
9000	937	2.24	1095	3.92	<u>1236</u>	<u>5.74</u>	1371	7.78	1501	9.95												
10600	1045	2.92	1189	4.84	1317	6.86	<u>1437</u>	<u>9.02</u>	1553	11.36	1665	13.85	1776	16.45								
12200	1157	3.75	1291	5.93	1409	8.18	1519	10.53	<u>1623</u>	<u>12.98</u>	1725	15.61	1824	18.37	1921	21.25	2017	24.23	2114	27.32		
13800	1273	4.75	1397	7.20	1507	9.68	1610	12.26	1707	14.92	1800	17.67	1891	20.56	1980	23.59	2067	26.73	2153	29.98		
17000	1511	7.34	<u>1618</u>	<u>10.32</u>	<u>1718</u>	<u>13.36</u>	1809	16.40	1895	19.50	1977	22.66	<u>2057</u>	<u>25.93</u>	<u>2134</u>	<u>29.25</u>	<u>2209</u>	<u>32.65</u>	<u>2284</u>	<u>36.21</u>		
20200	<u>1757</u>	<u>10.89</u>	<u>1850</u>	<u>14.40</u>	<u>1938</u>	<u>17.94</u>	<u>2022</u>	<u>21.54</u>	<u>2101</u>	<u>25.17</u>	<u>2175</u>	<u>28.78</u>	<u>2247</u>	<u>32.47</u>	<u>2317</u>	<u>36.23</u>	<u>2385</u>	<u>40.05</u>	<u>2452</u>	<u>43.96</u>		
23400			<u>2089</u>	<u>19.59</u>	<u>2168</u>	<u>23.69</u>	<u>2243</u>	<u>27.78</u>	<u>2316</u>	<u>31.94</u>	<u>2386</u>	<u>36.14</u>	<u>2453</u>	<u>40.36</u>	<u>2517</u>	<u>44.56</u>						

MAXIMUM RPM: CLASS I = 1556 CLASS II = 1981 CLASS III = 2546 Outlet Area = 5.67 ft² Max. BHP = 3.04 x (RPM / 1000)³

270 EPF (9-Blade, Arr. 3)

Wheel Diameter: 27.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5000	716	<u>1.13</u>	943	2.37																		
5800	756	1.33	961	2.65																		
6600	803	1.56	<u>991</u>	<u>2.98</u>	1163	4.59																
7400	854	1.82	<u>1028</u>	<u>3.34</u>	1187	5.04	1338	6.91														
8200	909	2.12	1070	3.76	<u>1219</u>	<u>5.55</u>	1358	7.48	1495	9.60												
9000	966	2.47	1115	4.20	<u>1256</u>	<u>6.10</u>	<u>1388</u>	<u>8.14</u>	1514	10.31	1638	12.63										
10600	1082	3.28	1217	5.24	1341	7.35	1460	9.58	1574	11.95	1683	14.41	1789	16.99	1895	19.72	1999	22.55				
12200	1203	4.30	1328	6.50	1439	8.83	1547	11.29	<u>1651</u>	<u>13.85</u>	<u>1751</u>	<u>16.51</u>	<u>1848</u>	<u>19.27</u>	<u>1942</u>	<u>22.12</u>	<u>2034</u>	<u>25.07</u>	<u>2126</u>	<u>28.16</u>		
13800	1326	5.54	1443	7.99	1547	10.56	1643	13.21	1738	15.99	1831	18.87	1921	21.83	2009	24.90	2094	28.03	2177	31.24		
17000	1576	8.74	1682	11.81	1774	14.83	1861	17.98	1941	21.17	2019	24.47	2096	27.86	2173	31.36	2248	34.90	2321	38.49		
20200	1831	13.12	1928	16.84	<u>2013</u>	<u>20.45</u>	<u>2090</u>	<u>24.01</u>	<u>2165</u>	<u>27.72</u>	<u>2235</u>	<u>31.46</u>	<u>2303</u>	<u>35.31</u>	<u>2368</u>	<u>39.18</u>	<u>2433</u>	<u>43.15</u>	<u>2499</u>	<u>47.26</u>		
23400			<u>2178</u>	<u>23.25</u>	<u>2258</u>	<u>27.52</u>	<u>2330</u>	<u>31.67</u>	<u>2397</u>	<u>35.79</u>	<u>2462</u>	<u>40.00</u>	<u>2526</u>	<u>44.34</u>								

MAXIMUM RPM: CLASS I = 1556 CLASS II = 1981 CLASS III = 2546 Outlet Area = 5.67 ft² Max. BHP = 3.08 x (RPM / 1000)³

270 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 27.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5000	698	<u>1.11</u>																				
5800	741	1.30	927	<u>2.57</u>																		
6600	790	1.53	<u>964</u>	<u>2.92</u>	1119	4.43																
7400	842	1.78	<u>1004</u>	<u>3.28</u>	1148	4.91																
8200	897	2.07	1048	3.68	<u>1186</u>	<u>5.43</u>	1311	7.27														
9000	953	2.38	1096	4.12	<u>1226</u>	<u>5.98</u>	1347	7.95	1460	10.00												
10600	1071	3.15	1200	5.13	1317	7.23	<u>1427</u>	<u>9.42</u>	1532	11.71	1630	14.06	1725	16.48	1823	19.02						
12200	1192	4.09	1310	6.31	1417	8.64	1518	11.07	1614	13.58	1707	16.18	1796	18.86	1880	21.56	1963	24.35	2047	27.24		
13800	1316	5.23	1425	7.70	1525	10.28	1618	12.95	1707	15.70	1793	18.53	1876	21.42	1956	24.36	2034	27.39	2109	30.47	2256	36.81
17000	1569	8.21	1667	11.25	1753	14.30	1835	17.44	1913	20.66	1988	23.97	2061	27.35	2132	30.78	2201	34.25	2269	37.79	2401	45.06
20200	1828	12.31	1915	15.90	<u>1994</u>	<u>19.51</u>	<u>2066</u>	<u>23.11</u>	<u>2136</u>	<u>26.81</u>	<u>2204</u>	<u>30.59</u>	<u>2269</u>	<u>34.42</u>	<u>2333</u>	<u>38.36</u>	<u>2395</u>	<u>42.33</u>	<u>2456</u>	<u>46.36</u>		
23400			<u>2168</u>	<u>21.86</u>	<u>2241</u>	<u>26.05</u>	<u>2308</u>	<u>30.22</u>	<u>2371</u>	<u>34.39</u>	<u>2432</u>	<u>38.63</u>	<u>2492</u>	<u>42.96</u>								

MAXIMUM RPM: CLASS I = 1556 CLASS II = 1981 CLASS III = 2546 Outlet Area = 5.67 ft² Max. BHP = 3.25 x (RPM / 1000)³

270 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 27.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5000	706	<u>1.14</u>																				
5800	756	1.37	939	2.65																		
6600	807	1.62	974	2.99																		
7400	861	1.89	1018	3.39	1162	5.04																
8200	917	2.20	1068	3.86	<u>1198</u>	<u>5.56</u>	1328	7.48														
9000	977	2.57	1120	4.36	1243	6.18	<u>1361</u>	<u>8.14</u>	1479	10.30												
10600	1101	3.45	1227	5.45	1344	7.60	1448	9.75	1548	12.00	1648	14.41	1748	16.98								
12200	1230	4.57	1341	6.76	1449	9.17	1550	11.67	1641	14.13	1727	16.63	1814	19.29	1902	22.14	1988	25.06				
13800	1360	5.92	1464	8.39	1560	10.97	1654	13.73	1743	16.55	1825	19.34	1902	22.13	1979	25.05	2056	28.09	2133	31.27	2286	37.93
17000	1623	9.43	1719	12.54	1800	15.55	1878	18.68	1956	21.99	2032	25.41	2106	28.91	2175	32.35	2241	35.78	2305	39.25	2429	46.31
20200	1891	14.27	1979	18.02	<u>2055</u>	<u>21.66</u>	<u>2123</u>	<u>25.24</u>	<u>2189</u>	<u>28.90</u>	<u>2255</u>	<u>32.71</u>	<u>2321</u>	<u>36.68</u>	<u>2385</u>	<u>40.71</u>	<u>2448</u>	<u>44.83</u>	<u>2509</u>	<u>48.96</u>		
23400			<u>2242</u>	<u>25.05</u>	<u>2314</u>	<u>29.35</u>	<u>2379</u>	<u>33.57</u>	<u>2439</u>	<u>37.74</u>	<u>2496</u>	<u>41.92</u>										

MAXIMUM RPM: CLASS I = 1556 CLASS II = 1981 CLASS III

300 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 30.00" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	627	1.27																				
7000	662	1.49	847	3.05																		
8000	702	1.73	872	3.40	1025	5.31																
9000	746	2.01	904	3.82	1047	5.81	1179	8.03														
10000	794	2.35	940	4.26	1074	6.37	1200	8.68	1317	11.17												
11000	842	2.70	980	4.74	1106	6.99	1225	9.40	1337	11.96	1443	14.70										
13000	941	3.56	1068	5.87	1181	8.36	1287	11.01	1390	13.83	1488	16.75	1582	19.82	1672	23.02						
15000	1041	4.58	1164	7.24	1266	9.96	1363	12.85	1456	15.91	1546	19.09	1633	22.36	1718	25.77	1800	29.30	1879	32.93		
17000	1144	5.82	1262	8.82	1359	11.83	1448	14.97	1533	18.23	1616	21.67	1696	25.20	1775	28.86	1851	32.56	1926	36.40		
21000	1359	9.10	1461	12.70	1555	16.45	1636	20.16	1709	23.89	1781	27.79	1851	31.80	1919	35.93	1986	40.19	2051	44.49		
25000	1582	13.67	1668	17.79	1753	22.16	1832	26.61	1903	31.03	1968	35.45	2030	39.95	2090	44.53	2150	49.26	2208	54.03		
29000			1884	24.42	1958	29.32	2031	34.41	2100	39.56	2165	44.76	2224	49.88	2279	54.97						

MAXIMUM RPM: CLASS I = 1401 CLASS II = 1783 CLASS III = 2291 Outlet Area = 7.00 ft² Max. BHP = 5.17 x (RPM / 1000)³

300 EPF (9-Blade, Arr. 3)

Wheel Diameter: 30.00" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	639	1.33																				
7000	675	1.56	860	3.20																		
8000	717	1.84	888	3.58	1041	5.56																
9000	761	2.14	921	3.99	1064	6.11	1198	8.40														
10000	809	2.50	959	4.48	1094	6.69	1219	9.13	1339	11.70												
11000	858	2.89	1000	5.02	1128	7.33	1246	9.87	1358	12.57	1467	15.41										
13000	960	3.89	1090	6.26	1205	8.83	1313	11.55	1415	14.48	1512	17.58	1607	20.83	1699	24.14	1790	27.60				
15000	1066	5.15	1186	7.73	1292	10.60	1391	13.58	1485	16.69	1575	19.97	1662	23.45	1746	27.07	1828	30.78	1909	34.60		
17000	1174	6.66	1287	9.53	1386	12.63	1477	15.90	1565	19.30	1649	22.80	1730	26.44	1808	30.22	1884	34.16	1958	38.22		
21000	1399	10.60	1496	14.27	1585	17.77	1667	21.52	1744	25.50	1817	29.55	1889	33.72	1959	37.98	2026	42.26	2092	46.69		
25000	1629	15.97	1714	20.50	1794	24.77	1869	28.93	1940	33.30	2007	37.89	2071	42.62	2133	47.44	2194	52.36	2254	57.33		
29000			1938	28.38	2010	33.57	2078	38.45	2143	43.24	2206	48.20	2266	53.37								

MAXIMUM RPM: CLASS I = 1401 CLASS II = 1783 CLASS III = 2291 Outlet Area = 7.00 ft² Max. BHP = 5.11 x (RPM / 1000)³

300 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 30.00" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	621	1.33																				
7000	657	1.55	845	3.17																		
8000	699	1.81	865	3.55																		
9000	745	2.12	895	3.97	1042	6.05																
10000	794	2.46	933	4.44	1065	6.65	1196	9.02														
11000	845	2.86	974	4.94	1095	7.27	1216	9.80	1335	12.47												
13000	949	3.81	1067	6.17	1173	8.70	1275	11.46	1377	14.40	1478	17.40	1579	20.63								
15000	1056	4.96	1166	7.63	1262	10.42	1354	13.39	1443	16.55	1531	19.88	1619	23.29	1707	26.80	1795	30.51				
17000	1167	6.37	1269	9.38	1360	12.47	1443	15.66	1524	19.03	1603	22.58	1680	26.24	1757	30.02	1835	33.91	1913	37.89	2068	46.31
21000	1394	9.97	1482	13.78	1563	17.47	1638	21.24	1708	25.11	1775	29.08	1841	33.19	1906	37.44	1970	41.84	2033	46.35	2158	55.65
25000	1626	14.85	1704	19.50	1776	23.98	1844	28.36	1909	32.82	1971	37.41	2029	42.00	2086	46.72	2141	51.48	2196	56.38		
29000			1931	26.73	1996	32.06	2058	37.24	2117	42.32	2174	47.43	2229	52.65	2282	57.96						

MAXIMUM RPM: CLASS I = 1401 CLASS II = 1783 CLASS III = 2291 Outlet Area = 7.00 ft² Max. BHP = 5.54 x (RPM / 1000)³

300 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 30.00" Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	626	1.35																				
7000	665	1.60																				
8000	712	1.90																				
9000	763	2.27	903	4.06																		
10000	817	2.70	945	4.57																		
11000	870	3.17	992	5.18	1105	7.44																
13000	978	4.24	1094	6.65	1192	9.06	1288	11.75	1387	14.66												
15000	1089	5.55	1201	8.43	1291	11.12	1376	13.93	1459	17.00	1542	20.25										
17000	1203	7.15	1308	10.43	1397	13.59	1474	16.63	1550	19.86	1623	23.25	1696	26.87	1770	30.61						
21000	1438	11.40	1529	15.42	1612	19.47	1687	23.44	1753	27.21	1815	30.97	1876	34.87	1937	38.95	1996	43.17	2055	47.58	2174	56.74
25000	1677	17.22	1757	21.99	1832	26.81	1902	31.63	1968	36.44	2027	41.02	2082	45.50	2135	50.00	2186	54.51	2237	59.17		
29000			1992	30.53	2059	36.06	2123	41.65	2184	47.25	2242	52.82										

MAXIMUM RPM: CLASS I = 1401 CLASS II = 1783 CLASS III = 2291 Outlet Area = 7.00 ft² Max. BHP = 5.52 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 21.00" above the base on fan size 300.

330 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 33.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	564	1.49																				
8000	589	1.70																				
9000	617	1.92	762	3.52																		
11000	682	2.47	824	4.65	954	7.09	1073	9.77														
13000	754	3.15	881	5.57	998	8.27	1107	11.13	1211	14.24	1308	17.51										
15000	828	3.97	946	6.67	1052	9.59	1152	12.72	1247	15.99	1339	19.47	1426	23.11	1510	26.94						
17000	903	4.92	1016	7.93	1113	11.08	1205	14.45	1294	18.03	1379	21.71	1461	25.53	1541	29.57	1617	33.70	1692	38.06		
19000	979	6.04	1090	9.41	1180	12.81	1265	16.39	1347	20.18	1427	24.18	1504	28.25	1578	32.40	1651	36.75	1722	41.25		
23000	1137	8.86	1238	12.89	1324	16.94	1400	21.07	1471	25.28	1541	29.70	1609	34.29	1675	39.00	1740	43.84	1804	48.80		
27000	1302	12.66	1389	17.21	1472	21.99	1546	26.81	1611	31.57	1673	36.45	1734	41.49	1794	46.70	1852	51.99	1909	57.42		
31000	1470	17.56	1547	22.67	1622	28.03	1693	33.53	1758	39.05	1817	44.55	1872	50.05	1926	55.71	1979	61.48	2031	67.34		
35000			1709	29.38	1776	35.27	1843	41.45	1906	47.68	1964	53.87	2018	60.07	2069	66.30						

MAXIMUM RPM: CLASS I = 1273 CLASS II = 1620 CLASS III = 2083 Outlet Area = 8.46 ft² Max. BHP = 8.32 x (RPM / 1000)³

330 EPF (9-Blade, Arr. 3)

Wheel Diameter: 33.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	574	1.56																				
8000	600	1.77	774	3.70																		
9000	630	2.03	792	4.06	939	6.39																
11000	696	2.63	841	4.89	969	7.44	1091	10.26														
13000	769	3.38	899	5.89	1017	8.66	1126	11.71	1230	14.96	1330	18.33										
15000	845	4.31	965	7.09	1073	10.09	1174	13.32	1269	16.80	1360	20.46	1449	24.27	1536	28.22						
17000	923	5.47	1036	8.46	1136	11.77	1230	15.23	1319	18.88	1403	22.73	1485	26.82	1565	31.06	1643	35.38	1720	39.84		
19000	1003	6.83	1110	10.07	1204	13.65	1291	17.37	1375	21.27	1455	25.33	1532	29.61	1606	34.05	1678	38.63	1749	43.35		
23000	1169	10.25	1264	14.18	1350	18.17	1428	22.46	1502	26.94	1573	31.47	1642	36.15	1709	40.97	1774	45.93	1838	51.13		
27000	1340	14.75	1424	19.53	1502	24.01	1575	28.71	1643	33.71	1707	38.84	1769	44.08	1831	49.51	1890	54.92	1948	60.46		
31000	1514	20.52	1589	26.12	1661	31.48	1728	36.61	1792	41.97	1852	47.59	1909	53.36	1965	59.34	2019	65.36	2073	71.52		
35000			1758	34.14	1823	40.36	1886	46.32	1945	52.09	2002	58.05	2057	64.35								

MAXIMUM RPM: CLASS I = 1273 CLASS II = 1620 CLASS III = 2083 Outlet Area = 8.46 ft² Max. BHP = 8.23 x (RPM / 1000)³

330 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 33.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	559	1.55																				
8000	583	1.76																				
9000	613	2.00	775	4.03																		
11000	681	2.59	816	4.84	949	7.39																
13000	756	3.33	876	5.82	988	8.61	1100	11.60														
15000	833	4.22	943	6.97	1044	9.99	1140	13.22	1238	16.68	1334	20.26										
17000	913	5.30	1017	8.36	1108	11.58	1196	15.07	1281	18.75	1366	22.58	1452	26.58	1537	30.77						
19000	995	6.57	1093	9.95	1178	13.43	1259	17.14	1337	21.05	1413	25.14	1489	29.39	1566	33.78	1642	38.25	1718	42.96		
23000	1164	9.72	1250	13.84	1328	17.92	1399	22.13	1466	26.45	1533	31.04	1597	35.72	1660	40.58	1723	45.62	1786	50.78	1913	61.39
27000	1336	13.81	1413	18.77	1484	23.54	1550	28.32	1612	33.24	1671	38.28	1728	43.43	1784	48.71	1840	54.22	1894	59.79	2001	71.38
31000	1511	19.04	1581	24.83	1646	30.44	1706	35.83	1764	41.32	1820	47.00	1872	52.65	1923	58.46	1972	64.29	2022	70.42		
35000			1751	32.13	1811	38.60	1868	44.89	1921	50.97	1973	57.16	2023	63.45	2071	69.85						

MAXIMUM RPM: CLASS I = 1273 CLASS II = 1620 CLASS III = 2083 Outlet Area = 8.46 ft² Max. BHP = 8.92 x (RPM / 1000)³

330 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 33.00"

Fan Efficiency Grade = FEG75

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	590	1.81																				
8000	623	2.09																				
9000	698	2.79	824	4.96																		
11000																						
13000	779	3.69	891	6.07	996	8.79																
15000	860	4.72	965	7.45	1059	10.33	1150	13.53														
17000	942	5.93	1045	9.13	1130	12.21	1212	15.55	1292	19.17												
19000	1026	7.35	1126	11.02	1207	14.45	1281	17.92	1355	21.74	1426	25.73	1500	29.97								
23000	1200	11.01	1289	15.44	1368	19.84	1436	24.00	1499	28.16	1560	32.45	1620	36.96	1679	41.71	1738	46.63	1799	51.76		
27000	1378	15.87	1457	21.02	1531	26.28	1598	31.44	1658	36.41	1712	41.18	1765	46.07	1817	51.09	1869	56.33	1920	61.78	2020	73.09
31000			1630	28.04	1697	34.01	1760	40.00	1819	45.95	1873	51.72	1923	57.33	1970	62.84	2016	68.43	2061	74.09		
35000			1807	36.73	1868	43.41	1926	50.13	1982	56.93	2035	63.67										

MAXIMUM RPM: CLASS I = 1273 CLASS II = 1620 CLASS III = 2083 Outlet Area = 8.46 ft² Max. BHP = 8.89 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 23.10" above the base on fan size 330.

365 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 36.50"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8000	491	1.66																				
9200	511	1.90																				
10400	534	2.16	682	4.34																		
11600	560	2.46	698	4.78																		
14000	615	3.12	741	5.79	852	8.67																
16400	676	3.92	791	6.92	893	10.15	987	13.51	1078	17.13												
18800	741	4.88	846	8.23	941	11.77	1029	15.53	1111	19.35	1191	23.40										
23600	880	7.40	967	11.40	1050	15.64	1128	20.01	1201	24.54	1271	29.26	1338	34.05	1403	38.93	1466	43.90	1529	49.14		
28400	1026	10.93	1099	15.45	1171	20.39	1240	25.45	1307	30.67	1371	36.04	1431	41.44	1490	47.06	1547	52.76	1603	58.58		
33200	1176	15.63	1239	20.71	1301	26.17	1363	32.00	1422	37.86	1480	43.85	1537	50.01	1592	56.30	1644	62.59	1695	69.03		
38000			1384	27.37	1439	33.38	1493	39.71	1547	46.34	1599	53.02	1651	59.88	1702	66.84	1751	73.80	1799	80.90		
42800			1532	35.59	1581	42.14	1630	49.03	1678	56.19	1726	63.62	1773	71.16	1819	78.74	1865	86.48				

MAXIMUM RPM: CLASS I = 1151 CLASS II = 1465 CLASS III = 1884 Outlet Area = 10.35 ft² Max. BHP = 14.26 x (RPM / 1000)³

365 EPF (9-Blade, Arr. 3)

Wheel Diameter: 36.50"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8000	496	1.73																				
9200	518	2.00																				
10400	541	2.28	689	4.55																		
11600	568	2.60	707	5.04																		
14000	628	3.34	751	6.11	862	9.11	968	12.42														
16400	693	4.25	803	7.35	906	10.73	999	14.21	1089	17.97												
18800	762	5.37	862	8.78	954	12.45	1043	16.36	1126	20.42	1203	24.51	1282	29.02								
23600	906	8.32	992	12.37	1070	16.67	1145	21.24	1218	25.98	1289	30.90	1357	35.95	1421	41.00	1483	46.15	1544	51.45		
28400	1053	12.27	1131	17.14	1201	22.10	1266	27.23	1329	32.63	1390	38.13	1451	43.85	1511	49.74	1569	55.72	1625	61.76		
33200	1204	17.52	1275	23.22	1339	28.93	1398	34.70	1455	40.71	1509	46.84	1562	53.14	1615	59.66	1667	66.25	1719	73.06		
38000	1357	24.22	1423	30.84	1482	37.35	1536	43.81	1588	50.43	1638	57.19	1687	64.19	1734	71.26	1780	78.45	1826	85.81		
42800			1572	40.05	1627	47.40	1678	54.70	1726	61.99	1773	69.48	1818	77.02	1862	84.75						

MAXIMUM RPM: CLASS I = 1151 CLASS II = 1465 CLASS III = 1884 Outlet Area = 10.35 ft² Max. BHP = 14.43 x (RPM / 1000)³

365 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 36.50"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8000	486	1.72																				
9200	506	1.96																				
10400	535	2.27																				
11600	566	2.61	691	4.97																		
14000	630	3.36	739	6.04	843	9.00																
16400	698	4.27	800	7.36	887	10.52	977	14.04														
18800	767	5.34	863	8.81	946	12.40	1022	16.10	1099	20.06												
23600	912	8.13	998	12.39	1073	16.77	1141	21.24	1205	25.81	1264	30.36	1325	35.24	1388	40.37						
28400	1061	11.88	1139	16.98	1208	22.15	1271	27.42	1329	32.74	1385	38.19	1438	43.67	1488	49.15	1537	54.72	1587	60.53	1692	72.93
33200	1213	16.79	1284	22.73	1348	28.73	1407	34.81	1461	40.88	1513	47.13	1562	53.39	1610	59.77	1656	66.16	1699	72.43	1784	85.42
38000	1367	23.04	1432	29.84	1492	36.72	1546	43.52	1598	50.48	1647	57.48	1693	64.49	1738	71.68	1781	78.87	1823	86.13		
42800			1583	38.54	1638	46.20	1690	53.94	1738	61.63	1784	69.39	1829	77.31	1871	85.16						

MAXIMUM RPM: CLASS I = 1151 CLASS II = 1465 CLASS III = 1884 Outlet Area = 10.35 ft² Max. BHP = 15.14 x (RPM / 1000)³

365 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 36.50"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
8000	489	1.75																				
9200	513	2.02																				
10400	542	2.34																				
11600	575	2.71	696	5.05																		
14000	646	3.60	749	6.23	849	9.16																
16400	719	4.67	813	7.67	899	10.85	985	14.32														
18800	793	5.96	883	9.37	960	12.87	1035	16.56	1109	20.47	1187	24.84										
23600	946	9.32	1029	13.61	1099	17.89	1161	22.22	1222	26.73	1281	31.31	1340	36.10	1400	41.17	1462	46.61				
28400	1103	13.91	1178	19.05	1245	24.27	1304	29.43	1357	34.58	1408	39.86	1458	45.22	1508	50.74	1557	56.35	1606	62.13	1705	74.28
33200	1264	20.06	1332	26.05	1393	32.06	1450	38.16	1502	44.22	1550	50.30	1594	56.29	1637	62.39	1680	68.65	1723	75.02	1808	88.09
38000			1489	34.81	1545	41.63	1599	48.64	1649	55.63	1695	62.52	1739	69.50	1779	76.30	1818	83.23	1856	90.22		
42800			1648	45.56	1700	53.23	1750	61.04	1797	68.85	1842	76.74	1884	84.52								

MAXIMUM RPM: CLASS I = 1151 CLASS II = 1465 CLASS III = 1884 Outlet Area = 10.35 ft² Max. BHP = 15.03 x (RPM / 1000)³

Class I = First white section

Class II = Blue shaded section

Class III = Bolded section after blue section

Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.

Power rating (BHP) does not include transmission losses.

Performance ratings do not include the effects of appurtenances (accessories).

Performance based on a shaft height of 25.50" above the base on fan size 365.

402 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 40.25"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
10000	<u>448</u>	<u>2.06</u>																				
11500	<u>467</u>	<u>2.37</u>																				
13000	490	2.71	622	5.41																		
16000	540	3.50	<u>657</u>	<u>6.59</u>	762	9.97																
19000	595	4.44	702	7.95	<u>797</u>	<u>11.74</u>	885	15.72														
22000	654	5.56	752	9.51	840	13.71	921	18.13	998	22.72	1072	27.53										
25000	717	6.93	806	11.32	888	15.90	964	20.75	1035	25.75	1103	30.87	1169	36.19								
28000	782	8.56	863	13.35	940	18.41	1012	23.66	1078	29.01	1142	34.61	1204	40.35	1264	46.22	1322	52.19				
34000	918	12.84	985	18.27	1051	24.19	1115	30.31	1176	36.56	1234	42.96	1290	49.59	1343	56.24	1395	63.07	1446	70.02		
40000	<u>1057</u>	<u>18.56</u>	1115	24.70	1172	31.33	1228	38.30	1283	45.48	1336	52.72	1388	60.18	1437	67.63	1485	75.32	1531	83.03		
46000			<u>1250</u>	<u>32.94</u>	1300	40.21	1350	47.96	1399	56.00	1446	64.04	1493	72.30	1539	80.67	1584	89.18	1628	97.85		
52000			1389	43.27	1433	51.19	1477	59.51	1521	68.26	1564	77.22	1607	86.43	1649	95.68	1690	104.96				

MAXIMUM RPM: CLASS I = 1044 CLASS II = 1329 CLASS III = 1708 Outlet Area = 12.60 ft² Max. BHP = 23.25 x (RPM / 1000)³

402 EPF (9-Blade, Arr. 3)

Wheel Diameter: 40.25"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
10000	<u>454</u>	<u>2.18</u>																				
11500	<u>474</u>	<u>2.50</u>																				
13000	497	2.87	628	5.66																		
16000	549	3.71	<u>667</u>	<u>6.98</u>	770	10.45																
19000	609	4.78	712	8.42	808	12.38	895	16.52	981	21.07												
22000	672	6.09	765	10.13	852	14.51	934	19.13	1010	23.89	1083	28.87										
25000	738	7.70	824	12.15	901	16.85	978	21.97	1050	27.21	1118	32.59	1182	38.01	1247	43.87	1314	50.25				
28000	805	9.59	885	14.45	957	19.60	1026	25.03	1094	30.75	1159	36.61	1221	42.62	1279	48.57	1337	54.86	1394	61.32		
34000	943	14.45	1014	20.26	1078	26.20	1138	32.43	1195	38.84	1251	45.45	1307	52.33	1362	59.43	1415	66.61	1466	73.87		
40000	<u>1083</u>	<u>20.84</u>	1148	27.73	1206	34.58	1260	41.56	1312	48.83	1361	56.20	1410	63.90	1458	71.71	1506	79.75	1553	87.90		
46000	<u>1226</u>	<u>29.16</u>	1285	37.08	1339	44.99	1388	52.80	1436	60.90	1481	69.04	1525	77.44	1568	86.05	1610	94.77	1652	103.72		
52000			1425	48.66	1475	57.61	1521	66.45	1564	75.24	1607	84.39	1648	93.58	1688	103.00						

MAXIMUM RPM: CLASS I = 1044 CLASS II = 1329 CLASS III = 1708 Outlet Area = 12.60 ft² Max. BHP = 23.52 x (RPM / 1000)³

402 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 40.25"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
10000	<u>443</u>	<u>2.14</u>																				
11500	<u>464</u>	<u>2.46</u>																				
13000	492	2.86																				
16000	550	3.73	652	6.83																		
19000	613	4.82	707	8.40	<u>790</u>	<u>12.17</u>																
22000	677	6.09	765	10.16	842	14.39	913	18.79	988	23.62												
25000	743	7.61	827	12.20	899	16.91	965	21.75	1027	26.71	1092	32.08										
28000	811	9.42	890	14.49	959	19.72	1022	25.07	1079	30.39	1135	35.96	1192	41.83	1251	48.01						
34000	949	13.95	1021	20.08	1084	26.27	1141	32.55	1195	39.03	1246	45.55	1294	52.10	1339	58.58	1385	65.42	1432	72.55	1529	87.50
40000	<u>1091</u>	<u>19.98</u>	1156	27.16	1214	34.37	1268	41.71	1317	49.02	1364	56.51	1409	64.11	1453	71.84	1494	79.41	1534	87.12	1611	102.71
46000	<u>1235</u>	<u>27.75</u>	1294	35.97	1348	44.24	1398	52.58	1445	60.98	1489	69.39	1531	77.92	1571	86.48	1610	95.17	1649	104.10		
52000			1435	46.83	1485	56.15	1531	65.42	1575	74.82	1617	84.29	1657	93.78	1696	103.47						

MAXIMUM RPM: CLASS I = 1044 CLASS II = 1329 CLASS III = 1708 Outlet Area = 12.60 ft² Max. BHP = 24.68 x (RPM / 1000)³

402 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 40.25"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
10000	<u>447</u>	<u>2.18</u>																				
11500	<u>470</u>	<u>2.53</u>																				
13000	499	2.96	620	5.75																		
16000	563	3.97	661	7.04	760	10.61																
19000	631	5.25	718	8.74	799	12.47	882	16.67														
22000	699	6.75	782	10.76	854	14.91	924	19.29	995	24.04												
25000	769	8.57	850	13.17	915	17.70	978	22.47	1039	27.38	1101	32.66	1166	38.48								
28000	841	10.76	918	15.91	981	20.95	1038	26.10	1094	31.44	1149	36.96	1204	42.73	1260	48.86	1318	55.46				
34000	987	16.33	1056	22.51	1117	28.75	1171	34.96	1219	41.11	1265	47.36	1312	53.93	1358	60.59	1403	67.34	1448	74.31	1540	89.13
40000	<u>1137</u>	<u>23.86</u>	1199	31.08	1255	38.36	1307	45.73	1354	53.01	1397	60.26	1437	67.48	1477	74.95	1516	82.46	1556	90.27	1633	105.96
46000			<u>1345</u>	<u>41.90</u>	1396	50.16	1445	58.64	1490	67.04	1533	75.55	1572	83.85	1609	92.21	1644	100.53	1678	108.89		
52000			1493	55.26	1541	64.67	1586	74.11	1629	83.67	1669	93.11	1708	102.73								

MAXIMUM RPM: CLASS I = 1044 CLASS II = 1329 CLASS III = 1708 Outlet Area = 12.60 ft² Max. BHP = 24.47 x (RPM / 1000)³

Class I = First white section

Class II = Blue shaded section

Class III = Bolded section after blue section

Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.

Power rating (BHP) does not include transmission losses.

Performance ratings do not include the effects of appurtenances (accessories).

Performance based on a shaft height of 28.12" above the base on fan

445 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 44.50" Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	<u>403</u>	<u>2.47</u>																				
13800	<u>420</u>	<u>2.84</u>																				
15600	440	3.25	560	6.49																		
17400	461	3.68	<u>574</u>	<u>7.17</u>																		
21000	507	4.69	<u>610</u>	<u>8.70</u>	<u>700</u>	<u>12.97</u>																
24600	558	5.92	652	10.42	<u>735</u>	<u>15.24</u>	812	20.30	886	25.69												
28200	612	7.37	697	12.37	775	17.69	<u>846</u>	<u>23.24</u>	<u>914</u>	<u>29.07</u>	<u>978</u>	<u>34.98</u>										
35400	727	11.20	798	17.20	865	23.49	929	30.06	<u>989</u>	<u>36.88</u>	<u>1046</u>	<u>43.92</u>	<u>1101</u>	<u>51.13</u>	<u>1154</u>	<u>58.44</u>	<u>1205</u>	<u>65.81</u>	<u>1256</u>	<u>73.55</u>		
42600	848	16.57	907	23.31	<u>966</u>	<u>30.73</u>	<u>1022</u>	<u>38.28</u>	<u>1077</u>	<u>46.14</u>	<u>1129</u>	<u>54.12</u>	<u>1179</u>	<u>62.36</u>	<u>1226</u>	<u>70.57</u>	<u>1273</u>	<u>79.18</u>	<u>1318</u>	<u>87.76</u>		
49800	<u>972</u>	<u>23.71</u>	<u>1024</u>	<u>31.37</u>	<u>1074</u>	<u>39.50</u>	<u>1124</u>	<u>48.16</u>	<u>1173</u>	<u>57.06</u>	<u>1220</u>	<u>65.99</u>	<u>1266</u>	<u>75.14</u>	<u>1311</u>	<u>84.56</u>	<u>1354</u>	<u>94.06</u>	<u>1396</u>	<u>103.78</u>		
57000			<u>1144</u>	<u>41.50</u>	<u>1188</u>	<u>50.39</u>	<u>1233</u>	<u>60.00</u>	<u>1276</u>	<u>69.79</u>	<u>1319</u>	<u>79.90</u>	<u>1361</u>	<u>90.09</u>	<u>1402</u>	<u>100.39</u>	<u>1443</u>	<u>111.03</u>	<u>1482</u>	<u>121.61</u>		
64200			<u>1267</u>	<u>54.06</u>	<u>1307</u>	<u>63.90</u>	<u>1346</u>	<u>74.08</u>	<u>1386</u>	<u>84.95</u>	<u>1424</u>	<u>95.87</u>	<u>1463</u>	<u>107.31</u>	<u>1500</u>	<u>118.56</u>	<u>1537</u>	<u>130.03</u>				

MAXIMUM RPM: CLASS I = 944 CLASS II = 1202 CLASS III = 1545 Outlet Area = 15.38 ft² Max. BHP = 38.36 x (RPM / 1000)³

445 EPF (9-Blade, Arr. 3)

Wheel Diameter: 44.50" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	<u>408</u>	<u>2.60</u>																				
13800	<u>426</u>	<u>3.00</u>																				
15600	446	3.44	566	6.82																		
17400	468	3.91	<u>581</u>	<u>7.54</u>																		
21000	518	5.03	<u>618</u>	<u>9.17</u>	<u>709</u>	<u>13.67</u>	794	18.53														
24600	572	6.41	661	11.02	<u>745</u>	<u>16.07</u>	<u>822</u>	<u>21.35</u>	894	26.84												
28200	629	8.11	710	13.18	786	18.73	<u>859</u>	<u>24.63</u>	<u>926</u>	<u>30.63</u>	<u>989</u>	<u>36.75</u>	<u>1053</u>	<u>43.45</u>								
35400	748	12.57	819	18.69	883	25.16	943	31.90	<u>1003</u>	<u>39.04</u>	<u>1061</u>	<u>46.42</u>	<u>1116</u>	<u>53.90</u>	<u>1168</u>	<u>61.40</u>	<u>1219</u>	<u>69.16</u>	<u>1269</u>	<u>77.13</u>		
42600	871	18.66	934	25.91	991	33.33	1044	41.01	1095	49.03	1145	57.30	1195	65.91	<u>1244</u>	<u>74.74</u>	<u>1291</u>	<u>83.61</u>	<u>1337</u>	<u>92.71</u>		
49800	<u>996</u>	<u>26.65</u>	<u>1054</u>	<u>35.22</u>	<u>1105</u>	<u>43.65</u>	<u>1154</u>	<u>52.40</u>	<u>1200</u>	<u>61.32</u>	<u>1244</u>	<u>70.47</u>	<u>1287</u>	<u>79.88</u>	<u>1330</u>	<u>89.59</u>	<u>1373</u>	<u>99.58</u>	<u>1415</u>	<u>109.67</u>		
57000	<u>1122</u>	<u>36.80</u>	<u>1176</u>	<u>46.74</u>	<u>1224</u>	<u>56.49</u>	<u>1268</u>	<u>66.17</u>	<u>1310</u>	<u>76.00</u>	<u>1352</u>	<u>86.34</u>	<u>1391</u>	<u>96.62</u>	<u>1429</u>	<u>107.13</u>	<u>1467</u>	<u>117.99</u>	<u>1505</u>	<u>129.14</u>		
64200			<u>1300</u>	<u>60.84</u>	<u>1345</u>	<u>71.91</u>	<u>1386</u>	<u>82.76</u>	<u>1425</u>	<u>93.66</u>	<u>1463</u>	<u>104.8</u>	<u>1500</u>	<u>116.15</u>	<u>1536</u>	<u>127.73</u>						

MAXIMUM RPM: CLASS I = 944 CLASS II = 1202 CLASS III = 1545 Outlet Area = 15.38 ft² Max. BHP = 38.87 x (RPM / 1000)³

445 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 44.50" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	<u>399</u>	<u>2.57</u>																				
13800	<u>417</u>	<u>2.95</u>																				
15600	441	3.41																				
17400	466	3.91	<u>568</u>	<u>7.44</u>																		
21000	520	5.07	609	9.09	<u>693</u>	<u>13.49</u>																
24600	576	6.44	659	11.05	<u>731</u>	<u>15.84</u>	<u>803</u>	<u>21.03</u>														
28200	634	8.09	712	13.28	780	18.67	<u>841</u>	<u>24.14</u>	904	30.09												
35400	753	12.28	824	18.72	885	25.26	941	32.00	<u>993</u>	<u>38.81</u>	<u>1041</u>	<u>45.61</u>	<u>1090</u>	<u>52.82</u>	<u>1141</u>	<u>60.47</u>	<u>1194</u>	<u>68.57</u>				
42600	877	18.01	941	25.69	997	33.41	1048	41.25	1096	49.30	1142	57.51	1185	65.67	<u>1225</u>	<u>73.72</u>	<u>1266</u>	<u>82.26</u>	<u>1306</u>	<u>90.82</u>	<u>1391</u>	<u>109.31</u>
49800	<u>1003</u>	<u>25.49</u>	<u>1061</u>	<u>34.42</u>	<u>1113</u>	<u>43.39</u>	<u>1161</u>	<u>52.47</u>	<u>1206</u>	<u>61.69</u>	<u>1248</u>	<u>70.99</u>	<u>1288</u>	<u>80.36</u>	<u>1327</u>	<u>89.89</u>	<u>1364</u>	<u>99.33</u>	<u>1400</u>	<u>108.91</u>	<u>1469</u>	<u>128.27</u>
57000	<u>1131</u>	<u>35.06</u>	<u>1184</u>	<u>45.27</u>	<u>1232</u>	<u>55.46</u>	<u>1277</u>	<u>65.79</u>	<u>1319</u>	<u>76.16</u>	<u>1359</u>	<u>86.64</u>	<u>1397</u>	<u>97.24</u>	<u>1433</u>	<u>107.84</u>	<u>1468</u>	<u>118.58</u>	<u>1502</u>	<u>129.37</u>		
64200			<u>1309</u>	<u>58.50</u>	<u>1354</u>	<u>70.02</u>	<u>1396</u>	<u>81.57</u>	<u>1435</u>	<u>93.06</u>	<u>1473</u>	<u>104.79</u>	<u>1509</u>	<u>116.50</u>	<u>1544</u>	<u>128.42</u>						

MAXIMUM RPM: CLASS I = 944 CLASS II = 1202 CLASS III = 1545 Outlet Area = 15.38 ft² Max. BHP = 40.80 x (RPM / 1000)³

445 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 44.50" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
12000	<u>402</u>	<u>2.62</u>																				
13800	<u>422</u>	<u>3.03</u>																				
15600	447	3.53																				
17400	474	4.08	<u>573</u>	<u>7.60</u>																		
21000	533	5.42	617	9.37	<u>698</u>	<u>13.72</u>																
24600	594	7.07	670	11.53	740	16.28	810	21.47														
28200	655	9.01	729	14.15	791	19.35	852	24.86														
35400	781	14.08	850	20.59	907	27.00	<u>957</u>	<u>33.42</u>	<u>1007</u>	<u>40.21</u>	<u>1055</u>	<u>47.05</u>	<u>1103</u>	<u>54.20</u>	<u>1151</u>	<u>61.65</u>	<u>1201</u>	<u>69.69</u>	<u>1253</u>	<u>78.39</u>		
42600	912	21.13	973	28.83	<u>1028</u>	<u>36.67</u>	1076	44.38	1120	52.19	1161	60.02	1202	68.11	<u>1242</u>	<u>76.23</u>	<u>1282</u>	<u>84.63</u>	<u>1322</u>	<u>93.29</u>	<u>1403</u>	<u>111.56</u>
49800	<u>1045</u>	<u>30.46</u>	<u>1100</u>	<u>39.40</u>	<u>1151</u>	<u>48.54</u>	<u>1197</u>	<u>57.63</u>	<u>1240</u>	<u>66.79</u>	<u>1279</u>	<u>75.86</u>	<u>1315</u>	<u>84.85</u>	<u>1350</u>	<u>93.97</u>	<u>1385</u>	<u>103.35</u>	<u>1420</u>	<u>112.88</u>	<u>1489</u>	<u>132.37</u>
57000			<u>1230</u>	<u>52.71</u>	<u>1277</u>	<u>63.11</u>	<u>1320</u>	<u>73.46</u>	<u>1361</u>	<u>83.96</u>	<u>1399</u>	<u>94.37</u>	<u>1435</u>	<u>104.82</u>	<u>1468</u>	<u>115.09</u>	<u>1500</u>	<u>1</u>				

490 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 49.00"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	376	<u>3.29</u>																				
18000	392	3.74																				
20000	409	4.20	514	8.25																		
24000	446	5.26	<u>542</u>	<u>9.89</u>	627	14.89																
28000	487	6.53	576	11.75	654	17.34	726	23.18														
32000	531	8.02	612	13.77	685	19.91	752	26.34	816	33.08												
36000	577	9.77	651	16.09	720	22.78	783	29.79	843	37.13	899	44.48	955	52.38								
44000	673	14.24	736	21.62	797	29.53	854	37.62	908	46.06	958	54.56	1007	63.42	1055	72.53	1101	81.67	1146	91.03		
52000	774	20.34	828	28.62	881	37.63	932	46.90	981	56.35	1028	66.06	1073	76.03	1116	86.13	1158	96.48	1200	107.26		
60000	878	28.34	925	37.53	971	47.38	1017	57.90	1061	68.50	1104	79.29	1147	90.58	1187	101.71	1226	113.14	1264	124.79		
68000			1025	48.61	1066	59.34	1107	70.79	1147	82.60	1186	94.57	1225	106.87	1263	119.30	1300	131.89	1336	144.66		
76000			1127	62.09	1164	73.77	1201	86.08	1237	98.79	1273	111.99	1309	125.58	1343	138.87	1378	152.77				

MAXIMUM RPM: CLASS I = 857 CLASS II = 1091 CLASS III = 1403 Outlet Area = 18.64 ft² Max. BHP = 62.10 x (RPM / 1000)³

490 EPF (9-Blade, Arr. 3)

Wheel Diameter: 49.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	381	<u>3.47</u>																				
18000	397	3.93	510	7.95																		
20000	414	4.42	520	8.67																		
24000	454	5.59	<u>550</u>	<u>10.46</u>	634	15.65																
28000	499	7.05	583	12.37	663	18.29	734	24.33	805	31.07												
32000	545	8.75	622	14.63	695	21.09	763	27.86	825	34.71	887	42.18										
36000	593	10.79	665	17.24	730	24.10	794	31.48	855	39.21	910	46.79	965	54.94	1020	63.59						
44000	693	16.04	756	23.59	813	31.53	867	39.90	920	48.64	972	57.75	1022	67.09	1069	76.42	1114	85.81	1159	95.68		
52000	795	22.92	853	31.88	904	40.86	952	50.22	998	59.97	1043	70.02	1088	80.46	1132	91.14	1175	102.05	1217	113.23		
60000	899	31.77	952	42.11	999	52.33	1043	62.77	1086	73.74	1126	84.77	1165	96.07	1204	107.73	1243	119.72	1282	132.10		
68000	1005	42.97	1054	54.77	1098	66.40	1138	77.89	1177	89.76	1215	102.02	1251	114.41	1286	127.04	1321	140.08	1355	153.12		
76000			1156	69.75	1198	82.94	1236	95.83	1272	108.78	1307	122.01	1341	135.50	1374	149.26						

MAXIMUM RPM: CLASS I = 857 CLASS II = 1091 CLASS III = 1403 Outlet Area = 18.64 ft² Max. BHP = 62.91 x (RPM / 1000)³

490 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 49.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	372	<u>3.40</u>																				
18000	391	3.89																				
20000	412	4.44																				
24000	455	5.63	539	10.30																		
28000	501	7.05	579	12.35	647	17.89																
32000	549	8.76	622	14.70	685	20.81	745	27.31	808	34.40												
36000	598	10.74	667	17.32	727	24.12	782	31.14	834	38.31	890	46.24										
44000	698	15.66	761	23.61	816	31.73	866	40.05	913	48.52	956	56.92	999	65.71	1044	75.13	1090	84.90				
52000	801	22.16	858	31.43	910	41.00	956	50.54	999	60.28	1040	70.17	1080	80.33	1116	90.10	1153	100.49	1189	110.89	1266	133.53
60000	906	30.48	959	41.25	1006	52.01	1050	63.00	1091	74.13	1129	85.29	1165	96.48	1201	108.09	1235	119.56	1268	131.19	1331	154.60
68000	1012	40.85	1061	53.07	1105	65.24	1146	77.53	1185	90.03	1221	102.42	1256	115.16	1289	127.86	1321	140.69	1352	153.55		
76000			1164	67.17	1206	80.89	1245	94.65	1281	108.30	1316	122.24	1349	136.12	1381	150.26						

MAXIMUM RPM: CLASS I = 857 CLASS II = 1091 CLASS III = 1403 Outlet Area = 18.64 ft² Max. BHP = 65.99 x (RPM / 1000)³

490 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 49.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
16000	377	<u>3.51</u>																				
18000	396	4.01																				
20000	418	4.61	513	8.78																		
24000	466	6.00	546	10.60	625	15.82																
28000	516	7.69	588	12.86	655	18.38	724	24.63														
32000	567	9.70	635	15.51	695	21.57	753	27.94	813	35.00												
36000	618	12.02	685	18.64	739	25.17	792	32.08	844	39.33	897	47.14	952	55.69								
44000	724	18.00	785	26.02	837	34.03	882	41.99	926	50.31	969	58.78	1012	67.64	1054	76.67	1098	86.45	1143	96.82		
52000	833	26.01	888	35.38	938	44.98	982	54.47	1021	63.85	1058	73.36	1095	83.21	1132	93.31	1168	103.51	1204	114.02	1276	135.90
60000	944	36.40	994	47.16	1040	58.11	1082	69.06	1121	80.07	1156	90.89	1189	101.76	1221	112.78	1253	124.09	1285	135.60	1348	159.13
68000			1102	61.67	1145	74.07	1185	86.56	1222	98.98	1257	111.47	1289	123.74	1319	135.97	1348	148.32	1376	160.69		
76000			1212	79.36	1251	92.95	1289	106.93	1324	120.74	1358	134.82	1389	148.50								

MAXIMUM RPM: CLASS I = 857 CLASS II = 1091 CLASS III = 1403 Outlet Area = 18.64 ft² Max. BHP = 65.48 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 34.23" above the base on fan size 490.

542 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 54.25" Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	342	4.13																				
22500	356	4.65																				
25000	372	5.24	467	10.33																		
30000	407	6.61	493	12.38	569	18.60																
35000	445	8.23	524	14.67	594	21.64	659	28.97														
40000	486	10.15	558	17.28	624	24.99	684	33.03	740	41.21	796	50.15										
45000	528	12.35	595	20.31	656	28.56	713	37.37	766	46.40	817	55.73	866	65.30								
55000	618	18.20	674	27.39	727	37.07	779	47.31	827	57.74	872	68.37	916	79.44	959	90.82	1000	102.15	1040	113.71		
65000	711	26.05	759	36.35	806	47.55	851	59.03	895	70.86	937	82.91	978	95.51	1016	107.93	1054	120.96	1091	134.19		
75000	807	36.39	849	47.88	890	60.17	930	73.07	970	86.50	1008	99.87	1046	113.78	1082	127.69	1117	141.92	1151	156.41		
85000			941	62.11	977	75.36	1014	89.73	1049	104.26	1084	119.28	1119	134.70	1152	149.83	1185	165.46	1218	181.67		
95000			1035	79.47	1068	94.04	1101	109.38	1133	125.19	1165	141.62	1197	158.53	1227	175.00	1258	192.24				

MAXIMUM RPM: CLASS I = 775 CLASS II = 986 CLASS III = 1267 Outlet Area = 22.86 ft² Max. BHP = 103.4 x (RPM / 1000)³

542 EPF (9-Blade, Arr. 3)

Wheel Diameter: 54.25" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	347	4.36																				
22500	361	4.92	462	9.90																		
25000	378	5.58	472	10.83																		
30000	415	7.06	500	13.08	575	19.50																
35000	456	8.88	532	15.59	603	22.91	666	30.36	729	38.66												
40000	499	11.09	568	18.43	632	26.34	693	34.76	749	43.35	803	52.36	860	62.62								
45000	544	13.76	608	21.77	666	30.34	723	39.50	777	49.01	827	58.59	875	68.44	924	79.16						
55000	636	20.49	692	29.88	743	39.77	791	50.16	838	61.00	884	72.21	929	83.87	972	95.73	1012	107.34	1052	119.51		
65000	730	29.34	782	40.57	827	51.67	871	63.55	911	75.44	951	87.93	991	100.89	1031	114.40	1069	127.83	1106	141.48		
75000	826	40.78	874	53.83	915	66.41	955	79.58	993	93.12	1029	106.94	1064	121.08	1098	135.36	1133	150.38	1167	165.46		
85000	923	55.12	967	69.91	1006	84.36	1043	99.04	1077	113.58	1111	128.85	1144	144.57	1175	160.19	1206	176.35	1236	192.48		
95000			1062	89.44	1099	105.80	1133	121.92	1166	138.39	1197	154.80	1227	171.45	1257	188.80						

MAXIMUM RPM: CLASS I = 775 CLASS II = 986 CLASS III = 1267 Outlet Area = 22.86 ft² Max. BHP = 104.6 x (RPM / 1000)³

542 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 54.25" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	339	4.28																				
22500	356	4.87																				
25000	376	5.58	462	10.72																		
30000	416	7.10	490	12.83																		
35000	459	8.94	528	15.50	589	22.42	652	30.05														
40000	503	11.11	568	18.48	625	26.18	677	34.07	733	42.91												
45000	548	13.63	610	21.86	664	30.39	713	39.10	759	47.99	808	57.73										
55000	640	19.92	697	29.92	746	40.01	791	50.43	833	60.97	872	71.56	910	82.44	949	93.92	989	105.84	1030	118.28		
65000	735	28.27	787	40.00	833	51.87	874	63.72	913	75.98	950	88.42	985	100.84	1018	113.26	1050	125.83	1082	138.76	1149	166.41
75000	832	39.01	879	52.41	922	66.03	961	79.67	997	93.33	1032	107.51	1064	121.40	1096	135.81	1127	150.30	1156	164.55	1212	193.54
85000	930	52.44	974	67.77	1013	82.90	1050	98.34	1084	113.67	1117	129.36	1148	145.09	1178	161.10	1207	177.26	1235	193.44		
95000			1069	85.94	1107	103.22	1141	120.16	1174	137.48	1205	154.77	1234	171.88	1263	189.62						

MAXIMUM RPM: CLASS I = 775 CLASS II = 986 CLASS III = 1267 Outlet Area = 22.86 ft² Max. BHP = 109.8 x (RPM / 1000)³

542 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 54.25" Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
20000	343	4.39																				
22500	361	5.04																				
25000	381	5.77	465	10.90																		
30000	426	7.57	497	13.27	567	19.71																
35000	472	9.72	536	16.12	596	23.00	657	30.71														
40000	519	12.28	580	19.53	634	27.13	686	35.10	738	43.64												
45000	567	15.33	626	23.49	675	31.71	722	40.29	768	49.23	815	58.90	863	69.29								
55000	665	23.05	719	33.01	766	43.07	807	53.13	845	63.25	884	73.97	922	84.92	959	96.03	997	107.82	1037	120.67		
65000	765	33.32	815	45.18	859	57.05	899	69.01	934	80.72	967	92.56	999	104.56	1032	117.15	1064	129.79	1096	142.82	1160	169.98
75000	868	46.84	912	60.19	953	73.83	991	87.62	1026	101.38	1058	115.05	1087	128.43	1116	142.32	1144	156.22	1173	170.81	1229	200.04
85000			1012	78.97	1050	94.36	1086	110.02	1119	125.50	1150	140.96	1180	156.74	1207	172.04	1233	187.47	1258	202.90		
95000			1113	101.67	1148	118.70	1182	136.18	1213	153.33	1243	170.73										

MAXIMUM RPM: CLASS I = 775 CLASS II = 986 CLASS III = 1267 Outlet Area = 22.86 ft² Max. BHP = 108.9 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 37.90" above the base on fan size 542.

600 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 60.00"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
25000	311	5.14																				
28000	324	5.79																				
31000	339	6.55	423	12.74																		
37000	370	8.20	447	15.27	515	22.87																
43000	403	10.09	475	18.08	538	26.62	596	35.50														
49000	440	12.45	505	21.19	564	30.53	618	40.32	670	50.63	720	61.44										
55000	477	15.08	537	24.71	593	34.92	644	45.57	692	56.61	738	67.96	783	79.86								
67000	557	22.09	608	33.33	656	45.13	703	57.59	746	70.17	787	83.19	827	96.73	866	110.62	903	124.38	939	138.37		
79000	640	31.51	683	43.96	726	57.66	767	71.67	807	86.09	845	100.75	882	116.03	917	131.39	951	147.06	984	162.89		
91000	724	43.59	762	57.48	800	72.58	837	88.44	872	104.29	908	121.07	942	137.78	975	154.85	1007	172.30	1037	189.46		
103000			844	74.42	877	90.57	910	107.77	943	125.84	975	144.12	1006	162.44	1037	181.31	1067	200.30	1096	219.44		
115000			928	95.13	958	112.79	987	130.99	1017	150.52	1046	170.38	1075	190.80	1103	211.12	1131	231.90				

MAXIMUM RPM: CLASS I = 700 CLASS II = 891 CLASS III = 1146 Outlet Area = 27.98 ft² Max. BHP = 171.1 x (RPM / 1000)³

600 EPF (9-Blade, Arr. 3)

Wheel Diameter: 60.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
25000	316	5.46																				
28000	329	6.15	419	12.28																		
31000	344	6.95	429	13.48																		
37000	377	8.74	453	16.10	521	24.04	588	33.13														
43000	414	10.98	482	19.18	546	28.16	603	37.32	659	47.34												
49000	452	13.63	514	22.59	572	32.31	627	42.61	678	53.23	727	64.33	777	76.48								
55000	491	16.75	549	26.54	602	37.08	653	48.16	702	59.82	747	71.45	791	83.66	835	96.65						
67000	573	24.83	624	36.31	670	48.32	714	61.12	756	74.15	798	87.92	839	102.23	877	116.32	914	130.78	950	145.52		
79000	657	35.46	703	48.89	745	62.65	784	76.86	821	91.55	858	107.01	894	122.68	929	138.56	964	155.13	998	171.99		
91000	742	49.02	785	64.73	823	80.21	859	96.12	893	112.40	926	129.31	957	146.13	989	163.98	1020	181.81	1052	200.74		
103000	828	65.99	868	83.92	903	101.30	936	118.86	968	136.94	999	155.55	1028	174.16	1057	193.56	1085	213.07	1112	232.45		
115000			952	106.95	986	126.89	1017	146.47	1046	165.96	1074	185.75	1102	206.32	1129	227.22						

MAXIMUM RPM: CLASS I = 700 CLASS II = 891 CLASS III = 1146 Outlet Area = 27.98 ft² Max. BHP = 173.1 x (RPM / 1000)³

600 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 60.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
25000	309	5.35																				
28000	325	6.10																				
31000	342	6.92	419	13.27																		
37000	378	8.79	445	15.89	511	23.93																
43000	416	11.00	479	19.13	533	27.48	590	36.89														
49000	455	13.59	514	22.66	565	31.99	613	41.85	663	52.56												
55000	495	16.63	551	26.66	600	37.12	644	47.69	686	58.64	730	70.45										
67000	577	24.20	628	36.28	673	48.69	713	61.21	751	74.02	787	87.13	821	100.23	857	114.45	893	128.86				
79000	661	34.11	708	48.33	749	62.57	787	77.19	822	91.99	856	107.27	888	122.49	918	137.64	947	152.94	976	168.65	1037	202.33
91000	747	46.85	790	63.17	829	79.72	864	96.15	897	112.87	928	129.79	958	147.08	987	164.56	1015	182.12	1041	199.27	1092	234.59
103000	834	62.76	874	81.33	910	99.86	943	118.38	974	137.01	1004	156.08	1032	175.11	1059	194.41	1085	213.81	1111	233.78		
115000			958	102.74	992	123.45	1024	144.39	1053	164.92	1081	185.76	1108	206.82	1134	228.14						

MAXIMUM RPM: CLASS I = 700 CLASS II = 891 CLASS III = 1146 Outlet Area = 27.98 ft² Max. BHP = 181.9 x (RPM / 1000)³

600 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 60.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
25000	313	5.51																				
28000	329	6.29																				
31000	347	7.18	422	13.51																		
37000	387	9.36	451	16.39	514	24.33																
43000	428	11.97	486	19.85	540	28.30	594	37.58														
49000	470	15.09	525	23.95	573	33.14	620	42.88	668	53.57												
55000	512	18.69	566	28.74	610	38.73	653	49.33	694	60.12	736	71.78	780	84.65								
67000	599	27.92	648	40.05	691	52.40	728	64.65	763	77.15	798	90.12	832	103.31	866	117.03	901	131.65	936	146.75		
79000	688	40.19	733	54.52	773	68.96	809	83.43	841	97.75	871	112.18	901	127.16	930	142.06	960	157.91	988	173.24	1047	206.80
91000	779	56.15	819	72.33	857	89.12	891	105.71	923	122.52	951	138.70	978	155.25	1004	171.96	1030	189.13	1056	206.63	1107	242.21
103000			908	94.67	942	113.13	975	132.22	1005	150.99	1033	169.67	1060	188.70	1084	206.97	1108	225.90	1131	244.79		
115000			998	121.65	1030	142.37	1060	163.15	1089	184.32	1116	205.28	1142	226.42								

MAXIMUM RPM: CLASS I = 700 CLASS II = 891 CLASS III = 1146 Outlet Area = 27.98 ft² Max. BHP = 180.2 x (RPM / 1000)³

Class I = First white section

Class II = Blue shaded section

Class III = Bolded section after blue section

Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.

Power rating (BHP) does not include transmission losses.

Performance ratings do not include the effects of appurtenances (accessories).

Performance based on a shaft height of 41.92" above the base on fan size 600.

660 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 66.00"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
30000	282	6.17																				
35000	299	7.31	379	14.52																		
40000	317	8.53	<u>392</u>	<u>16.50</u>																		
45000	337	9.97	<u>407</u>	<u>18.57</u>	469	<u>27.85</u>																
53000	371	12.59	435	22.29	492	32.80	544	43.64														
61000	408	15.79	466	26.64	519	38.20	<u>567</u>	<u>50.20</u>	613	62.77	<u>657</u>	<u>75.78</u>										
69000	446	19.54	499	31.57	549	44.33	594	57.40	<u>637</u>	<u>71.20</u>	<u>678</u>	<u>85.32</u>	<u>717</u>	<u>99.59</u>	756	114.81						
77000	486	24.13	534	37.15	580	50.97	623	65.19	<u>664</u>	<u>80.20</u>	<u>702</u>	<u>95.29</u>	<u>740</u>	<u>111.32</u>	<u>775</u>	<u>126.80</u>	<u>810</u>	<u>143.08</u>	<u>845</u>	<u>160.24</u>		
93000	568	35.82	608	50.55	648	66.76	686	83.28	723	100.34	759	118.17	792	135.79	<u>824</u>	<u>153.85</u>	<u>856</u>	<u>172.78</u>	<u>887</u>	<u>191.87</u>		
109000	<u>653</u>	<u>51.66</u>	<u>687</u>	<u>68.12</u>	<u>722</u>	<u>86.31</u>	<u>756</u>	<u>105.39</u>	<u>788</u>	<u>124.36</u>	<u>821</u>	<u>144.53</u>	<u>852</u>	<u>164.54</u>	<u>882</u>	<u>184.95</u>	<u>911</u>	<u>205.76</u>	<u>939</u>	<u>226.79</u>		
125000			<u>769</u>	<u>90.56</u>	<u>799</u>	<u>110.16</u>	<u>829</u>	<u>131.05</u>	<u>859</u>	<u>153.00</u>	<u>888</u>	<u>175.16</u>	<u>916</u>	<u>197.31</u>	<u>944</u>	<u>220.10</u>	<u>971</u>	<u>242.96</u>	<u>998</u>	<u>266.68</u>		
141000			<u>853</u>	<u>118.46</u>	<u>880</u>	<u>140.06</u>	<u>907</u>	<u>162.78</u>	<u>933</u>	<u>186.09</u>	<u>959</u>	<u>210.28</u>	<u>985</u>	<u>235.18</u>	<u>1011</u>	<u>260.66</u>	<u>1036</u>	<u>285.91</u>				

MAXIMUM RPM: CLASS I = 637 CLASS II = 810 CLASS III = 1041 Outlet Area = 33.84 ft² Max. BHP = 275.4 x (RPM / 1000)³

660 EPF (9-Blade, Arr. 3)

Wheel Diameter: 66.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
30000	286	6.52																				
35000	303	7.72	383	15.24																		
40000	322	9.06	<u>397</u>	<u>17.36</u>	464	26.54																
45000	344	10.67	<u>413</u>	<u>19.65</u>	<u>475</u>	<u>29.37</u>	534	40.05														
53000	381	13.69	441	23.58	499	34.64	551	46.01	601	58.17												
61000	419	17.31	474	28.30	526	40.37	<u>576</u>	<u>53.27</u>	<u>621</u>	<u>66.15</u>	<u>664</u>	<u>79.52</u>	708	94.23								
69000	459	21.75	510	33.83	557	46.93	602	60.63	<u>646</u>	<u>75.17</u>	<u>687</u>	<u>89.90</u>	<u>726</u>	<u>104.94</u>	<u>764</u>	<u>120.50</u>	<u>803</u>	<u>137.36</u>				
77000	500	27.04	548	40.35	591	54.34	632	69.07	<u>673</u>	<u>84.73</u>	<u>712</u>	<u>100.67</u>	<u>750</u>	<u>117.31</u>	<u>785</u>	<u>133.58</u>	<u>819</u>	<u>150.20</u>	<u>854</u>	<u>168.21</u>		
93000	583	40.25	626	56.15	665	72.48	701	89.33	735	106.64	769	124.76	803	143.65	<u>836</u>	<u>162.84</u>	<u>868</u>	<u>182.36</u>	<u>899</u>	<u>202.19</u>		
109000	<u>668</u>	<u>57.77</u>	<u>708</u>	<u>76.75</u>	<u>743</u>	<u>95.40</u>	<u>775</u>	<u>114.11</u>	<u>807</u>	<u>134.08</u>	<u>837</u>	<u>154.30</u>	<u>866</u>	<u>174.88</u>	<u>895</u>	<u>196.12</u>	<u>924</u>	<u>217.98</u>	<u>952</u>	<u>239.80</u>		
125000	<u>755</u>	<u>80.52</u>	<u>791</u>	<u>102.19</u>	<u>823</u>	<u>123.38</u>	<u>853</u>	<u>144.72</u>	<u>882</u>	<u>166.65</u>	<u>910</u>	<u>189.14</u>	<u>936</u>	<u>211.50</u>	<u>962</u>	<u>234.79</u>	<u>988</u>	<u>258.88</u>	<u>1013</u>	<u>282.83</u>		
141000			<u>875</u>	<u>133.21</u>	<u>905</u>	<u>157.30</u>	<u>934</u>	<u>181.86</u>	<u>960</u>	<u>205.63</u>	<u>986</u>	<u>230.36</u>	<u>1011</u>	<u>255.36</u>	<u>1035</u>	<u>280.62</u>						

MAXIMUM RPM: CLASS I = 637 CLASS II = 810 CLASS III = 1041 Outlet Area = 33.84 ft² Max. BHP = 278.8 x (RPM / 1000)³

660 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 66.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
30000	280	6.42																				
35000	300	7.67																				
40000	322	9.12	388	17.10																		
45000	345	10.74	<u>406</u>	<u>19.41</u>	465	29.07																
53000	383	13.71	440	23.75	<u>488</u>	<u>33.91</u>	<u>539</u>	<u>45.48</u>														
61000	422	17.25	475	28.49	521	40.11	563	52.08	607	65.26												
69000	462	21.43	513	34.14	556	47.02	596	60.37	<u>633</u>	<u>73.92</u>	<u>671</u>	<u>88.42</u>	<u>710</u>	<u>103.59</u>								
77000	503	26.38	551	40.36	593	54.78	631	69.49	<u>666</u>	<u>84.27</u>	<u>699</u>	<u>99.27</u>	<u>732</u>	<u>114.86</u>	<u>767</u>	<u>131.64</u>						
93000	587	38.87	631	55.78	669	72.67	704	90.01	736	107.44	767	125.33	796	143.13	<u>823</u>	<u>160.70</u>	<u>851</u>	<u>179.51</u>	<u>878</u>	<u>198.13</u>	<u>936</u>	<u>238.73</u>
109000	<u>673</u>	<u>55.36</u>	<u>712</u>	<u>74.80</u>	<u>748</u>	<u>94.74</u>	<u>780</u>	<u>114.44</u>	<u>810</u>	<u>134.42</u>	<u>839</u>	<u>155.09</u>	<u>866</u>	<u>175.62</u>	<u>892</u>	<u>196.25</u>	<u>918</u>	<u>217.61</u>	<u>942</u>	<u>238.40</u>	<u>988</u>	<u>280.28</u>
125000	<u>760</u>	<u>76.42</u>	<u>796</u>	<u>98.84</u>	<u>829</u>	<u>121.44</u>	<u>859</u>	<u>143.92</u>	<u>887</u>	<u>166.44</u>	<u>914</u>	<u>189.40</u>	<u>940</u>	<u>212.86</u>	<u>964</u>	<u>235.90</u>	<u>988</u>	<u>259.72</u>	<u>1011</u>	<u>283.43</u>		
141000			<u>881</u>	<u>128.07</u>	<u>912</u>	<u>153.65</u>	<u>940</u>	<u>178.84</u>	<u>967</u>	<u>204.50</u>	<u>992</u>	<u>229.85</u>	<u>1016</u>	<u>255.36</u>	<u>1040</u>	<u>281.83</u>						

MAXIMUM RPM: CLASS I = 637 CLASS II = 810 CLASS III = 1041 Outlet Area = 33.84 ft² Max. BHP = 292.8 x (RPM / 1000)³

660 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 66.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
30000	283	6.56																				
35000	304	7.93	378	15.46																		
40000	328	9.57	<u>392</u>	<u>17.49</u>																		
45000	353	11.42	411	19.96	468	29.60																
53000	394	14.93	447	24.74	495	35.05	543	46.34														
61000	436	19.19	486	30.28	529	41.72	<u>570</u>	<u>53.53</u>	612	66.48	656	80.93										
69000	479	24.32	527	36.85	567	49.49	604	62.40	<u>641</u>	<u>76.03</u>	<u>677</u>	<u>90.07</u>	<u>715</u>	<u>105.60</u>								
77000	522	30.28	568	44.29	607	58.33	641	72.34	<u>675</u>	<u>87.13</u>	<u>708</u>	<u>102.21</u>	<u>740</u>	<u>117.54</u>	<u>774</u>	<u>134.47</u>	<u>808</u>	<u>152.07</u>				
93000	611	45.70	652	62.42	689	79.46	722	96.50	751	113.24	779	130.42	807	148.19	<u>835</u>	<u>166.48</u>	<u>862</u>	<u>184.80</u>	<u>889</u>	<u>203.68</u>	<u>944</u>	<u>243.74</u>
109000	<u>702</u>	<u>66.34</u>	<u>739</u>	<u>85.88</u>	<u>773</u>	<u>105.73</u>	<u>804</u>	<u>125.56</u>	<u>833</u>	<u>145.59</u>	<u>859</u>	<u>165.25</u>	<u>884</u>	<u>185.33</u>	<u>907</u>	<u>204.86</</u>						

730 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 73.00"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
40000	263	8.28																				
45000	276	9.45	<u>346</u>	<u>18.52</u>																		
50000	290	10.76	<u>357</u>	<u>20.68</u>																		
55000	305	12.23	<u>368</u>	<u>22.72</u>	<u>424</u>	<u>34.06</u>																
60000	320	13.76	381	25.06	<u>434</u>	<u>37.07</u>	484	49.94														
70000	353	17.40	408	30.02	<u>457</u>	<u>43.43</u>	503	57.78	546	72.49												
80000	387	21.63	437	35.69	484	50.77	<u>526</u>	<u>66.27</u>	<u>566</u>	<u>82.49</u>	<u>604</u>	<u>99.02</u>	641	116.27								
90000	424	27.03	469	42.42	512	58.71	552	75.63	<u>589</u>	<u>93.01</u>	<u>625</u>	<u>111.25</u>	<u>660</u>	<u>130.06</u>	<u>693</u>	<u>148.77</u>	<u>726</u>	<u>168.56</u>				
110000	499	40.70	537	58.52	574	77.82	609	97.38	643	117.67	676	138.96	706	159.78	<u>736</u>	<u>181.75</u>	<u>765</u>	<u>203.99</u>	<u>794</u>	<u>227.10</u>		
130000	577	59.46	609	79.38	641	101.11	672	123.77	702	146.75	732	170.68	761	195.11	<u>788</u>	<u>219.30</u>	<u>815</u>	<u>244.70</u>	<u>840</u>	<u>269.38</u>		
150000			<u>684</u>	<u>106.25</u>	<u>712</u>	<u>130.12</u>	<u>740</u>	<u>155.62</u>	<u>767</u>	<u>181.73</u>	<u>793</u>	<u>207.92</u>	<u>819</u>	<u>234.82</u>	<u>845</u>	<u>262.60</u>	<u>870</u>	<u>290.49</u>	<u>894</u>	<u>318.48</u>		
170000			<u>761</u>	<u>139.92</u>	<u>786</u>	<u>166.17</u>	<u>811</u>	<u>193.85</u>	<u>835</u>	<u>222.24</u>	<u>859</u>	<u>251.71</u>	<u>883</u>	<u>282.04</u>	<u>906</u>	<u>312.07</u>	<u>929</u>	<u>342.76</u>				

MAXIMUM RPM: CLASS I = 576 CLASS II = 733 CLASS III = 942 Outlet Area = 41.41 ft² Max. BHP = 456.2 x (RPM / 1000)³

730 EPF (9-Blade, Arr. 3)

Wheel Diameter: 73.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
40000	267	8.78	342	17.60																		
45000	280	10.02	350	19.46																		
50000	295	11.47	<u>362</u>	<u>21.82</u>	421	33.06																
55000	311	13.06	<u>373</u>	<u>23.96</u>	<u>429</u>	<u>35.81</u>	483	49.04														
60000	327	14.73	386	26.45	<u>440</u>	<u>39.12</u>	<u>489</u>	<u>52.37</u>														
70000	362	18.91	414	31.78	464	46.08	<u>510</u>	<u>60.98</u>	552	76.08	594	92.54										
80000	399	24.12	447	38.41	491	53.81	<u>533</u>	<u>69.87</u>	574	87.08	611	103.97	648	122.12	685	141.41						
90000	436	30.16	481	45.92	521	62.50	560	80.18	<u>598</u>	<u>98.66</u>	<u>634</u>	<u>117.52</u>	<u>668</u>	<u>136.62</u>	<u>701</u>	<u>156.31</u>	<u>733</u>	<u>176.40</u>	<u>766</u>	<u>198.18</u>		
110000	513	45.89	552	64.52	588	83.95	621	103.97	653	124.90	685	146.80	716	169.06	<u>747</u>	<u>192.44</u>	<u>776</u>	<u>215.47</u>	<u>804</u>	<u>238.77</u>		
130000	591	66.70	627	89.03	659	111.22	689	133.94	718	157.71	745	181.57	772	206.44	<u>799</u>	<u>232.09</u>	<u>826</u>	<u>258.60</u>	<u>852</u>	<u>285.05</u>		
150000	671	94.01	704	120.01	733	145.30	<u>761</u>	<u>171.32</u>	<u>787</u>	<u>197.36</u>	<u>812</u>	<u>223.99</u>	<u>837</u>	<u>252.01</u>	<u>860</u>	<u>279.36</u>	<u>884</u>	<u>308.58</u>	<u>907</u>	<u>337.47</u>		
170000			<u>781</u>	<u>157.49</u>	<u>809</u>	<u>186.94</u>	<u>835</u>	<u>216.23</u>	<u>859</u>	<u>245.17</u>	<u>882</u>	<u>274.40</u>	<u>905</u>	<u>304.80</u>	<u>927</u>	<u>335.49</u>						

MAXIMUM RPM: CLASS I = 576 CLASS II = 733 CLASS III = 942 Outlet Area = 41.41 ft² Max. BHP = 461.8 x (RPM / 1000)³

730 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 73.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
40000	262	8.59																				
45000	278	9.97	343	19.32																		
50000	295	11.52	<u>353</u>	<u>21.33</u>																		
55000	311	13.02	<u>366</u>	<u>23.55</u>	420	35.46																
60000	329	14.87	382	26.28	<u>429</u>	<u>38.26</u>																
70000	365	19.00	414	31.96	457	45.50	<u>498</u>	<u>59.87</u>														
80000	401	23.76	448	38.49	489	53.85	525	69.13	560	85.12	598	102.96										
90000	439	29.61	483	45.89	522	62.96	557	80.19	<u>589</u>	<u>97.50</u>	<u>620</u>	<u>115.33</u>	<u>653</u>	<u>134.78</u>	<u>686</u>	<u>154.57</u>						
110000	516	44.27	556	64.11	591	84.14	623	104.69	653	125.70	681	146.64	707	167.41	733	189.15	<u>759</u>	<u>211.62</u>	<u>785</u>	<u>234.46</u>	<u>840</u>	<u>283.65</u>
130000	595	63.87	631	87.12	664	110.94	693	134.32	721	158.62	747	183.02	772	207.79	796	232.62	<u>819</u>	<u>257.56</u>	<u>841</u>	<u>282.52</u>	<u>884</u>	<u>333.53</u>
150000	676	89.52	708	116.01	<u>738</u>	<u>143.01</u>	<u>766</u>	<u>170.38</u>	<u>792</u>	<u>197.79</u>	<u>816</u>	<u>224.95</u>	<u>840</u>	<u>253.46</u>	<u>862</u>	<u>281.30</u>	<u>884</u>	<u>310.09</u>				
170000			<u>787</u>	<u>151.93</u>	<u>815</u>	<u>182.62</u>	<u>840</u>	<u>212.61</u>	<u>865</u>	<u>243.87</u>	<u>888</u>	<u>274.68</u>	<u>910</u>	<u>305.64</u>	<u>931</u>	<u>336.76</u>						

MAXIMUM RPM: CLASS I = 576 CLASS II = 733 CLASS III = 942 Outlet Area = 41.41 ft² Max. BHP = 484.4 x (RPM / 1000)³

730 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 73.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		9" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
40000	266	8.92																				
45000	283	10.45	<u>345</u>	<u>19.63</u>																		
50000	300	12.03	<u>357</u>	<u>21.85</u>																		
55000	319	13.96	371	24.31	<u>423</u>	<u>36.17</u>																
60000	338	16.06	387	27.14	<u>434</u>	<u>39.28</u>	483	53.29														
70000	376	20.87	422	33.59	463	46.94	<u>503</u>	<u>61.14</u>	544	76.79												
80000	415	26.70	460	41.40	497	56.17	532	71.35	<u>567</u>	<u>87.50</u>	<u>602</u>	<u>104.59</u>	639	123.62								
90000	455	33.72	498	50.26	533	66.50	565	83.17	<u>597</u>	<u>100.71</u>	<u>628</u>	<u>118.68</u>	<u>659</u>	<u>137.50</u>	<u>691</u>	<u>157.74</u>	<u>724</u>	<u>179.48</u>				
110000	537	51.88	575	71.76	609	91.99	639	112.17	665	131.73	691	152.24	717	173.36	743	195.24	<u>768</u>	<u>217.09</u>	<u>793</u>	<u>239.61</u>	<u>846</u>	<u>289.40</u>
130000	620	76.15	<u>654</u>	<u>99.40</u>	<u>686</u>	<u>123.49</u>	<u>714</u>	<u>146.97</u>	<u>741</u>	<u>171.28</u>	<u>764</u>	<u>194.31</u>	<u>787</u>	<u>218.44</u>	<u>809</u>	<u>242.62</u>	<u>831</u>	<u>267.35</u>	<u>853</u>	<u>292.58</u>	<u>895</u>	<u>342.82</u>
150000			<u>736</u>	<u>135.10</u>	<u>765</u>	<u>162.48</u>	<u>791</u>	<u>189.37</u>	<u>817</u>	<u>217.60</u>	<u>840</u>	<u>244.70</u>	<u>862</u>	<u>272.21</u>	<u>882</u>	<u>299.04</u>	<u>901</u>	<u>325.76</u>				

807 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 80.75"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
45000	231	<u>9.30</u>																		
50000	240	10.41																		
55000	249	11.50	<u>313</u>	<u>22.70</u>																
60000	260	12.89	<u>321</u>	<u>24.84</u>																
70000	281	15.66	338	29.10	<u>387</u>	<u>43.22</u>														
90000	330	23.05	378	39.12	422	56.39	<u>462</u>	<u>74.42</u>	<u>499</u>	<u>92.59</u>	<u>536</u>	<u>112.37</u>								
110000	383	33.01	424	51.93	463	71.92	499	92.55	533	114.16	565	136.11	<u>596</u>	<u>158.59</u>	<u>626</u>	<u>181.56</u>				
130000	438	46.18	473	67.26	508	90.47	541	114.09	572	138.11	602	163.31	630	188.53	657	214.15	710	267.66	761	323.43
150000	<u>495</u>	<u>63.36</u>	<u>526</u>	<u>86.85</u>	<u>556</u>	<u>112.10</u>	<u>586</u>	<u>138.91</u>	<u>615</u>	<u>166.23</u>	<u>642</u>	<u>193.28</u>	<u>669</u>	<u>221.94</u>	<u>694</u>	<u>250.23</u>	<u>743</u>	<u>309.70</u>	<u>790</u>	<u>371.12</u>
170000			581	111.11	608	138.76	634	167.54	660	197.50	686	228.50	711	259.71	735	291.15	781	355.99		
190000			<u>637</u>	<u>140.31</u>	661	169.89	685	201.33	709	234.34	733	268.57	755	301.44	778	336.41				
210000			694	175.19	716	207.24	738	240.93	760	276.36	782	313.25								

MAXIMUM RPM: CLASS I = 488 CLASS II = 637 CLASS III = 802 **Outlet Area** = 50.65 ft² **Max. BHP** = 754.3 x (RPM / 1000)³

807 EPF (9-Blade, Arr. 3)

Wheel Diameter: 80.75"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
45000	234	<u>9.79</u>																		
50000	243	10.96	310	21.86																
55000	253	12.25	<u>317</u>	<u>23.93</u>																
60000	264	13.68	<u>325</u>	<u>26.11</u>	379	39.68														
70000	287	16.77	<u>342</u>	<u>30.56</u>	<u>392</u>	<u>45.55</u>	438	61.47												
90000	339	25.26	385	41.75	427	59.29	<u>468</u>	<u>78.29</u>	<u>505</u>	<u>97.32</u>	<u>541</u>	<u>117.48</u>	<u>578</u>	<u>139.79</u>						
110000	394	36.88	434	55.89	471	76.50	506	97.98	540	120.32	573	143.68	604	167.24	<u>633</u>	<u>190.57</u>	693	242.94		
130000	450	51.88	487	74.32	520	97.36	551	121.62	580	146.10	610	172.47	639	199.38	667	226.81	719	281.72	769	339.15
150000	508	71.36	542	97.25	572	123.07	600	149.61	627	177.42	653	205.94	678	234.52	704	265.15	754	327.76	<u>801</u>	<u>391.61</u>
170000	566	95.28	598	125.00	626	154.10	652	183.52	677	213.88	700	244.10	724	276.88	746	308.52	792	376.91		
190000	625	124.78	655	158.28	681	190.60	705	222.75	728	255.49	751	289.86	772	323.61						
210000			712	197.06	737	233.31	760	269.10	782	305.28										

MAXIMUM RPM: CLASS I = 488 CLASS II = 637 CLASS III = 802 **Outlet Area** = 50.65 ft² **Max. BHP** = 794.9 x (RPM / 1000)³

807 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 80.75"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
45000	229	9.62																		
50000	240	10.89																		
55000	251	12.16	310	23.62																
60000	263	13.62	<u>317</u>	<u>25.57</u>																
70000	289	17.03	337	30.21	<u>383</u>	<u>44.88</u>														
90000	341	25.11	385	41.82	423	59.08	458	76.99	494	96.24										
110000	397	36.28	437	56.32	471	76.63	503	97.83	532	119.01	560	140.75	590	164.63	620	188.93				
130000	453	50.29	490	73.81	522	97.46	552	122.26	579	146.79	605	171.90	629	196.75	653	222.62	703	278.18		
150000	511	68.39	545	95.35	575	122.45	603	150.28	628	177.81	653	206.93	676	235.40	698	264.04	740	322.49	<u>782</u>	<u>383.96</u>
170000	570	90.99	602	121.84	630	152.38	656	183.32	680	214.27	703	246.01	725	278.24	746	310.55	786	375.66		
190000	630	118.82	659	152.84	685	186.59	710	221.29	733	255.79	755	290.76	776	326.22						
210000			717	189.61	742	227.34	765	264.87	787	302.91										

MAXIMUM RPM: CLASS I = 488 CLASS II = 637 CLASS III = 802 **Outlet Area** = 50.65 ft² **Max. BHP** = 803.3 x (RPM / 1000)³

807 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 80.75"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
45000	232	9.91																		
50000	243	11.22																		
55000	255	12.67	312	24.04																
60000	268	14.30	<u>320</u>	<u>26.08</u>																
70000	296	18.19	342	31.33	<u>386</u>	<u>45.70</u>														
90000	353	28.08	394	44.47	429	61.21	463	78.76	498	98.12	534	119.29								
110000	411	41.18	450	61.44	482	81.48	510	101.34	539	122.77	567	144.67	595	167.61	<u>624</u>	<u>192.35</u>				
130000	471	58.61	507	82.53	538	106.41	564	129.42	589	153.41	613	177.69	638	203.65	661	228.69	709	283.48	759	344.14
150000	533	81.40	565	108.37	594	135.73	620	162.90	644	190.40	666	217.82	687	245.44	708	273.81	750	332.72	791	393.66
170000	595	109.63	624	139.79	652	171.31	677	202.37	700	233.26	721	263.77	741	294.77	760	325.84	797	389.24		
190000			685	178.45	710	212.49	734	247.38	757	282.96	778	317.86	797	351.70						
210000			747	224.73	770	261.91	792	299.58												

MAXIMUM RPM: CLASS I = 488 CLASS II = 637 CLASS III = 802 **Outlet Area** = 50.65 ft² **Max. BHP** = 794.7 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 56.41" above the base on fan size 807.

890 EPFN (9-Blade, Arr. 1 and 4)

Wheel Diameter: 89.00"

Fan Efficiency Grade = FEG85

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
70000	231	14.82	<u>287</u>	<u>28.71</u>																
80000	247	17.60	<u>300</u>	<u>33.16</u>	<u>346</u>	<u>49.60</u>														
90000	264	20.75	313	37.39	<u>357</u>	<u>55.63</u>	398	74.99												
100000	282	24.30	328	42.34	<u>369</u>	<u>61.70</u>	408	<u>82.62</u>	444	103.94										
110000	301	28.38	344	47.88	383	68.52	420	90.96	454	113.54	487	137.32								
120000	320	32.81	361	54.06	398	75.93	<u>433</u>	<u>99.52</u>	<u>466</u>	<u>124.09</u>	<u>497</u>	<u>148.84</u>	527	174.47						
140000	360	43.73	396	67.57	430	92.62	462	118.55	492	145.48	521	173.70	548	201.58	575	230.90	627	291.88		
160000	402	57.78	434	84.01	464	111.61	494	140.81	522	170.30	549	201.11	574	231.71	599	263.99	647	330.07	692	396.82
180000	445	75.17	473	103.26	501	134.10	528	165.97	554	198.28	579	231.19	604	266.19	627	300.56	671	371.08	714	445.07
200000	488	95.89	513	126.01	539	159.49	564	194.40	588	229.70	611	264.99	634	301.71	657	340.30	699	416.74		
240000			597	185.24	619	223.23	640	262.49	661	303.74	681	345.05	701	387.34	721	430.66				
280000			684	264.85	702	306.52	720	349.82												

MAXIMUM RPM: CLASS I = 443 CLASS II = 578 CLASS III = 728 Outlet Area = 61.53 ft² Max. BHP = 1227 x (RPM / 1000)³

890 EPF (9-Blade, Arr. 3)

Wheel Diameter: 89.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
70000	234	15.63	<u>291</u>	<u>30.34</u>																
80000	252	18.85	<u>304</u>	<u>34.93</u>	<u>350</u>	<u>52.16</u>														
90000	270	22.27	318	39.80	<u>362</u>	<u>58.73</u>	402	78.56												
100000	289	26.30	333	44.96	375	65.58	413	86.85	449	109.29	485	133.67								
110000	309	31.05	350	50.93	389	72.86	426	96.06	459	118.96	492	143.94	525	170.78						
120000	329	36.30	368	57.56	404	80.61	439	105.13	472	130.50	503	156.46	532	182.42	562	211.03				
140000	371	49.26	406	73.18	438	98.63	469	125.86	499	154.00	528	183.05	556	213.11	582	242.73	633	305.43		
160000	413	64.95	446	92.40	476	120.90	503	149.87	530	180.80	556	212.09	582	244.88	608	279.47	655	346.96	700	417.26
180000	456	84.25	487	115.25	514	145.89	540	178.16	565	211.98	588	245.32	612	281.14	635	316.88	681	392.74	724	469.85
200000	500	107.76	529	142.30	554	175.76	578	210.38	602	247.39	624	284.25	645	321.38	666	359.68	709	441.33		
240000			614	209.43	637	250.24	658	290.39	679	332.38	699	374.84	718	417.63						
280000			700	296.50	722	345.85														

MAXIMUM RPM: CLASS I = 443 CLASS II = 578 CLASS III = 728 Outlet Area = 61.53 ft² Max. BHP = 1244 x (RPM / 1000)³

890 EPQN (12-Blade, Arr. 1 and 4)

Wheel Diameter: 89.00"

Fan Efficiency Grade = FEG80

CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
70000	234	15.80	284	29.80																
80000	252	18.82	298	34.35																
90000	271	22.30	315	39.60	<u>353</u>	<u>57.44</u>														
100000	291	26.39	332	44.99	368	64.49	403	85.24												
110000	311	30.90	351	51.42	385	72.33	416	93.77	449	117.64										
120000	332	36.17	370	58.18	403	80.98	432	103.56	461	127.86	491	153.74								
140000	373	47.98	409	73.60	439	99.11	468	126.42	494	153.35	518	180.15	543	209.06	569	239.63				
160000	416	63.02	449	91.83	478	121.03	504	150.59	529	181.32	552	211.62	574	242.51	596	274.82	640	341.81		
180000	459	80.97	490	113.31	518	146.39	543	179.41	566	212.76	588	246.79	609	280.94	629	315.26	668	386.58	707	461.44
200000	503	102.75	532	138.61	558	174.67	582	211.15	604	247.57	625	284.85	645	322.48	665	361.57	701	437.08		
240000			618	201.98	641	244.55	663	288.04	684	332.29	703	375.42	722	420.34						
280000			705	283.87	727	335.00														

MAXIMUM RPM: CLASS I = 443 CLASS II = 578 CLASS III = 728 Outlet Area = 61.53 ft² Max. BHP = 1306 x (RPM / 1000)³

890 EPQ (12-Blade, Arr. 3)

Wheel Diameter: 89.00"

Fan Efficiency Grade = FEG80

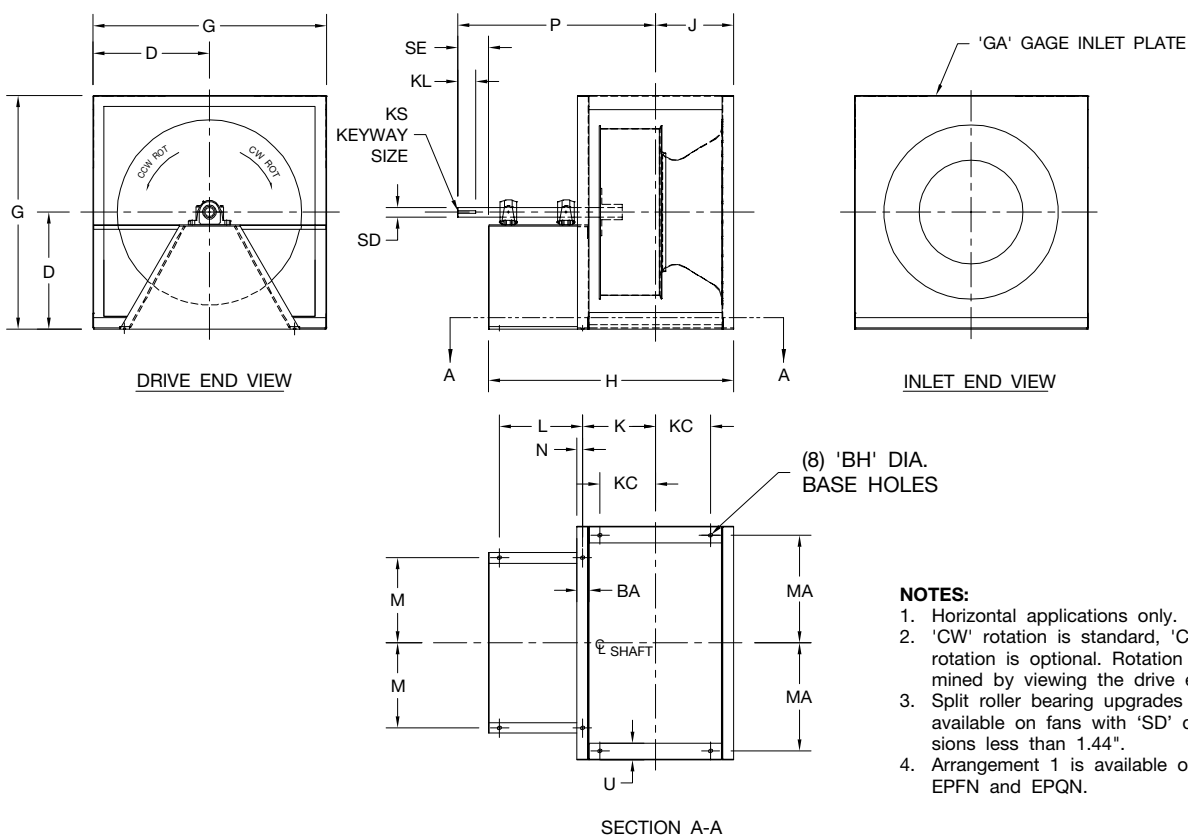
CFM	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP		10" SP		12" SP	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
70000	238	16.51	<u>287</u>	<u>30.57</u>																
80000	258	20.05	302	35.42	345	52.69														
90000	279	24.25	319	40.86	<u>357</u>	<u>58.88</u>	396	79.28												
100000	300	28.99	338	47.13	373	66.55	407	87.22	443	110.83										
110000	321	34.26	359	54.59	390	74.69	422	96.94	453	120.16	485	145.57								
120000	343	40.47	380	62.65	409	84.07	438	107.07	467	131.62	495	156.73	525	185.04						
140000	387	55.01	421	80.42	450	105.98	476	132.08	500	157.91	525	185.83	549	214.01	574	244.55				
160000	432	73.25	464	102.39	492	131.72	516	160.40	539	190.37	560	219.59	582	250.83	603	281.95	646	348.89	690	421.54
180000	478	95.82	508	128.68	534	161.13	558	194.02	580	227.26	600	260.17	619	293.12	638	326.84	676	396.93	714	471.06
200000	525	123.46	552	159.10	577	195.41	600	231.90	622	269.36	641	305.13	659	341.23	677	378.74	711	453.02		
240000			643	237.24	665	280.13	686	323.75	706	367.88	725	412.28								
280000																				

MAXIMUM RPM: CLASS I = 443 CLASS II = 578 CLASS III = 728 Outlet Area = 61.53 ft² Max. BHP = 1293 x (RPM / 1000)³

Class I = First white section
 Class II = Blue shaded section
 Class III = Bolded section after blue section
 Underlined figures indicate Maximum Static Efficiency

Performance certified is for installation Type A; Free inlet, Free outlet.
 Power rating (BHP) does not include transmission losses.
 Performance ratings do not include the effects of appurtenances (accessories).
 Performance based on a shaft height of 62.18" above the base on fan size 890.

Horizontal, Arr. 1 - Class I and II



NOTES:

1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Split roller bearing upgrades are not available on fans with 'SD' dimensions less than 1.44".
4. Arrangement 1 is available on models EPFN and EPQN.

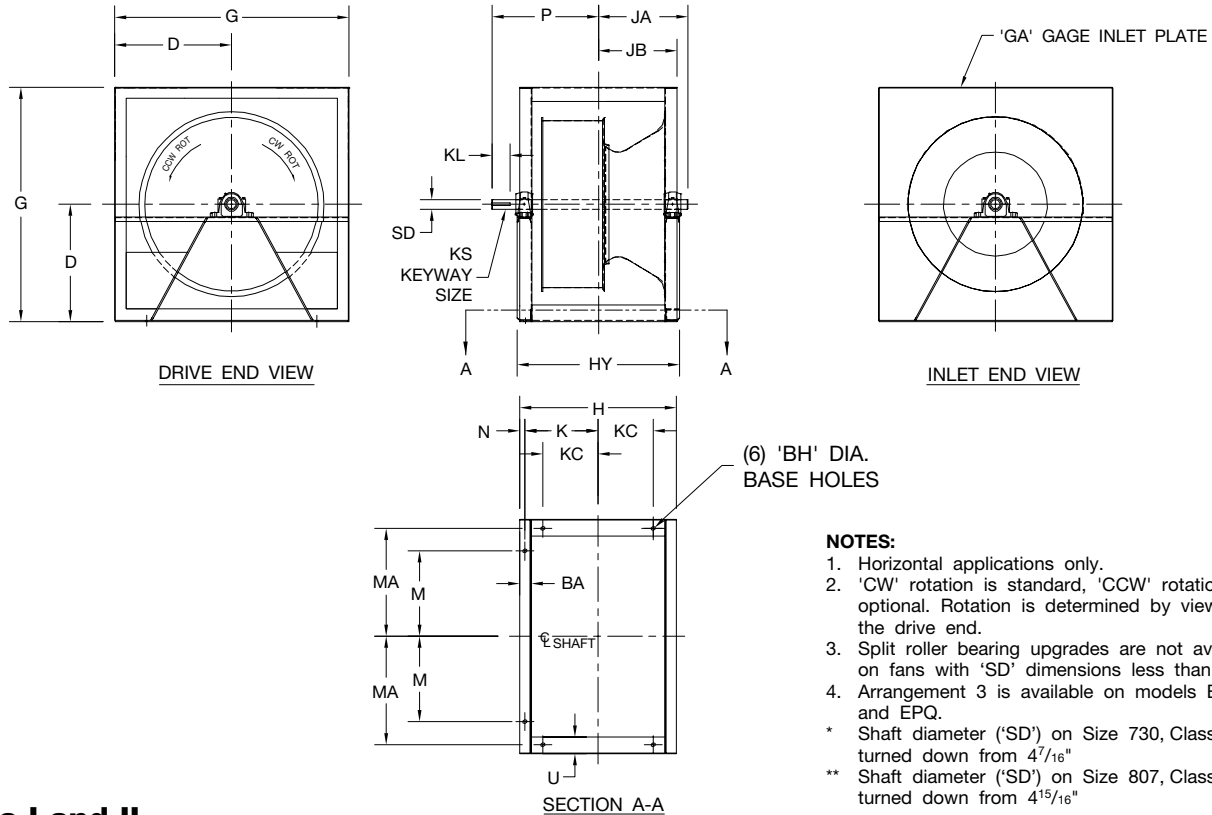
SIZE	BA	BH	D	G	GA	H	J	K	KC	KL	KS		L	M	MA	N	P	SD		SE	U
											CL I	CL II						CL I	CL II		
122	1.50	0.81	10.00	20.00	12	22.88	6.88	6.25	4.00	3.25	.25 x .13	.25 x .13	7.88	6.75	9.13	0.63	20.38	1.00	1.19	4.38	1.50
150	1.50	0.81	11.00	22.00	12	26.88	7.88	7.25	5.00	3.25	.25 x .13	.25 x .13	9.88	8.25	10.13	0.63	23.38	1.00	1.19	4.38	1.50
165	1.50	0.81	12.00	24.00	12	28.13	8.50	7.88	5.50	3.25	.25 x .13	.25 x .13	9.88	8.75	11.13	0.63	24.00	1.00	1.19	4.38	1.50
182	1.75	0.81	13.00	26.00	12	30.88	9.50	8.75	5.25	3.88	.25 x .13	.38 x .19	10.75	9.63	11.50	0.75	26.38	1.19	1.44	5.00	4.00
200	2.25	0.81	14.50	29.00	12	33.75	10.69	9.69	7.50	3.63	.38 x .19	.38 x .19	11.50	10.63	13.00	1.00	28.06	1.44	1.44	5.00	4.00
222	2.25	0.81	16.00	32.00	10	37.88	11.50	10.50	8.00	4.25	.38 x .19	.38 x .19	14.00	11.75	14.50	1.00	32.00	1.44	1.69	5.63	4.00
245	2.50	0.81	17.00	34.00	10	41.38	12.63	11.50	7.50	4.25	.38 x .19	.38 x .19	15.38	12.88	14.50	1.13	34.38	1.44	1.69	5.63	4.00
270	2.50	0.81	19.00	38.00	10	45.38	13.63	12.50	8.00	5.63	.38 x .19	.50 x .25	17.38	14.13	16.50	1.13	38.75	1.69	1.94	7.00	4.00
300	3.00	0.81	21.00	42.00	10	50.13	15.25	13.88	9.00	5.50	.50 x .25	.50 x .25	19.13	15.88	17.50	1.38	41.88	1.94	1.94	7.00	4.75
330	3.50	0.81	23.00	46.00	10	54.88	16.88	15.25	10.75	6.75	.50 x .25	.50 x .25	20.88	17.38	19.50	1.63	46.25	1.94	2.19	8.25	4.75
365	3.50	0.81	25.50	51.00	7	59.31	18.31	16.69	12.00	6.75	.50 x .25	.63 x .31	22.44	18.88	22.00	1.63	49.25	1.94	2.44	8.25	4.75
402	3.50	0.81	28.00	56.00	7	64.19	19.75	18.13	13.50	6.75	.50 x .25	.63 x .31	24.44	20.88	24.50	1.63	52.69	2.19	2.44	8.25	4.75
445	4.00	0.81	31.00	62.00	7	70.81	21.81	19.94	15.81	6.50	.63 x .31	.63 x .31	27.19	22.88	26.50	1.88	57.25	2.44	2.69	8.25	6.00
490	4.00	0.81	34.00	68.00	7	76.31	23.56	21.69	17.56	6.50	.63 x .31	.75 x .38	29.19	25.38	29.50	1.88	61.00	2.69	2.94	8.25	6.00
542	4.00	0.81	38.00	76.00	7	81.31	25.56	23.69	19.56	6.38	.75 x .38	.88 x .44	30.19	27.63	33.50	1.88	64.00	2.94	3.44	8.25	6.00
600	5.00	0.81	38.00	76.00	.25	89.88	28.81	26.44	21.81	6.63	.75 x .38	.88 x .44	32.75	30.63	33.50	2.38	69.56	2.94	3.44	8.50	6.00
660	5.00	0.81	40.75	81.50	.25	97.50	31.13	28.75	24.13	6.63	.88 x .44	1.00 x .50	35.75	33.13	36.25	2.38	75.00	3.44	3.94	8.63	6.00
730	5.00	0.81	46.00	92.00	.25	105.75	33.75	31.38	26.75	6.63	.88 x .44	1.00 x .50	38.75	37.13	41.50	2.38	80.63	3.44	3.94	8.63	6.00
807	5.00	0.81	51.00	102.00	.25	114.63	36.69	34.31	29.69	6.13	1.00 x .50	1.00 x .50	41.75	40.88	46.50	2.38	86.19	3.94	4.44	8.25	6.00

AC1001287

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.



Horizontal, Arr. 3 - Class I, II, and III



NOTES:

1. Horizontal applications only.
 2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
 3. Split roller bearing upgrades are not available on fans with 'SD' dimensions less than 1.44".
 4. Arrangement 3 is available on models EPF and EPQ.
- * Shaft diameter ('SD') on Size 730, Class III is turned down from 4⁷/₁₆"
- ** Shaft diameter ('SD') on Size 807, Class III is turned down from 4¹⁵/₁₆"

Class I and II

SIZE	BA	BH	D	G	GA	H	HY		JA		JB	K	KC	KL	KS		M	MA	N	P		SD		U
							CL I	CL II	CL I	CL II					CL I	CL II				CL I	CL II	CL I	CL II	
122	1.50	0.81	10.00	20.00	12	13.75	16.00	16.00	7.75	7.88	6.88	6.25	4.00	2.38	.25 x .13	.25 x .13	6.75	9.13	0.63	11.13	11.13	1.00	1.19	1.50
150	1.50	0.81	11.00	22.00	12	15.75	18.00	18.00	8.75	8.88	7.88	7.25	5.00	3.38	.25 x .13	.25 x .13	8.25	10.13	0.63	13.13	13.13	1.00	1.19	1.50
165	1.50	0.81	12.00	24.00	12	17.00	19.25	19.25	9.38	9.50	8.50	7.88	5.50	3.38	.25 x .13	.25 x .13	8.75	11.13	0.63	13.75	13.75	1.00	1.19	1.50
182	1.75	0.81	13.00	26.00	12	19.00	20.75	20.75	10.25	10.31	9.50	8.75	5.25	3.00	.25 x .13	.38 x .19	9.63	11.50	0.75	14.13	15.06	1.19	1.44	4.00
200	2.25	0.81	14.50	29.00	12	21.38	22.13	23.13	10.94	11.25	10.69	9.69	7.50	3.00	.25 x .13	.38 x .19	10.63	13.00	1.00	14.81	15.75	1.19	1.44	4.00
222	2.25	0.81	16.00	32.00	10	23.00	23.75	24.75	11.88	12.19	11.50	10.50	8.00	4.00	.38 x .19	.38 x .19	11.75	14.50	1.00	17.56	17.69	1.44	1.69	4.00
245	2.50	0.81	17.00	34.00	10	25.25	25.50	26.50	12.75	13.06	12.63	11.50	7.50	3.50	.38 x .19	.50 x .25	12.88	14.50	1.13	17.94	18.06	1.44	1.94	4.00
270	2.50	0.81	19.00	38.00	10	27.25	27.50	28.50	13.75	14.06	13.63	12.50	8.00	3.50	.38 x .19	.50 x .25	14.13	16.50	1.13	18.94	19.06	1.44	1.94	4.00
300	3.00	0.81	21.00	42.00	10	30.50	30.75	30.75	15.19	15.31	15.25	13.88	9.00	4.50	.38 x .19	.50 x .25	15.88	17.50	1.38	21.19	21.50	1.69	1.94	4.75
330	3.50	0.81	23.00	46.00	10	33.75	34.00	34.00	16.56	16.69	16.88	15.25	10.75	4.50	.38 x .19	.50 x .25	17.38	19.50	1.63	22.44	22.63	1.69	1.94	4.75
365	3.50	0.81	25.50	51.00	7	36.63	37.00	38.00	18.06	18.56	18.31	16.69	12.00	4.75	.50 x .25	.50 x .25	18.88	22.00	1.63	24.13	24.75	1.94	2.19	4.75
402	3.50	0.81	28.00	56.00	7	39.50	39.88	40.88	19.56	20.00	19.75	18.13	13.50	5.50	.50 x .25	.50 x .25	20.88	24.50	1.63	26.56	26.94	1.94	2.19	4.75
445	4.00	0.81	31.00	62.00	7	43.63	44.00	44.00	21.56	21.75	21.81	19.94	15.81	5.50	.50 x .25	.63 x .31	22.88	26.50	1.88	28.50	28.81	2.19	2.44	6.00
490	4.00	0.81	34.00	68.00	7	47.13	47.50	47.50	23.31	23.56	23.56	21.69	17.56	5.50	.50 x .25	.63 x .31	25.38	29.50	1.88	30.25	30.88	2.19	2.69	6.00
542	4.00	0.81	38.00	76.00	7	51.13	51.50	53.50	25.31	26.06	25.56	23.69	19.56	6.63	.63 x .31	.75 x .38	27.63	33.50	1.88	33.69	34.63	2.44	2.94	6.00
600	5.00	0.81	38.00	76.00	.25	57.63	58.13	58.13	28.44	28.56	28.81	26.44	21.81	6.81	.63 x .31	.88 x .44	30.63	33.50	2.38	37.00	38.19	2.69	3.44	6.00
660	5.00	0.81	40.75	81.50	.25	62.25	62.75	64.75	30.75	31.38	31.13	28.75	24.13	7.38	.75 x .38	.88 x .44	33.13	36.25	2.38	40.00	42.06	2.94	3.44	6.00
730	5.00	0.81	46.00	92.00	.25	67.50	68.00	70.00	33.50	34.00	33.75	31.38	26.75	7.38	.88 x .44	.88 x .44	37.13	41.50	2.38	43.69	44.69	3.44	3.44	6.00
807	5.00	0.81	51.00	102.00	.25	73.38	73.88	77.88	36.63	39.25	36.69	34.31	29.69	6.31	1.00 x .50	1.00 x .50	40.88	46.50	2.38	45.75	47.88	3.94	4.44	6.00

Class III

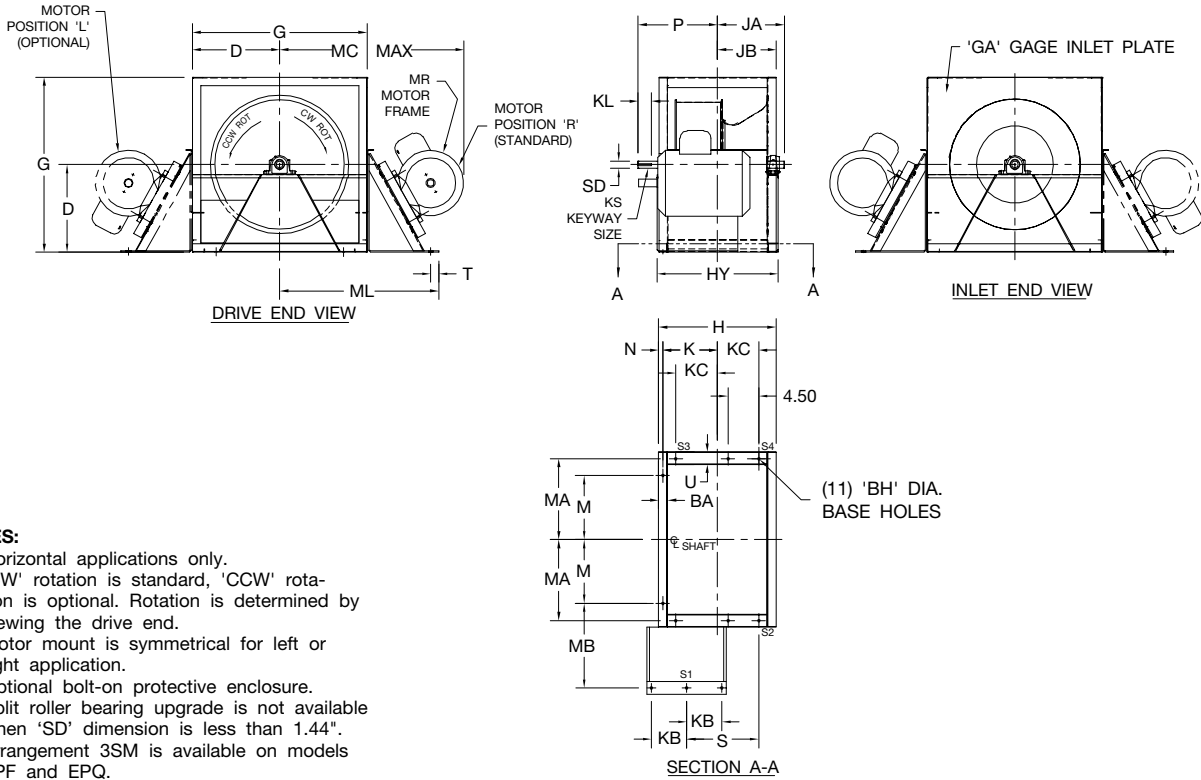
AC1001285B

SIZE	BA	BH	D	G	GA	H	HY	JA	JB	K	KC	KL	KS	M	MA	N	P	SD	U
182	1.75	0.81	13.00	26.00	10	19.00	21.75	10.69	9.50	8.75	5.25	2.94	.38 x .19	9.63	11.50	0.75	15.19	1.69	4.00
200	2.25	0.81	14.50	29.00	10	21.38	23.13	11.38	10.69	9.69	7.50	2.94	.38 x .19	10.63	13.00	1.00	15.88	1.69	4.00
222	2.25	0.81	16.00	32.00	7	23.00	24.88	12.31	11.50	10.50	8.00	3.94	.50 x .25	11.75	14.50	1.00	18.06	1.94	4.00
245	2.50	0.81	17.00	34.00	7	25.25	26.63	13.19	12.63	11.50	7.50	3.50	.50 x .25	12.88	14.50	1.13	18.50	1.94	4.00
270	2.50	0.81	19.00	38.00	7	27.25	28.63	14.38	13.63	12.50	8.00	3.44	.50 x .25	14.13	16.50	1.13	19.56	2.19	4.00
300	3.00	0.81	21.00	42.00	7	30.50	30.88	15.38	15.25	13.88	9.00	4.44	.50 x .25	15.88	17.50	1.38	21.69	2.19	4.75
330	3.50	0.81	23.00	46.00	7	33.75	35.13	17.13	16.88	15.25	10.75	4.56	.63 x .31	17.38	19.50	1.63	23.63	2.44	4.75
365	3.50	0.81	25.50	51.00	.25	36.63	38.13	18.69	18.31	16.69	12.00	4.56	.63 x .31	18.88	22.00	1.63	24.94	2.44	4.75
402	3.50	0.81	28.00	56.00	.25	39.50	43.00	20.88	19.75	18.13	13.50	5.50	.63 x .31	20.88	24.50	1.63	28.13	2.69	4.75
445	4.00	0.81	31.00	62.00	.25	43.63	46.13	22.44	21.81	19.94	15.81	6.63	.75 x .38	22.88	26.50	1.88	31.06	2.94	6.00
490	4.00	0.81	34.00	68.00	.25	47.13	51.63	24.69	23.56	21.69	17.56	6.63	.75 x .38	25.38	29.50	1.88	33.75	2.94	6.00
542	4.00	0.81	38.00	76.00	.25	51.13	55.63	26.81	25.56	23.69	19.56	6.38	.88 x .44	27.63	33.50	1.88	36.56	3.44	6.00
600	5.00	0.81	38.00	76.00	.31	57.63	60.25	29.31	28.81	26.44	21.81	6.88	1.00 x .50	30.63	33.50	2.38	39.56	3.94	6.00
660	5.00	0.81	40.75	81.50	.31	62.25	66.88	32.13	31.13	28.75	24.13	8.25	1.00 x .50	33.13	36.25	2.38	44.19	3.94	6.00
730	5.00	0.81	46.00	92.00	.31	67.50	72.13	34.56	33.75	31.38	26.75	8.69	.88 x .44	37.13	41.50	2.38	47.06	3.44*	6.00
807	5.00	0.81	51.00	102.00	.31	73.38	78.00	37.69	36.69	34.31	29.69	8.31	1.00 x .50	40.88	46.50	2.38	49.81	3.94**	6.00

AC1001320B

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Horizontal, Arr. 3SM - Class I and II



NOTES:

1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Motor mount is symmetrical for left or right application.
4. Optional bolt-on protective enclosure.
5. Split roller bearing upgrade is not available when 'SD' dimension is less than 1.44".
6. Arrangement 3SM is available on models EPF and EPQ.

SIZE	BA	BH	D	G	GA	H	HY		JA		JB	K	KB	KC	KL	KS	
							CL I	CL II	CL I	CL II						CL I	CL II
165	1.50	0.81	12.00	24.00	12	17.00	19.25	19.25	9.63	11.06	8.50	7.88	5.00	5.50	3.38	.25 x .13	.25 x .13
182	1.75	0.81	13.00	26.00	12	19.00	20.75	22.75	10.81	12.06	9.50	8.75	5.63	5.25	3.00	.25 x .13	.38 x .19
200	2.25	0.81	14.50	29.00	12	21.38	22.13	24.13	11.50	12.75	10.69	9.69	5.63	7.50	3.00	.25 x .13	.38 x .19
222	2.25	0.81	16.00	32.00	10	23.00	25.75	25.75	13.56	13.56	11.50	10.50	5.63	8.00	4.00	.38 x .19	.38 x .19
245	2.50	0.81	17.00	34.00	10	25.25	27.50	27.50	14.44	14.44	12.63	11.50	6.50	7.50	3.50	.38 x .19	.50 x .25
270	2.50	0.81	19.00	38.00	10	27.25	29.50	29.50	15.44	15.44	13.63	12.50	6.50	8.00	3.50	.38 x .19	.50 x .25
300	3.00	0.81	21.00	42.00	10	30.50	31.75	32.75	16.56	16.75	15.25	13.88	8.75	9.00	4.50	.38 x .19	.50 x .25
330	3.50	0.81	23.00	46.00	10	33.75	34.00	35.00	17.69	17.88	16.88	15.25	8.75	10.75	4.50	.38 x .19	.50 x .25
365	3.50	0.81	25.50	51.00	7	36.63	37.00	38.00	19.19	20.00	18.31	16.69	10.44	12.00	4.75	.50 x .25	.50 x .25
402	3.50	0.81	28.00	56.00	7	39.50	40.88	40.88	20.81	21.44	19.75	18.13	9.69	13.50	5.50	.50 x .25	.50 x .25
445	4.00	0.81	31.00	62.00	7	43.63	44.00	44.00	23.00	23.25	21.81	19.94	9.69	15.81	5.50	.50 x .25	.63 x .31
490	4.00	0.81	34.00	68.00	7	47.13	47.50	49.50	24.75	25.56	23.56	21.69	9.69	17.56	5.50	.50 x .25	.63 x .31
542	4.00	0.81	38.00	76.00	7	51.13	51.50	53.50	27.00	27.25	25.56	23.69	10.19	19.56	6.63	.63 x .31	.75 x .38
600	5.00	0.81	38.00	76.00	.25	57.63	58.13	60.13	29.88	30.69	28.81	26.44	9.19	21.81	6.81	.63 x .31	.88 x .44

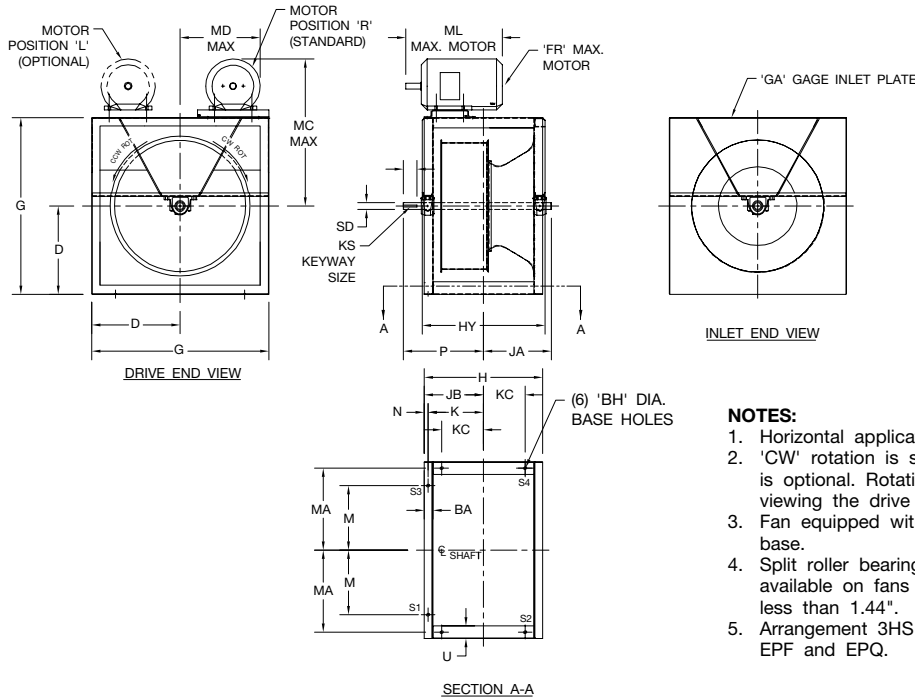
SIZE	M	MA	MB	MC	ML	MR	N	P		S		SD		T	U
								CL I	CL II	CL I	CL II	CL I	CL II		
165	8.75	11.13	13.50	26.75	23.25	56 - 215T	0.63	13.63	13.94	8.38	8.69	1.00	1.19	1.00	1.50
182	9.63	11.50	13.69	27.50	24.31	143T - 215T	0.75	14.69	15.69	8.75	8.94	1.19	1.44	1.00	4.00
200	10.63	13.00	14.19	31.00	25.81	143T - 254T	1.00	16.38	16.38	12.50	12.50	1.19	1.44	1.00	4.00
222	11.75	14.50	14.94	37.50	27.69	143T - 254T	1.00	18.25	18.25	14.75	14.75	1.44	1.69	1.00	4.00
245	12.88	14.50	15.69	32.00	29.56	143T - 256T	1.13	18.63	18.63	13.25	13.25	1.44	1.94	1.00	4.00
270	14.13	16.50	17.75	37.75	32.88	145T - 256T	1.13	19.63	19.63	14.81	14.81	1.44	1.94	1.00	4.00
300	15.88	17.50	18.88	42.00	36.00	145T - 284T	1.38	21.75	22.00	15.44	15.69	1.69	1.94	1.25	4.75
330	17.38	19.50	21.13	48.25	39.75	145T - 286T	1.63	22.88	23.75	17.81	18.06	1.69	1.94	1.25	4.75
365	18.88	22.00	23.38	53.25	43.50	182T - 324T	1.63	24.63	25.75	18.88	19.13	1.94	2.19	1.25	4.75
402	20.88	24.50	25.63	49.50	48.00	182T - 326T	1.63	27.06	28.19	23.31	23.56	1.94	2.19	1.50	4.75
445	22.88	26.50	27.63	53.25	52.00	184T - 326T	1.88	29.25	30.31	27.69	26.50	2.19	2.44	1.50	6.00
490	25.38	29.50	30.31	62.50	57.19	213T - 326T	1.88	31.00	32.06	30.25	31.31	2.19	2.69	1.50	6.00
542	27.63	33.50	33.75	66.50	62.88	213T - 364T	1.88	35.06	34.88	34.94	34.75	2.44	2.94	1.50	6.00
600	30.63	33.50	33.06	70.75	65.19	213T - 365T	2.38	37.63	38.69	40.94	40.63	2.69	3.44	1.50	6.00

AC1001294C

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

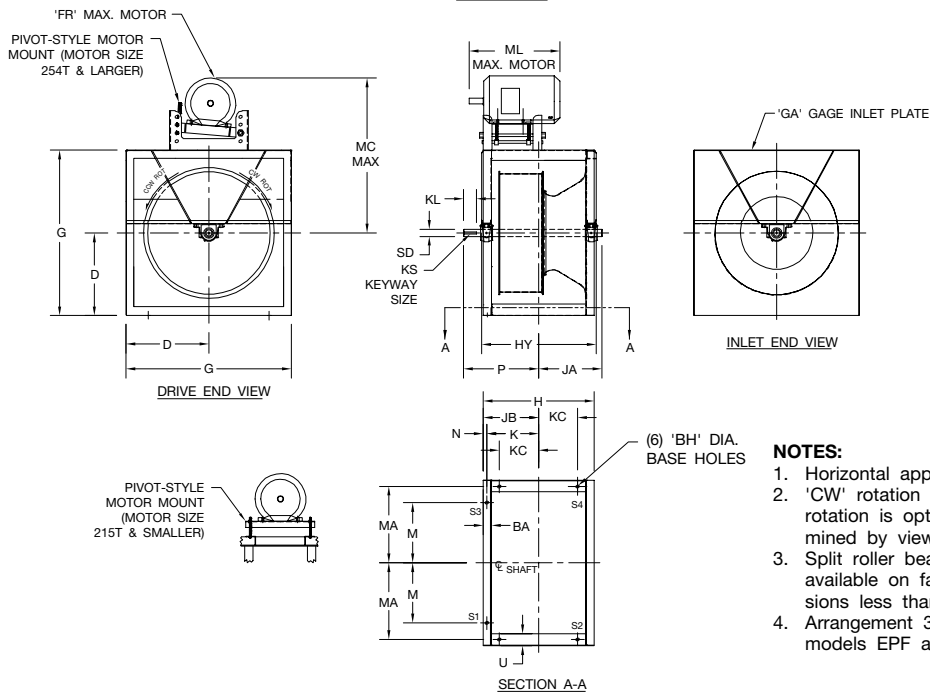
Horizontal, Arr. 3HS/3HA - Class I and II

Arr. 3HS



- NOTES:**
1. Horizontal applications only.
 2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
 3. Fan equipped with standard NEMA slide base.
 4. Split roller bearing upgrades are not available on fans with 'SD' dimensions less than 1.44".
 5. Arrangement 3HS is available on models EPF and EPQ.

Arr. 3HA



- NOTES:**
1. Horizontal applications only.
 2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
 3. Split roller bearing upgrades are not available on fans with 'SD' dimensions less than 1.44".
 4. Arrangement 3HA is available on models EPF and EPQ.

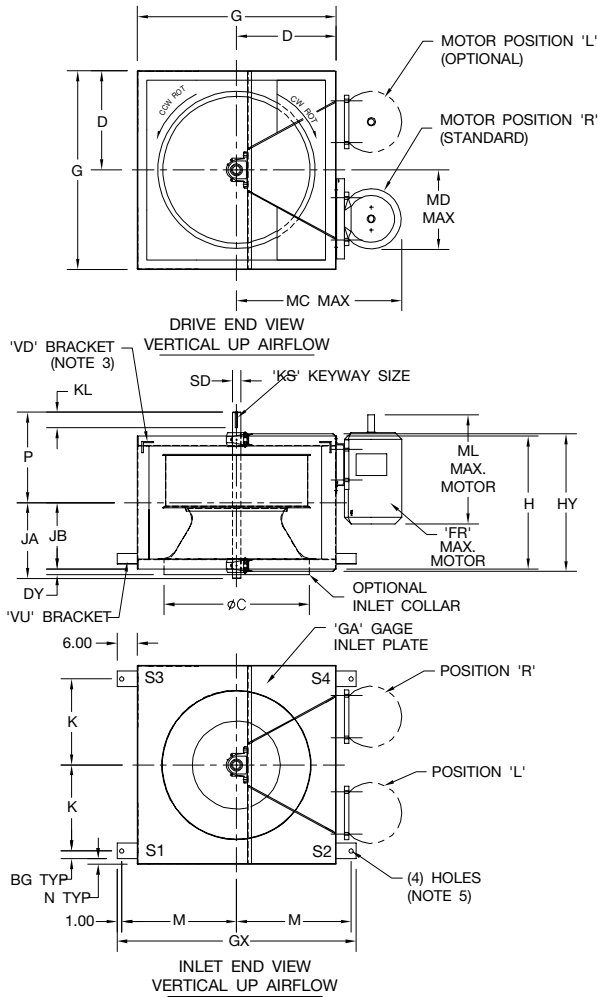
SIZE	3HA	3HS	BA	BH	D	FR	G	GA	H	HY		JA		JB	K	KC	KL	KS		M	MA	MC			ML	N	P		SD		U
										CL I	CL II	CL I	CL II					CL I	CL II			3HA	3HS	3HS			CL I	CL II	CL I	CL II	
122	---	---	1.50	0.81	10.00	215T	20.00	12	13.75	16.00	16.00	7.75	7.88	6.88	6.25	4.00	2.38	25x.13	25x.13	6.75	9.13	26.81	---	---	20.25	0.63	11.13	11.13	1.00	1.19	1.50
150	---	---	1.50	0.81	11.00	215T	22.00	12	15.75	18.00	18.00	8.75	8.88	7.88	7.25	5.00	3.38	25x.13	25x.13	8.25	10.13	27.81	---	---	20.25	0.63	13.13	13.31	1.00	1.19	1.50
165	---	---	1.50	0.81	12.00	215T	24.00	12	17.00	19.25	19.25	9.38	9.50	8.50	7.88	5.50	3.38	25x.13	25x.13	8.75	11.13	28.81	---	---	20.25	0.63	13.75	13.75	1.00	1.19	1.50
182	182	1.75	0.81	13.00	215T	26.00	12	19.00	20.75	20.75	10.25	10.31	9.50	8.75	5.25	3.00	25x.13	38x.19	9.63	11.50	29.88	27.50	13.00	20.25	0.75	14.13	15.06	1.19	1.44	4.00	
200	200	2.25	0.81	14.50	215T	29.00	12	21.38	22.13	23.13	10.94	11.25	10.69	9.69	7.50	3.00	25x.13	38x.19	10.63	13.00	31.38	29.00	14.50	20.25	1.00	14.81	15.75	1.19	1.44	4.00	
222	222	2.25	0.81	16.00	256T	32.00	10	23.00	23.75	24.75	11.88	12.19	11.50	10.50	8.00	4.00	38x.19	38x.19	11.75	14.50	33.38	33.25	16.13	25.75	1.00	17.56	17.69	1.44	1.69	4.00	
245	245	2.50	0.81	17.00	256T	34.00	10	25.25	25.50	26.50	12.75	13.06	12.63	11.50	7.50	3.50	38x.19	50x.25	12.88	14.50	40.38	34.25	17.13	25.75	1.13	17.94	18.06	1.44	1.94	4.00	
270	270	2.50	0.81	19.00	286T	38.00	10	27.25	27.50	28.50	13.75	14.06	13.63	12.50	8.00	3.50	38x.19	50x.25	14.13	16.50	43.88	37.75	19.13	28.88	1.13	18.94	19.06	1.44	1.94	4.00	
300	300	3.00	0.81	21.00	286T	42.00	10	30.50	30.75	30.75	15.19	15.31	15.25	13.88	9.00	4.50	38x.19	50x.25	15.88	17.50	45.88	39.75	21.13	28.88	1.38	21.19	21.50	1.69	1.94	4.75	
330	330	3.50	0.81	23.00	326T	46.00	10	33.75	34.00	34.50	17.69	17.88	16.88	15.25	10.75	4.50	38x.19	50x.25	17.38	19.50	52.38	44.25	23.00	32.00	1.63	22.44	22.63	1.69	1.94	4.75	
365	365	3.50	0.81	25.50	326T	51.00	7	36.63	37.00	38.00	18.06	18.56	18.31	16.69	12.00	4.75	50x.25	50x.25	18.88	22.00	54.88	46.75	25.50	32.00	1.63	24.13	24.75	1.94	2.19	4.75	
402	402	3.50	0.81	28.00	326T	56.00	7	39.50	39.88	40.88	19.56	20.00	19.75	18.13	13.50	5.50	50x.25	50x.25	20.88	24.50	57.50	49.25	28.00	32.00	1.63	26.56	26.94	1.94	2.19	4.75	
445	445	4.00	0.81	31.00	365T	62.00	7	43.63	44.00	44.00	21.56	21.75	21.81	19.94	15.81	5.50	50x.25	63x.31	22.88	26.50	62.38	54.25	31.25	34.38	1.88	28.50	28.81	2.19	2.44	6.00	
490	490	4.00	0.81	34.00	365T	68.00	7	47.13	47.50	47.50	23.31	23.56	23.56	21.69	17.56	5.50	50x.25	63x.31	25.38	29.50	65.38	57.25	34.25	34.38	1.88	30.25	30.88	2.19	2.69	6.00	
542	542	4.00	0.81	38.00	365T	76.00	7	51.13	51.50	53.50	25.31	26.06	25.56	23.69	19.56	6.63	63x.31	75x.38	27.63	33.50	69.38	61.25	38.25	34.38	1.88	33.63	34.63	2.44	2.94	6.00	

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

AC1001288D
AC1001289C

Vertical, Arr. 3VS/3VA - Class I and II

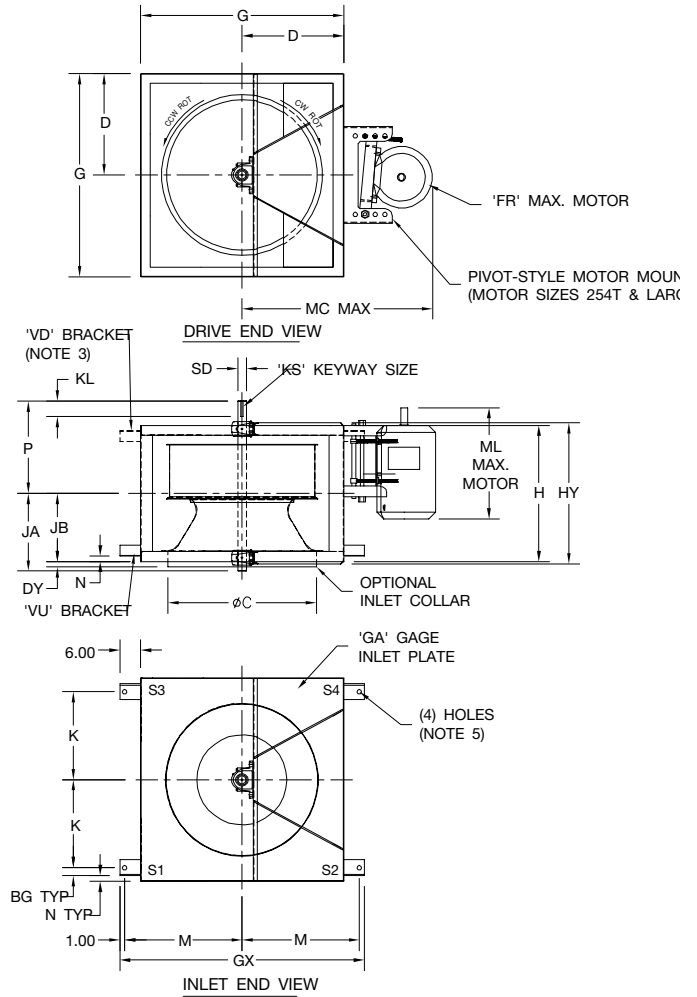
Arr. 3VS



NOTES:

- Vertical applications only.
- 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
- Vertical up (VU) airflow is standard. Vertical down (VD) airflow requires brackets mounted on drive end.
- Split roller bearing upgrades are not available on vertical fans.
- Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
Size 182-365: 0.56 Size 402-542: 0.81
- Fans equipped with standard NEMA motor slide base.
- Arrangement 3VS is available on models EPF and EPQ.

Arr. 3VA



NOTES:

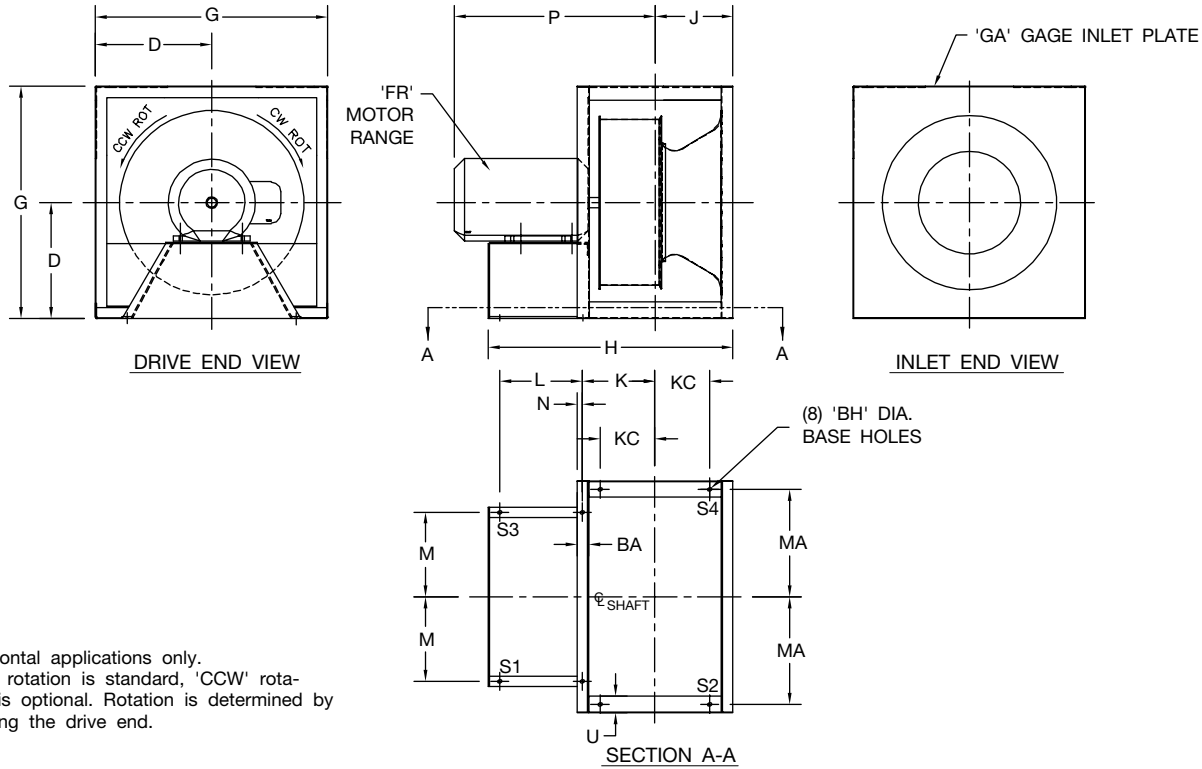
- Vertical applications only.
- 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
- Vertical up (VU) airflow is standard. Vertical down (VD) airflow requires brackets mounted on drive end.
- Split roller bearing upgrades are not available on vertical fans.
- Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
Size 122-365: 0.56 Size 402-542: 0.81
- Arrangement 3VA is available on models EPF and EPQ.

Size	BG	C	D	DY	FR	G	GA	GX	H	HY				JB	K	KL	KS		M	MC					N	P				SD
										CL I	CL II	CL I	CL II				CL I	CL II		3VA	3VS	3VS	3VA	3VS		CL I	CL II	CL I	CL II	
122	—	1.13	13.25	10.00	2.13	215T	20.00	12	32.00	13.75	16.00	16.00	7.75	7.88	6.88	7.88	2.38	0.25x0.13	0.25x0.13	15.00	28.75	—	—	20.25	—	1.00	11.13	11.13	1.00	1.19
150	—	1.13	16.19	11.00	2.13	215T	22.00	12	34.00	15.75	18.00	18.00	8.75	8.88	7.88	8.88	3.38	0.25x0.13	0.25x0.13	16.00	29.75	—	—	20.25	—	1.00	13.13	13.13	1.00	1.19
165	—	1.13	17.75	12.00	2.13	215T	24.00	12	36.00	17.00	19.25	19.25	9.38	9.50	8.50	9.88	3.38	0.25x0.13	0.25x0.13	17.00	30.75	—	—	20.25	—	1.00	13.75	13.75	1.00	1.19
182	182	1.13	19.50	13.00	1.88	215T	26.00	12	38.00	19.00	20.75	20.75	10.25	10.38	9.50	10.38	3.38	0.25x0.13	0.38x0.19	18.00	31.75	26.00	13.13	20.25	16.25	1.00	14.50	15.38	1.19	1.44
200	200	1.63	21.38	14.50	1.88	215T	29.00	12	41.00	21.38	22.13	23.13	10.94	11.31	10.69	11.38	3.69	0.25x0.13	0.38x0.19	19.50	33.25	29.25	14.50	20.25	20.25	1.50	15.50	16.38	1.19	1.44
222	222	1.63	23.75	16.00	1.88	256T	32.00	10	44.00	23.00	23.75	24.75	11.88	12.19	11.50	12.88	4.56	0.38x0.19	0.38x0.19	21.00	38.31	30.75	16.00	25.75	20.25	1.50	18.13	18.25	1.44	1.69
245	245	1.63	26.06	17.00	1.63	256T	34.00	10	46.00	25.25	25.50	26.50	12.75	13.06	12.63	13.88	4.06	0.38x0.19	0.50x0.25	22.00	39.31	31.75	17.00	25.75	20.25	1.50	18.50	18.63	1.44	1.94
270	270	1.63	28.50	19.00	1.63	286T	38.00	10	50.00	27.25	27.50	28.50	13.75	14.06	13.63	15.88	4.06	0.38x0.19	0.50x0.25	24.00	42.81	33.75	19.00	28.88	20.25	1.50	19.50	19.63	1.44	1.94
300	300	1.63	31.63	21.00	1.13	286T	42.00	10	54.00	30.50	30.75	30.75	15.19	15.31	15.25	17.88	5.06	0.38x0.19	0.50x0.25	26.00	44.81	38.25	21.13	28.88	25.75	1.50	21.75	22.06	1.69	1.94
330	330	1.63	34.75	23.00	1.13	326T	46.00	10	58.00	33.75	34.00	34.00	16.63	16.69	16.88	19.88	5.06	0.38x0.19	0.50x0.25	28.00	51.00	40.25	23.13	32.00	25.75	1.50	22.94	23.19	1.69	1.94
365	365	2.13	38.50	25.50	1.69	326T	51.00	7	63.00	36.63	37.00	38.00	18.06	18.44	18.31	21.88	5.31	0.50x0.25	0.50x0.25	30.50	53.50	42.75	25.63	32.00	25.75	1.50	24.69	25.31	1.94	2.19
402	402	2.13	42.44	28.00	1.69	326T	56.00	7	68.00	39.50	39.88	40.88	19.63	19.88	19.75	24.38	5.94	0.50x0.25	0.50x0.25	33.00	56.00	45.25	28.13	32.00	25.75	1.50	26.94	27.38	1.94	2.19
445	445	2.13	46.88	31.00	1.19	365T	62.00	7	74.00	43.63	44.00	44.00	21.56	21.56	21.81	27.38	6.38	0.50x0.25	0.63x0.31	36.00	61.00	49.75	31.13	34.38	28.88	1.50	29.38	29.69	2.19	2.44
490	490	2.13	51.63	34.00	1.19	365T	68.00	7	80.00	47.13	47.50	47.50	23.19	23.56	23.56	30.38	6.50	0.63x0.31	0.63x0.31	39.00	64.00	52.75	34.13	34.38	28.88	1.50	31.25	31.88	2.44	2.69
542	542	2.13	57.13	38.00	2.19	365T	76.00	7	88.00	51.13	51.50	53.50	25.31	26.06	25.56	34.38	7.50	0.63x0.31	0.88x0.44	43.00	68.00	59.25	38.00	34.38	32.00	1.50	34.56	35.50	2.44	3.44

AC1001292F
AC1001293F

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Horizontal, Arr. 4 - Class I and II



NOTES:

1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.

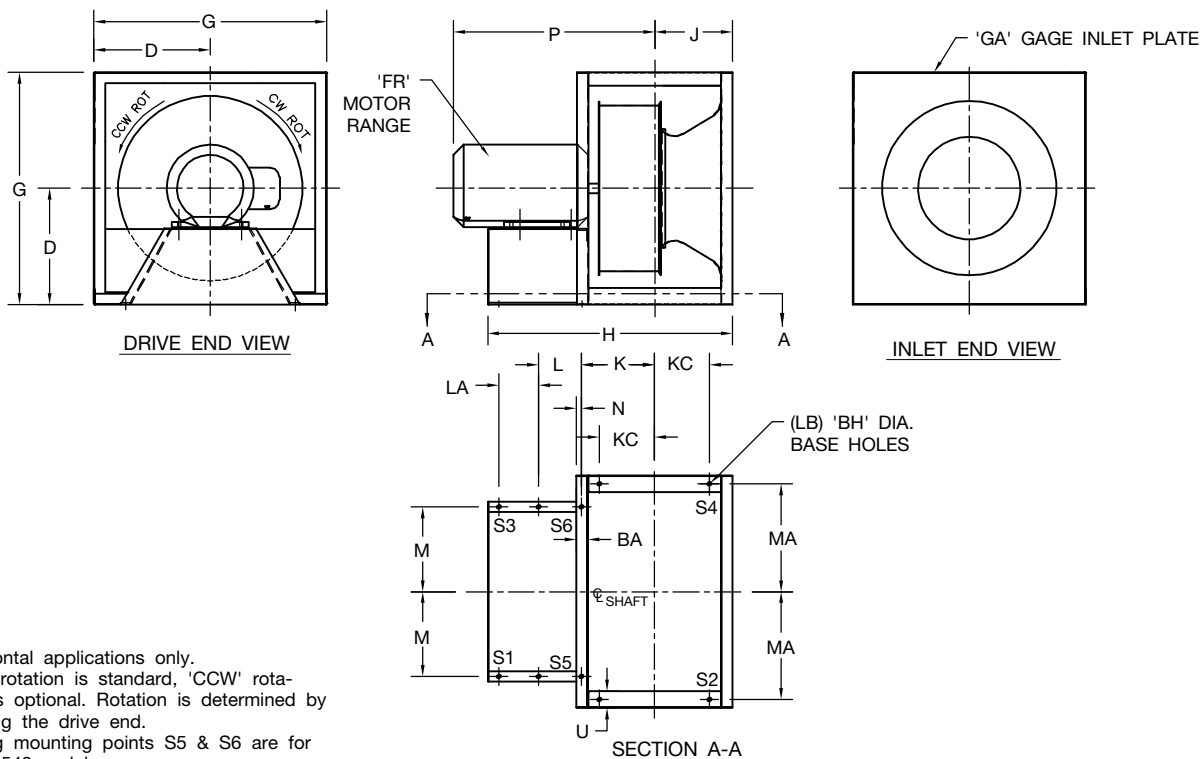
Class I and II, Size 122 - 270

Size	BA	BH	D	FR	G	GA	H		J		K		KC		L	M	MA	N	P Max.		U	
							50-77% Width	78-105% Width	50-77% Width	78-105% Width	50-77% Width	78-105% Width	50-77% Width	78-105% Width					50-77% Width	78-105% Width		
122	1.50	0.81	10.00	56	20.00	12	19.56	20.56	6.38	6.88	5.75	6.25	3.50	4.00	5.38	6.75	9.13	0.63	17.06	17.44	1.50	
				143T-145T			21.63	22.63											7.44	17.19		17.69
				182T-184T			23.06	24.06											8.88	18.56		19.06
150	1.50	0.81	11.00	56	22.00	12	21.44	22.56	7.31	7.88	6.69	7.25	4.44	5.00	5.38	8.25	10.13	0.63	18.00	18.56	1.50	
				143T-145T			23.31	24.44											7.25	18.13		18.69
				182T-184T			24.69	25.81											8.63	19.50		20.06
165	1.50	0.81	12.00	56	24.00	12	22.88	24.13	7.88	8.50	7.25	7.88	4.88	5.50	5.69	8.75	11.13	0.63	18.56	19.19	1.50	
				143T-145T			25.19	26.44											8.00	18.69		19.31
				182T-184T			26.44	27.69											9.25	20.06		20.69
182	1.75	0.81	13.00	56	26.00	12	27.56	29.06	8.75	9.50	8.00	8.75	4.50	5.25	8.75	9.63	11.50	0.75	19.31	20.56	4.00	
				143T-145T			28.81	30.31											10.00	20.69		21.94
				182T-184T			30.56	32.06											11.75	24.06		25.31
200	2.25	0.81	14.50	56	29.00	12	29.06	30.69	9.88	10.69	8.88	9.69	6.69	7.50	8.25	10.63	13.00	1.00	19.94	21.13	4.00	
				143T-145T			30.44	32.06											9.63	21.31		22.50
				182T-184T			32.31	33.94											11.75	24.69		25.88
222	2.25	0.81	16.00	56	32.00	10	32.75	34.63	10.56	11.50	9.56	10.50	7.06	8.00	10.56	11.75	14.50	1.00	22.00	24.00	4.00	
				143T-145T			34.56	36.44											12.38	25.38		27.38
				182T-184T			38.50	40.38											16.31	30.25		32.25
245	2.50	0.81	17.00	56	34.00	10	34.56	36.56	11.63	12.63	10.50	11.50	6.50	7.50	10.38	12.88	14.50	1.13	22.81	27.75	4.00	
				143T-145T			36.31	38.31											12.13	26.19		28.13
				182T-184T			40.31	42.31											16.13	31.06		33.00
270	2.50	0.81	19.00	56	38.00	10	37.75	10.00	12.50	13.63	11.38	12.50	6.88	8.00	11.81	14.13	16.50	1.13	27.06	28.88	4.00	
				143T-145T			41.69	43.94											15.75	31.94		33.75
				182T-184T			43.44	45.69											17.50	34.44		36.25

AC1004817

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Horizontal, Arr. 4 - Class I and II



NOTES:

1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Spring mounting points S5 & S6 are for sizes 542 and larger.

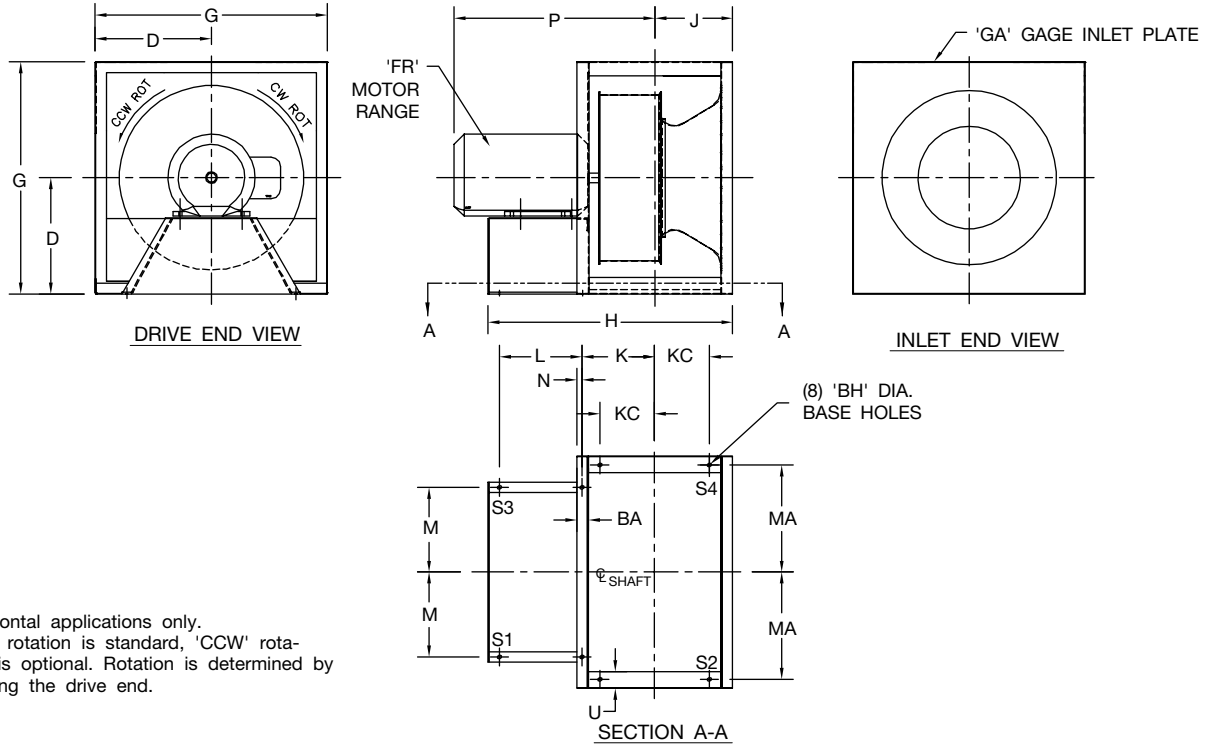
Class I and II, Size 300 - 660

Size	BA	BH	D	FR	G	GA	H		J		K		KC		L	LA	LB	M	MA	N	P Max.		U
							50-77%	78-105%	50-77%	78-105%	50-77%	78-105%	50-77%	78-105%							Width	Width	
							Width	Width	Width	Width	Width	Width	Width	Width							Width	Width	
300	3.00	0.81	21.00	213T-215T	42.00	10	40.31	42.81	14.00	15.25	12.63	13.88	7.75	9.00	11.63	—	8	15.88	17.50	1.38	28.06	29.94	4.75
				254T-256T			44.31	46.81							15.63	—	8				32.94	34.81	
				284T-286T			45.94	48.44							17.25	—	8				35.44	37.31	
330	3.50	0.81	23.00	284T-286T	46.00	10	46.31	49.06	15.50	16.88	13.88	15.25	9.38	10.75	14.88	—	8	17.38	19.50	1.63	36.44	38.38	4.75
				254T-256T			48.06	50.81							16.63	—	8				36.44	38.38	
				324T-326T			49.81	52.56							9.19	9.19	10				38.94	40.88	
365	3.50	0.81	25.50	284T-286T	51.00	7	50.38	53.38	16.81	18.31	15.19	16.69	10.50	12.00	16.31	—	8	18.88	22.00	1.63	37.81	39.31	4.75
				324T-326T			51.25	54.25							17.19	—	8				40.31	41.81	
				364T-365T			51.94	54.94							17.88	—	8				42.06	43.56	
402	3.50	0.81	28.00	404T-405T	56.00	7	54.25	57.25	18.13	19.75	16.50	18.13	11.88	13.50	10.09	10.09	10	20.88	24.50	1.63	47.56	49.06	4.75
				284T-286T			53.13	56.38							16.44	—	8				39.13	40.75	
				324T-326T			54.38	57.63							17.69	—	8				41.63	43.25	
445	4.00	0.81	31.00	364T-365T	62.00	7	54.38	57.63	20.00	21.81	18.13	19.94	14.00	15.81	17.69	—	8	22.88	26.50	1.88	43.38	45.00	6.00
				404T-405T			46.50	59.75							9.91	9.91	10				48.88	50.50	
				324T-326T			60.00	63.63							9.91	9.91	10				43.00	46.50	
490	4.00	0.81	34.00	404T-405T	68.00	7	61.13	64.75	21.56	23.56	19.69	21.69	15.56	17.56	10.47	10.47	10	25.38	29.50	1.88	44.75	48.25	6.00
				364T-365T			62.94	66.88							9.78	9.78	10				44.56	48.00	
				404T-405T			64.06	68.00							10.34	10.34	10				46.31	49.75	
542	4.00	0.81	38.00	364T-365T	76.00	7	63.81	67.75	23.31	25.56	21.44	23.69	17.31	19.56	10.22	10.22	10	27.63	33.50	1.88	51.81	53.81	6.00
				404T-405T			67.56	72.00							10.34	10.34	10				48.06	51.63	
				444T-445T			67.25	71.69							10.19	10.19	10				53.56	55.81	
600	5.00	0.81	38.00	364T-365T	76.00	0.25	70.63	75.06	26.38	28.81	24.00	26.44	19.38	21.81	11.88	11.88	10	30.63	33.50	2.38	60.06	62.31	6.00
				404T-405T			72.81	77.69							10.19	10.19	10				50.19	53.56	
				444T-445T			73.56	78.44							10.56	10.56	10				55.69	58.13	
660	5.00	0.81	40.75	364T-365T	81.50	0.25	75.50	80.38	28.38	31.13	26.00	28.75	21.44	24.13	11.53	11.53	10	33.13	36.25	2.38	62.19	64.63	6.00
				404T-405T			76.38	81.75							9.69	9.69	10				52.25	56.19	
				444T-445T			77.44	82.81							10.44	10.44	10				57.75	60.44	
							80.19	85.56						11.81	11.81	10				64.25	66.94		

AC1004818

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Horizontal, Arr. 4 - Class III



NOTES:

- Horizontal applications only.
- 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.

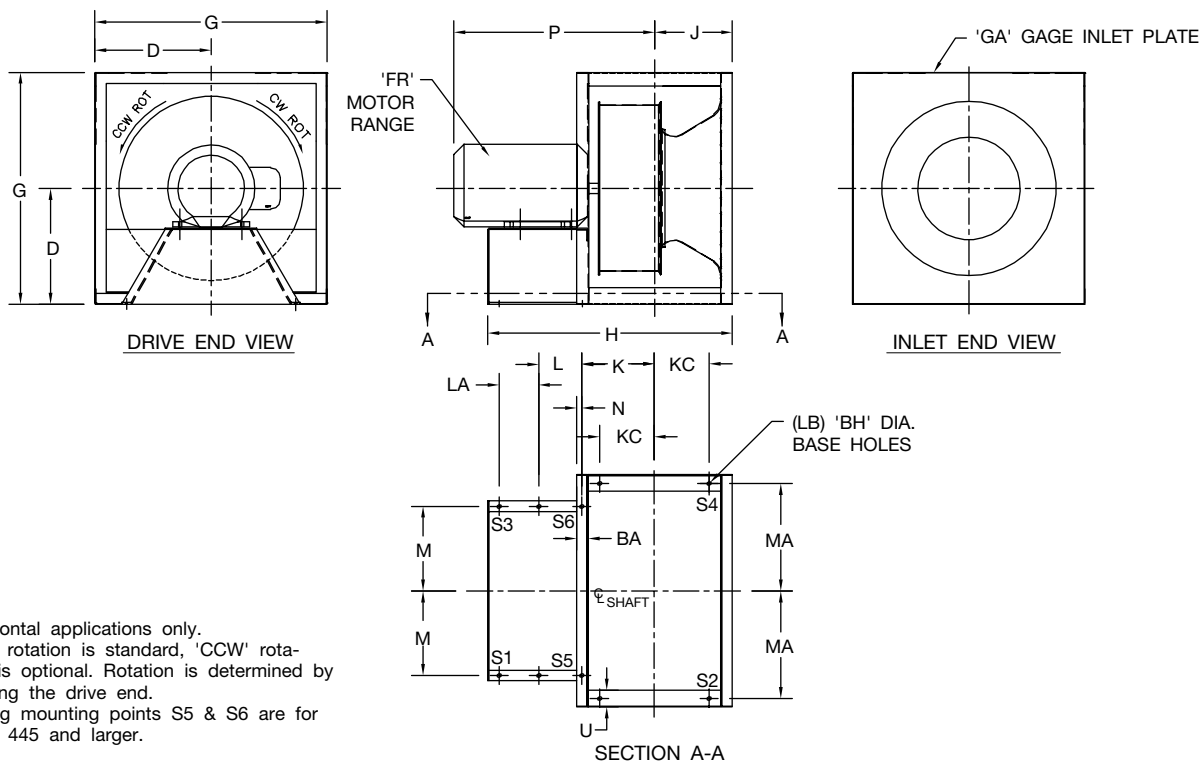
Class III, Size 182 - 330

Size	BA	BH	D	FR	G	GA	H		J		K		KC		L	M	MA	N	P Max.		U	
							50-77% Width	78-105% Width	50-77% Width	78-105% Width	50-77% Width	78-105% Width	50-77% Width	78-105% Width					50-77% Width	78-105% Width		
182	1.75	0.81	13.00	143T-145T	26.00	10	27.00	28.44	8.75	9.50	8.00	8.75	4.50	5.25	8.13	9.63	11.50	0.75	19.38	20.13	4.00	
				182T-184T			28.25	29.69											9.38	20.75		21.50
				213T-215T			29.75	31.19											10.88	24.13		24.88
200	2.25	0.81	14.50	143T-145T	29.00	10	29.13	30.69	9.88	10.69	8.88	9.69	6.69	7.50	8.25	10.63	13.00	1.00	20.00	20.81	4.00	
				182T-184T			30.50	32.06											9.63	21.38		22.19
				213T-215T			31.63	33.19											10.75	24.75		25.56
222	2.25	0.81	16.00	182T-184T	32.00	7	32.56	34.38	10.56	11.50	9.56	10.50	7.06	8.00	10.31	11.75	14.50	1.00	22.13	23.06	4.00	
				213T-215T			33.44	35.25											11.19	25.50		26.44
				254T-256T			37.44	39.25											15.19	30.38		31.31
245	2.50	0.81	17.00	182T-184T	34.00	7	34.94	36.88	11.63	12.63	10.50	11.50	6.50	7.50	10.69	12.88	14.50	1.13	22.94	23.94	4.00	
				213T-215T			35.56	37.50											11.31	26.31		27.31
				254T-256T			39.31	41.25											15.06	31.19		32.19
270	2.50	0.81	19.00	213T-215T	38.00	7	37.56	39.75	12.50	13.63	11.38	12.50	6.88	8.00	11.56	14.13	16.50	1.13	27.19	28.31	4.00	
				254T-256T			40.69	42.88											14.69	32.06		33.19
				284T-286T			42.44	44.63											16.44	34.56		35.69
300	3.00	0.81	21.00	213T-215T	42.00	7	40.50	42.94	14.00	15.25	12.63	13.88	7.75	9.00	11.75	15.88	17.50	1.38	28.19	29.44	4.75	
				254T-256T			43.44	45.88											14.69	33.06		34.31
				284T-286T			44.94	47.38											16.19	35.56		36.81
330	3.50	0.81	23.00	324T-326T	46.00	7	46.69	49.13	15.50	16.88	13.88	15.25	9.38	10.75	11.94	17.38	19.50	1.63	38.06	39.31	4.75	
				254T-256T			44.94	47.63											13.44	34.06		35.44
				284T-286T			46.44	49.13											14.94	36.56		37.94
				324T-326T			48.75	51.44						17.25				39.06	40.44			

AC1004819

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Horizontal, Arr. 4 - Class III



NOTES:

- Horizontal applications only.
- 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
- Spring mounting points S5 & S6 are for sizes 445 and larger.

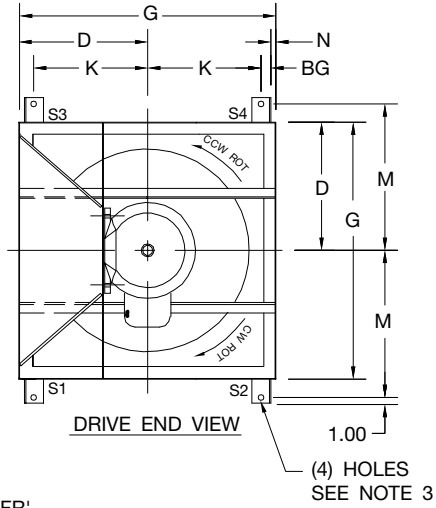
Class III, Size 365 - 660

Size	BA	BH	D	FR	G	GA	H		J		K		KC		L	LA	LB	M	MA	N	P Max.		U
							50-77%	78-105%	50-77%	78-105%	50-77%	78-105%	50-77%	78-105%							50-77%	78-105%	
							Width	Width	Width	Width	Width	Width	Width	Width							Width	Width	
365	3.50	0.81	25.50	284T-286T	51.00	0.25	48.25	51.19	16.81	18.31	15.19	19.69	10.50	12.00	14.13	—	8	18.88	22.00	1.63	38.00	39.44	4.75
				324T-326T			49.38	52.31							15.25	—	8				40.50	41.94	
				364T-365T			50.63	53.56							16.50	—	8				42.25	43.69	
				404T-405T			53.63	56.56							9.75	9.75	10				47.75	49.19	
402	3.50	0.81	28.00	284T-286T	56.00	0.25	52.50	55.69	18.13	19.75	16.50	18.13	11.88	13.50	15.75	—	8	20.88	24.50	1.63	39.31	40.88	4.75
				324T-326T			53.75	56.94							17.00	—	8				41.81	43.38	
				364T-365T			53.25	56.44							16.50	—	8				43.56	45.13	
				404T-405T			56.25	59.44							9.75	9.75	10				49.06	50.63	
445	4.00	0.81	31.00	324T-326T	62.00	0.25	59.63	63.19	20.00	21.81	18.13	19.94	14.00	15.81	16.00	—	8	22.88	26.50	1.88	50.44	52.19	6.00
				444T-445T			63.38	66.94							11.56	11.56	10				56.94	58.69	
				324T-326T			60.06	63.94							16.63	—	8				44.75	46.69	
				364T-365T			60.44	64.31							17.00	—	8				46.50	48.44	
490	4.00	0.81	34.00	404T-405T	68.00	0.25	61.44	65.31	21.56	23.56	19.69	21.69	15.56	17.56	18.00	—	8	25.38	29.50	1.88	52.00	53.94	6.00
				444T-445T			66.19	70.06							11.38	11.38	10				58.50	60.44	
				364T-365T			63.56	67.94							16.63	—	8				48.25	50.44	
				404T-405T			65.44	69.81							9.25	9.25	10				53.75	55.94	
542	4.00	0.81	38.00	444T-445T	76.00	0.25	69.13	73.50	23.31	25.56	21.44	23.69	17.31	19.56	11.09	11.09	10	27.63	33.50	1.88	60.25	62.44	6.00
				364T-365T			71.56	76.38							9.53	9.53	10				50.38	52.81	
				404T-405T			71.31	76.13							9.41	9.41	10				55.88	58.31	
				444T-445T			74.06	78.88							10.78	10.78	10				62.38	64.81	
600	5.00	0.81	38.00	364T-365T	76.00	0.31	78.06	83.38	26.38	28.81	24.00	26.44	19.38	21.81	10.71	10.71	10	30.63	33.50	2.38	52.50	55.44	6.00
				404T-405T			77.69	83.00							10.53	10.53	10				58.00	60.63	
				444T-445T			76.44	84.75							11.41	11.41	10				64.50	67.13	
				364T-365T			78.06	83.38							10.71	10.71	10				52.50	55.44	
660	5.00	0.81	40.75	404T-405T	81.50	0.31	77.69	83.00	28.38	31.13	26.00	28.75	21.44	24.13	10.53	10.53	10	33.13	36.25	2.38	58.00	60.63	6.00
				444T-445T			76.44	84.75							11.41	11.41	10				64.50	67.13	
				364T-365T			78.06	83.38							10.71	10.71	10				52.50	55.44	
				404T-405T			77.69	83.00							10.53	10.53	10				58.00	60.63	

AC1004820

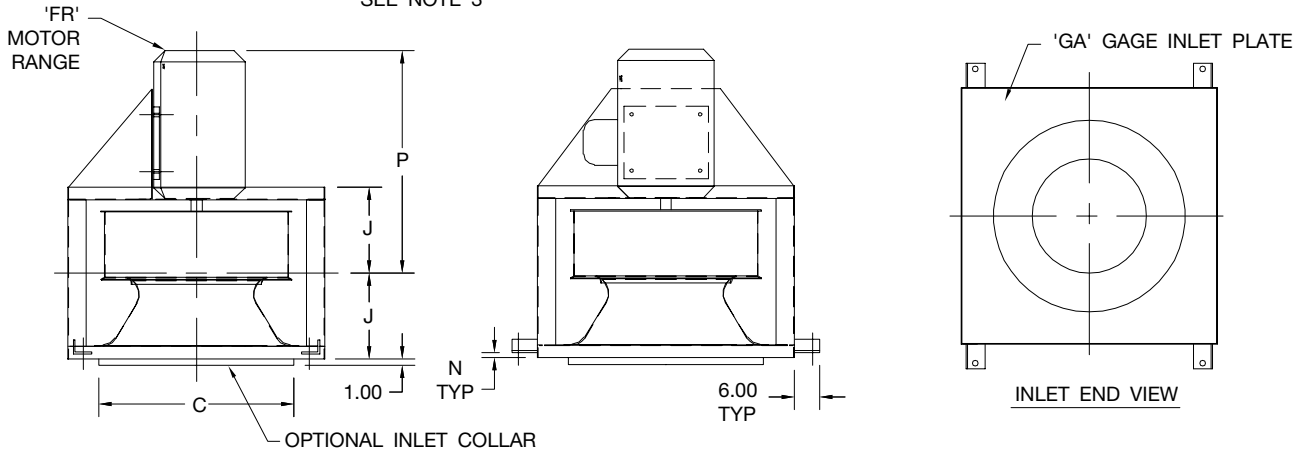
DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Vertical, Arr. 4V - Class I and II



NOTES:

1. Vertical applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
Size 182-365: 0.56
Size 402-490: 0.81



Size	BG	C	D	FR	G	GA	J		K	M	N	P MAX.	
							50-70% WIDTH	71-105% WIDTH				50-70% WIDTH	71-105% WIDTH
182	1.63	19.50	13.00	143T - 215T	26.00	12	8.75	9.50	10.38	18.00	1.00	25.13	26.00
200	1.63	21.38	14.50	143T - 215T	29.00	12	9.88	10.69	11.38	19.50	1.50	25.63	26.75
222	1.63	23.75	16.00	182T - 256T	32.00	10	10.56	11.50	12.88	21.00	1.50	31.88	33.00
245	1.63	26.06	17.00	182T - 256T	34.00	10	11.63	12.63	13.88	22.00	1.50	32.63	33.75
270	1.63	28.50	19.00	213T - 286T	38.00	10	12.50	13.63	15.88	24.00	1.50	35.88	37.00
300	1.63	31.63	21.00	213T - 286T	42.00	10	14.00	15.25	17.88	26.00	1.50	36.88	38.00
330	1.63	34.75	23.00	254T - 326T	46.00	10	15.50	16.88	19.88	28.00	1.50	40.25	42.13
365	2.13	38.50	25.50	284T - 405T	51.00	7	16.81	18.31	21.88	30.50	1.50	48.50	51.25
402	2.13	42.44	28.00	284T - 405T	56.00	7	18.13	19.75	24.38	33.00	1.50	49.88	52.63
445	2.13	46.88	31.00	324T - 405T	62.00	7	20.00	21.81	27.38	36.00	1.50	52.88	54.88
490	2.13	51.63	34.00	324T - 405T	68.00	7	21.56	23.56	30.38	39.00	1.50	54.19	56.50

AC1001426
AC1001427
AC1001428

DIMENSIONS ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

Fans shall be Model EPF, EPFN, EPQ or EPQN centrifugal plenum (plug) type, as manufactured by Twin City Fan & Blower, Minneapolis, Minnesota.

Fans shall have a sharply rising pressure characteristic extending through the operating range and continuing to rise beyond the peak efficiency to ensure quiet and stable operation. Fans shall have a 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 class limits as specified in AMCA's Standard 2408-69.

PERFORMANCE — Performance ratings shall conform to AMCA Standard 205 (fan efficiency grade), 211 (air performance) and 311 (sound performance). Fans shall be tested in accordance with ANSI/AMCA Standard 210 (air performance) and 300 (sound performance) in an AMCA accredited laboratory. Fans shall be licensed to bear the AMCA certified ratings seal for both sound and air, and fan efficiency grade (FEG). Arrangement 3 fans shall be tested and rated with shaft, bearings, and bearing bar in the inlet. Sound certification shall apply to both inlet and outlet sound power levels.

Fans shall have a sharply rising pressure characteristic extending through the operating range and continuing to rise beyond the peak efficiency to ensure quiet and stable operation. Fans shall have a 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 class limits as specified in AMCA Standard 99.

CONSTRUCTION — Fans shall be designed without a scroll type housing and shall incorporate a non-overloading type backward inclined airfoil blade wheel, heavy-gauge reinforced steel inlet plate, structural steel frame, and shaft and bearings.

FRAME AND INLET PANEL — Inlet panels shall be of heavy-gauge reinforced steel construction. The inlet panel incorporates a removable spun inlet cone designed for smooth airflow into the accompanying inlet retaining ring of the fan wheel. A square, formed lip suitable for attachment of a boot connector shall surround the unit.

WHEEL — 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 245 and smaller shall have airfoil-shaped extruded aluminum blades. Sizes 270 and larger shall have die-formed airfoil steel blades with the option of extruded aluminum blades. All wheels on direct drive arrangement 4 fans shall have airfoil-shaped extruded aluminum blades. All hollow blade wheels shall be continuously welded around all edges. EPF and EPFN wheels shall have nine blades for high efficiencies. EPQ and EPQN wheels shall have twelve blades for better sound quality. All wheels shall be statically and dynamically balanced on precision electronic balancers to a Balance Quality Grade G6.3 per ANSI/AMCA 204 or better.

SHAFT — Shafts shall be AISI 1040 or 1045 hot rolled steel, accurately turned, ground, polished, and ring gauged for verification. Shafts shall be sized for the first critical speed of at least 1.43 times the maximum speed. All shafts must be dial indicated for straightness after the keyways are cut and straightened as required.

FAN BEARINGS — Bearings shall be heavy duty, grease lubricated, spherical roller or adapter mounted anti-friction ball, self-aligning, pillow block type and selected for a minimum bearing life (AFBMA L-10) in excess of 80,000 hours at the maximum fan RPM. All bearings shall be equipped with greasable zerk fittings and, where necessary, extended lube lines for easy access for lubrication.

DRIVE — Motor sheaves shall be cast iron, variable pitch on applications 10 HP and smaller, and fixed pitch on 15 HP and larger. Drives and belts shall be rated for 140% of the required motor HP.

FINISH AND COATING — The entire fan assembly, excluding the shaft, shall be thoroughly degreased and deburred before application of a rust-preventative primer. After the fan is completely assembled, a finish coat of paint shall be applied to the entire assembly. The fan shaft shall be coated with a petroleum-based rust protectant. Aluminum components shall be unpainted.

ACCESSORIES — When specified, accessories shall be provided by Twin City Fan & Blower to maintain one source responsibility.

VARIABLE INLET VANES — When specified, the variable inlet vanes shall be internal "nested" type. Each assembly is to have eleven vanes on sizes 245 and larger, and eight vanes on sizes 182 through 222. 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.

FACTORY RUN TEST — All fans prior to shipment shall be completely assembled and test run as a unit at the specified operating speed or maximum RPM allowed for the particular construction type. Maximum vibration shall be within the limits of ANSI/AMCA 204 Fan Application Category BV-3. Balance readings shall be taken by electronic type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.

GUARANTEE — The manufacturer shall guarantee the workmanship and materials for its EPF, EPFN, EPQ and EPQN fans for at least one (1) year from startup or eighteen (18) months from shipment, whichever occurs first.

INDUSTRIAL & COMMERCIAL FANS

Centrifugal Fans | Utility Sets | Plenum & Plug Fans | Inline Centrifugal Fans

Mixed Flow Fans | Tubeaxial & Vaneaxial Fans | Propeller Wall Fans | Propeller Roof Ventilators

Centrifugal Roof & Wall Exhausters | Ceiling Ventilators | Gravity Ventilators | Duct Blowers

Radial Bladed Fans | Radial Tip Fans | High Efficiency Industrial Fans | Pressure Blowers

Laboratory Exhaust Fans | Filtered Supply Fans | Mancoolers | Fiberglass Fans | Custom Fans



A Twin City Fan Company

TWIN CITY FAN & BLOWER | WWW.TCF.COM

5959 Trenton Lane N | Minneapolis, MN 55442 | Phone: 763-551-7600 | Fax: 763-551-7601

CBD6 COUNTERBALANCED BACKDRAFT DAMPER

STANDARD CONSTRUCTION

FRAME

6063T5 extruded aluminum .125" (3.2) wall thickness.

BLADES

6063T5 extruded aluminum .070" (1.8) wall thickness with extruded vinyl edge seals.

BEARINGS

Zytel.

LINKAGE

1/8" x 1/2" (3 x 13) aluminum tiebars.

COUNTERBALANCE

Zinc plated bar on blades (except top blade). Adjustable for final "on the job" setting.

FINISH

Mill.

MAXIMUM SIZE

Single section – 48"w x 52"h (1219 x 1321).

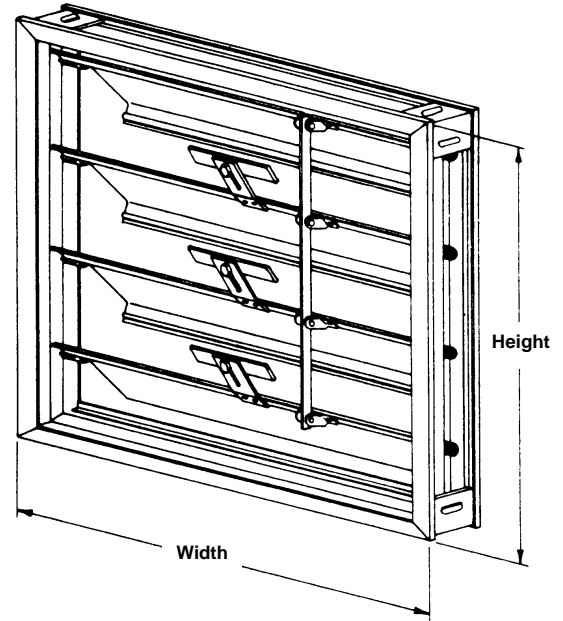
Assembly of sections – unlimited.

MINIMUM SIZE

6" w x 10"h (152 x 254)

TEMPERATURE LIMITS

-40°F (-40°C) minimum and +200°F (93°C) maximum.



VARIATIONS

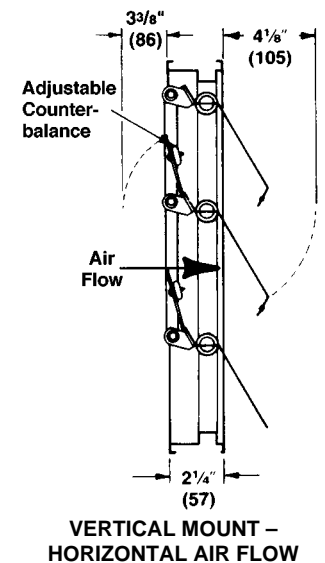
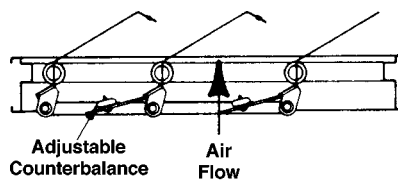
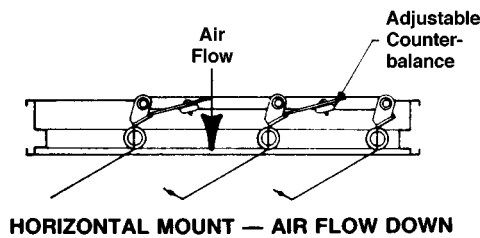
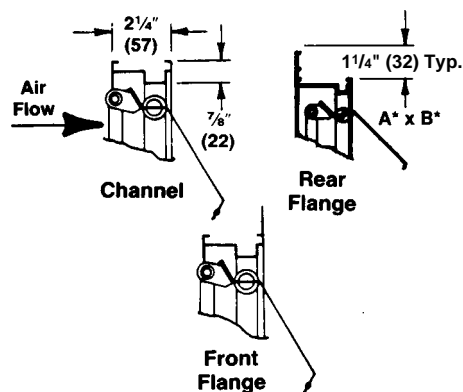
The following variations to the CBD6 are available at additional cost:

- Special finishes
- Bird or insect screens

NOTES

1. Unit furnished approx. 1/4" (6) smaller than given opening dimensions.
2. Dimensions shown in parentheses () indicate millimeters.

FRAME CONSTRUCTION



SUGGESTED SPECIFICATION

Furnish and install, at locations shown on plans or in accordance with schedules, heavy duty backdraft dampers that meet the following minimum construction standards: Frame shall be .125" (3.2) wall thickness 6063T5 extruded aluminum with 12 gage (2.8) galvanized steel structural brace at each corner. Blades shall be .070" (1.8) wall thickness 6063T5 extruded aluminum with extruded vinyl blade edge seals mechanically locked into blade edge. Adhesive or clip on type seals are unacceptable. Bearings shall be corrosion

resistant, long life synthetic type for quiet operation. Linkage shall be 1/2" (13) wide tiebar connected to stainless steel pivot pins. Dampers shall be designed for maximum 3500 fpm spot velocities and minimum 4 inches w.g. back pressure depending on damper size. Dampers shall be in all respects equivalent to Ruskin model CBD6.

INSTALLATION

- When used in fan discharge applications, damper should be located at least one-half the fan diameter away from the fan.
- For proper operation, damper must be installed square and free from racking.
- Bracing of multiple section assemblies:
The CBD6 is intended to be self supporting only in the largest single section size. Multiple section damper assemblies may require bracing to support the weight of the assembly and to hold against system pressure. Ruskin recommends appropriate bracing to support the damper horizontally at least once for every 8 feet of damper width. Vertical assemblies and higher system pressures may require more bracing.

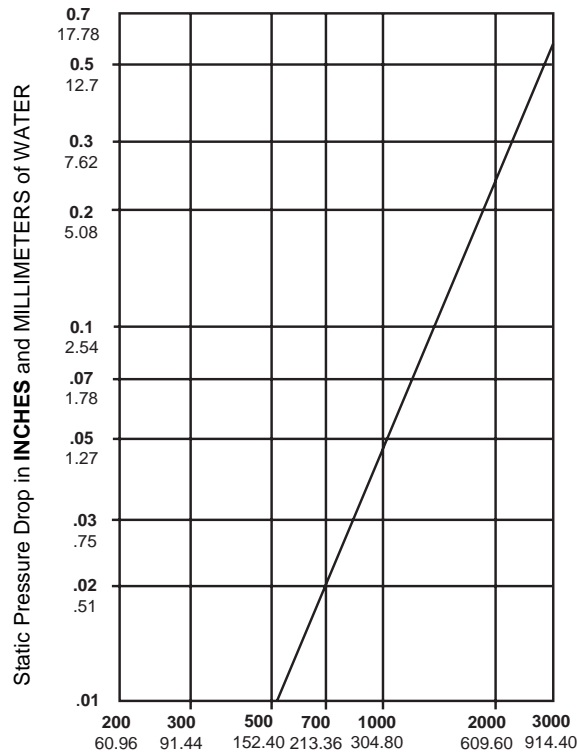
PERFORMANCE DATA

DAMPER PERFORMANCE

DAMPER WIDTH	MAXIMUM BACK PRESSURE	MAXIMUM SYSTEM VELOCITY	LEAKAGE*		BLADES START TO OPEN	BLADES FULLY OPEN
			Percent of Max. Flow	CFM/ Sq. Ft.		
48" (1219)	4.0" w.g.	2500 FPM	.6%	15	.01" w.g.	.05" w.g.
36" (914)	8.0" w.g.	2500 FPM	.6%	15		
24" (610)	12.0" w.g.	2500 FPM	.7%	17.5		
12" (305)	16.0" w.g.	2500 PFM	1%	25		

*Leakage information based on pressure differential of 1" w.g. tested per AMCA Std. 500.

DAMPER PRESSURE DROP (24" x 24")



Air Velocity in FEET and METERS per minute through FACE AREA.
Tested per AMCA Std. 500, Fig. 5.3, ductwork upstream and downstream.



Koch Filter Corporation
Filtration Products Crafted with Pride

*MicroMax*TM

Extended Surface Minipleat Filter



- **Minipleat Design**
- **Beverage Board or Metal Frame**
- **Three Efficiency Ranges**
 - 90-95% (MERV 14)
 - 80-85% (MERV 13)
 - 60-65% (MERV 11)
- **Compact 4" Depth**
- **Lightweight Construction**

MicroMAX Minipleat Filter

The Koch MicroMAX is an extended surface minipleat filter designed for use in a wide variety of air filtration systems. The MicroMAX offers a unique combination of high efficiency and low pressure drop making it the ideal filter for use in any standard HVAC system.

The added advantages of its compact 4" depth and lightweight-yet-rigid construction also give the MicroMAX unsurpassed capability to perform in more specialized and difficult applications.

Standard Applications

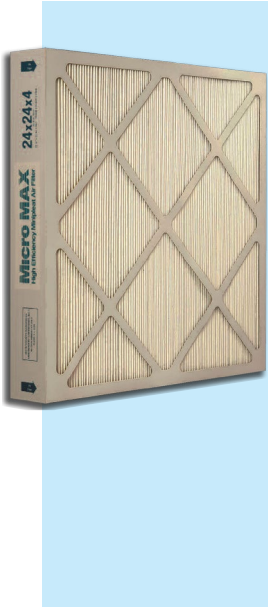
- Hospitals
- Industrial Plants
- Commercial Buildings
- Universities
- Pharmaceutical Facilities
- Sports Arenas

Extreme Applications

- Gas Turbines
- Variable-Air-Volume Systems
- High Humidity / High Moisture Areas

Specialized Applications

- Diffusion Filters for Automotive Paint Spray Booths
- Prefilters for HEPA filters in Clean Rooms and other critical areas



Compact MicroMAX Design...

Reduces Shipping Cost...



Compared with most competitive filter, which are packaged only one-per-carton, **MicroMAX** filters are packaged three-per-carton. This multiple packaging means substantial reductions in shipping costs.

...Saves Space

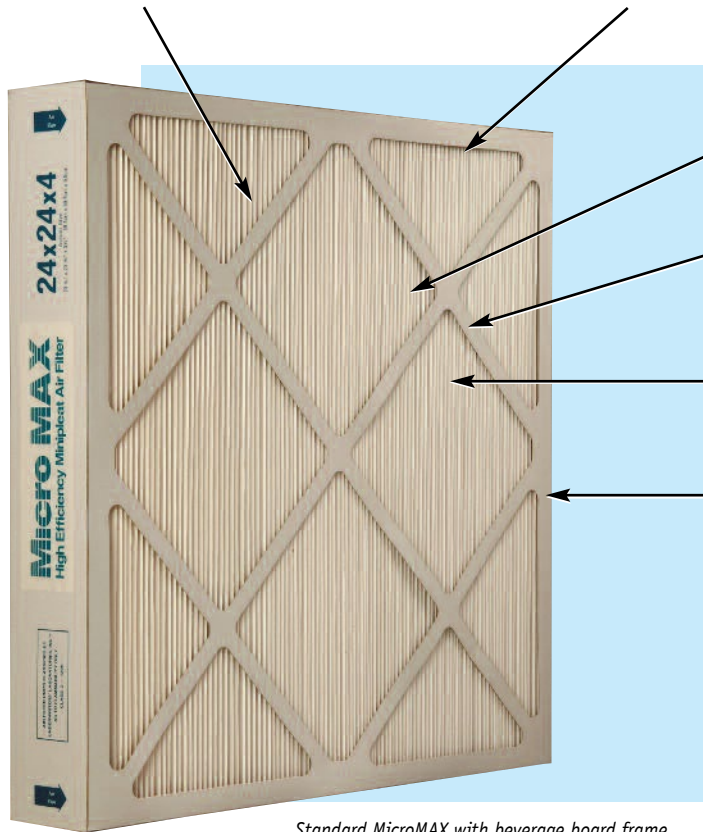


MicroMAX filters contain 120 sq. ft. of media, yet they are only 4" deep, and weigh just 7 lbs. each. Most competitive 12" deep filters with equal media area required three times the storage space, and weigh as much as 25 lbs. each.

MicroMax Construction

Minipleat design offers 120 sq. ft. of media in a 24"x24"x4" frame for high dust holding capacity and extended filter lifecycles.

Media pack is completely sealed within the frame to eliminate air bypass.



Minipleat configuration provides high efficiency and lower pressure drop.

Die-cut supports are bonded to media pack for rigidity.

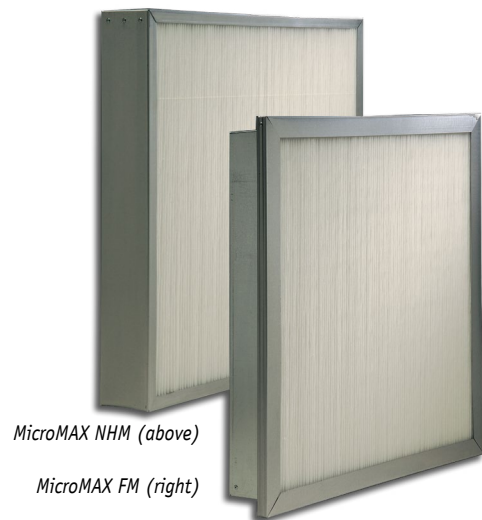
Specially-formulated adhesive bead insures even airflow and filter strength.

Available with double-walled, moisture resistant, beverage board frame (completely incinerable) or galvanized steel frame. MicroMAX with galvanized frames are offered with peripheral header (model FM) or no header (model NHM).

Standard MicroMAX with beverage board frame (completely incinerable)

Dual Density Filter Media

The media used in MicroMAX minipleat filters is composed of microfiberglass paper, treated with a specially-formulated, water-repellent binder. Millions of fibers are constructed into a Graded Density mat, with coarse fibers upstream and finer fibers on the air-exiting side. This dual-density insures full media utilization, which results in higher dust holding capacity and extended filter life. Also available with antimicrobial-treated media.



MicroMAX NHM (above)

MicroMAX FM (right)

Adhesive bead separators uniformly secure the pleats to allow maximum air flow with minimal pressure drop.





MicroMAX Performance Data

MODEL NO	RATED FILTER FACE VELOCITY (FPM)	NOMINAL SIZE (W X H X D)	ACTUAL SIZE (W X H X D)	RATED AIR FLOW CAPACITY (CFM)	RATED INITIAL RESISTANCE (IN. W.G.)	RECOMMENDED FINAL RESISTANCE (IN. W.G.)	GROSS MEDIA AREA (SQ. FT.)	SHIPPING WEIGHT ¹ (lbs. per CTN)
MicroMAX 90 - 95% (MERV 14)								
MX-9-444	500	24x24x4	23- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	2000	0.68	1.5	120	20
MX-9-054	500	20x25x4	19- ¹ / ₂ x24- ¹ / ₂ x3- ³ / ₄	1750	0.68	1.5	111	18
MX-9-044	500	20x24x4	19- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1650	0.68	1.5	106	16
MX-9-004	500	20x20x4	19- ¹ / ₂ x19- ¹ / ₂ x3- ³ / ₄	1400	0.68	1.5	88	11
MX-9-844	500	18x24x4	17- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1500	0.68	1.5	95	11
MX-9-654	500	16x25x4	15- ¹ / ₂ x24- ¹ / ₂ x3- ³ / ₄	1400	0.68	1.5	88	11
MX-9-604	500	16x20x4	15- ¹ / ₂ x19- ¹ / ₂ x3- ³ / ₄	1100	0.68	1.5	70	9
MX-9-244	500	12x24x4	11- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1000	0.68	1.5	63	19
MicroMAX 80 - 85% (MERV 13)								
MX-8-444	500	24x24x4	23- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	2000	0.59	1.5	120	20
MX-8-054	500	20x25x4	19- ¹ / ₂ x24- ¹ / ₂ x3- ³ / ₄	1750	0.59	1.5	111	18
MX-8-044	500	20x24x4	19- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1650	0.59	1.5	106	16
MX-8-004	500	20x20x4	19- ¹ / ₂ x19- ¹ / ₂ x3- ³ / ₄	1400	0.59	1.5	88	11
MX-8-844	500	18x24x4	17- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1500	0.59	1.5	95	11
MX-8-654	500	16x25x4	15- ¹ / ₂ x24- ¹ / ₂ x3- ³ / ₄	1400	0.59	1.5	88	11
MX-8-604	500	16x20x4	15- ¹ / ₂ x19- ¹ / ₂ x3- ³ / ₄	1100	0.59	1.5	70	9
MX-8-244	500	12x24x4	11- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1000	0.59	1.5	63	19
MicroMAX 60 - 65% (MERV 11)								
MX-6-444	500	24x24x4	23- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	2000	0.40	1.5	120	20
MX-6-054	500	20x25x4	19- ¹ / ₂ x24- ¹ / ₂ x3- ³ / ₄	1750	0.40	1.5	111	18
MX-6-044	500	20x24x4	19- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1650	0.40	1.5	106	16
MX-6-004	500	20x20x4	19- ¹ / ₂ x19- ¹ / ₂ x3- ³ / ₄	1400	0.40	1.5	88	11
MX-6-844	500	18x24x4	17- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1500	0.40	1.5	95	11
MX-6-654	500	16x25x4	15- ¹ / ₂ x24- ¹ / ₂ x3- ³ / ₄	1400	0.40	1.5	88	11
MX-6-604	500	16x20x4	15- ¹ / ₂ x19- ¹ / ₂ x3- ³ / ₄	1100	0.40	1.5	70	9
MX-6-244	500	12x24x4	11- ³ / ₈ x23- ³ / ₈ x3- ³ / ₄	1000	0.40	1.5	63	19

- Shipping weights listed above apply to MicroMAX with beverage board frames. Add 10 lbs. per carton for metal framed models.
- Data based on ASHRAE 52.1 and 52.2.
- MicroMAX filters are classified as U.L. Class 2. Testing conducted according to U.L. Standard 900.
- Width and height dimensions are interchangeable. MicroMAX filters may be installed with pleats in either direction.
- Filters may be operated at up to 125% of rated face velocity.
- MicroMAX filters should be used with a prefilters for maximum performance.

Corporate Offices

P.O. Box 3186 • 625 West Hill Street (40208)
 Louisville, KY 40201 • 502.634.4796
 Fax: 502.637.2280 • E mail: info@kochfilter.com
 www.kochfilter.com

Regional Sales Offices/Distribution Centers

Atlanta, GA • Detroit, MI • East Greenville, PA* • Houston, TX* • Indianapolis, IN
 Kansas City, MO • Louisville, KY* • Madbury, NH • Nashville, TN • Mira Loma, CA*

*Denotes manufacturing site.



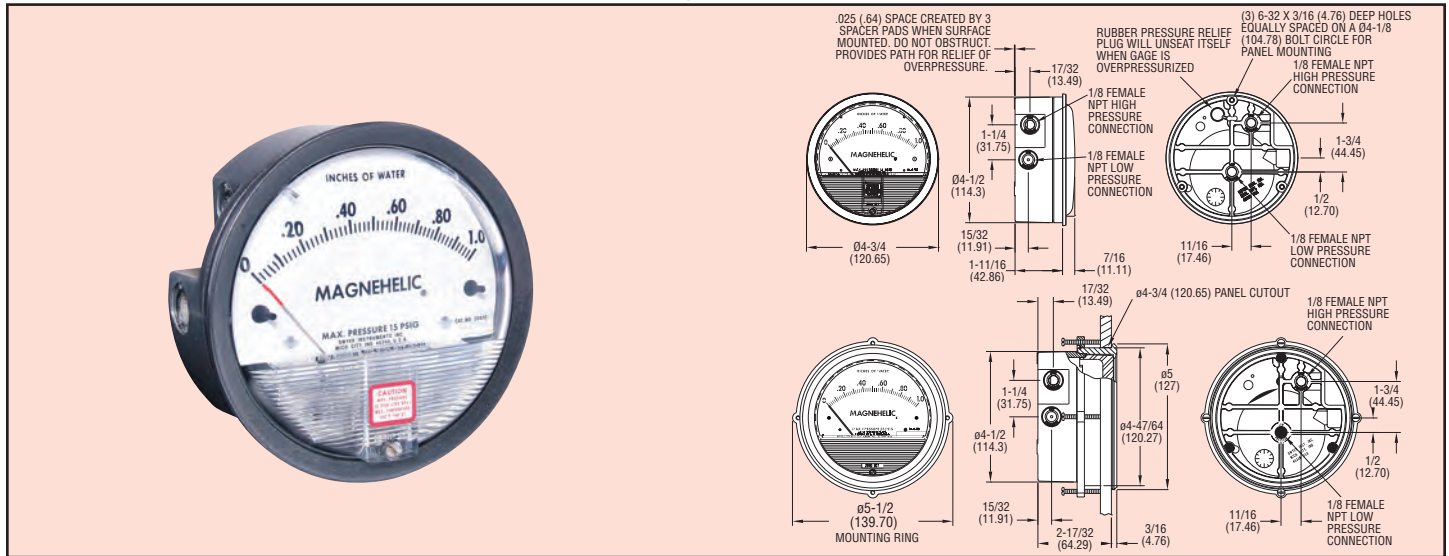
Look for the Koch Green icon! Whenever you see the Koch Green icon, we are identifying a product that meets or exceeds our criteria in one or more of the following categories: Earns LEED Points, Reduces Energy Costs, Extends Filter Lifecycles, Conserves Resources, and Improves Indoor Environmental Quality.



Series
2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%



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

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

Mounting

A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. Although calibrated for vertical position, many ranges above 1" may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4-9/16" hole is required for flush panel mounting. Complete mounting and connection fittings, plus instructions, are furnished with each instrument. See pages 6 and 7 for more information on mounting accessories.



Flush, Surface or Pipe Mounted



Enclosure Mounted

SPECIFICATIONS

Service: Air and non-combustible, compatible gases (natural gas option available).
Note: May be used with hydrogen. Order a Buna-N diaphragm. Pressures must be less than 35 psi.

Wetted Materials: Consult factory.

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

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

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

Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only. See Overpressure Protection Note on next page.

Temperature Limits: 20 to 140°F*

(-6.67 to 60°C). -20°F (-28°C) with low temperature option.

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

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

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

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

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

Agency Approval: RoHS. **Note:** -SP models not RoHS approved.

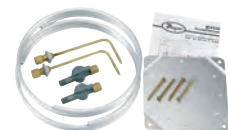
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

ACCESSORIES



Model A-432 Portable Kit

Combine carrying case with any Magnehelic® gage of standard range, except high pressure connection. Includes 9 ft (2.7 m) of 3/16" ID rubber tubing, standhanger bracket and terminal tube with holder.



Model A-605 Air Filter Gage Accessory Kit

Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4" aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves.

A-605B Air Filter Gage Accessory Kit, Air filter kit with two plastic open/close valves, two 4" steel static tips, plastic tubing and mounting flange

A-605C Air Filter Gage Accessory Kit, Air filter kit with two plastic open/close valves, two plastic static tips, plastic tubing and mounting flange

V-MAX™ Grid Coil Cleaning

Product Overview



Cleaner, Energy-Efficient and Environmentally Sustainable Indoor Air Quality

Proven to eliminate bacteria, mold and viruses, which can be dispersed into the air supply, from the moist coil environment. This ensures that clean airflow is cooled by the coil without cross contamination.

- Provides energy savings
- Eliminates costly coil cleaning maintenance and reduces system downtime
- Helps maintain healthy air supply
- Improves temperature and humidity control

Benefits of UV-C Coil Cleaning

UV coil systems are typically installed downstream of the evaporator coil to destroy bacteria, mold and organic matter that grows and collects on cooling coils and surrounding areas.



Clogged Coil



UV Destroys Biofilm



Clean Coil Post-UV

Better Comfort

Coil disinfection prevents biofilm accumulation on fins resulting in effective heat transfer with better temperature and humidity control.

Energy Savings

Maintaining a coil free of microbial growth will maximize coil heat transfer efficiency and reduce energy consumption up to 15% in some systems.

Reduced Maintenance Cost and Less Downtime

UV energy ensures the cooling coil remains clean at all times, eliminating costly coil cleaning maintenance and reducing system downtime

V-MAX™ Grid Coil Cleaning

Designed for Medium-to-Large Air Handling Unit Installation

- Scalable design to meet any plenum size
- Lamps can be easily mounted on vertical supports
- Ballast is designed to easily mount in vertical support strut
- Negligible pressure drop
- Low power consumption with universal voltage
- 90° boot lamp connectors for ease of installation
- Available in 21" (53.34 cm), 33" (83.82 cm), 48" (121.92 cm) and 61" (154.94 cm) lamps

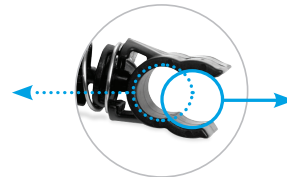


Clip Features

Snap-in clips are designed to hold either the end cap or the bulb.



For Bulb



For End Cap

Tech Specs

Input Voltage	Lamp Configuration					
	21" (53.34 cm)	Dual 21" (Dual 53.34 cm)	33" (83.82 cm)	Dual 33" (Dual 83.82 cm)	48" (121.92 cm)	61" (154.94 cm)
120	0.45	0.90	0.75	1.45	1.24	1.3
208	0.30	0.60	0.45	0.90	0.75	0.80
240	0.25	0.50	0.40	0.80	0.65	0.70

Designed for use with 120, 208, and 240 VAC input. Approximate current draw (in Amps).

- Rated for temperature 30°F - 135°F (-1°C - 57°C)
- RH: up to 95% non condensing
- 90° boot lamp connectors for ease of installation; boot extends over lamp endcap providing high level of moisture resistance

Regulatory Approvals

- ETL listed to UL/Canadian standards:
- UL 1598/CSA 22.2 250
 - UL 1995/CSA 22.2 236
 - UL 153/CSA 22.2 12

Stationary Radiometer

INSTALLER/OWNER'S GUIDE



ALTRU...V
REAL SCIENCE FOR HVAC MAINTENANCE

Specifications subject to change without notice.

©Altru-V is a brand owned by UVDI.

Copyright © 2003 by UltraViolet Devices, Inc. All rights reserved.

Stationary Radiometer Installation, Care and Use Instructions

RADIOMETER – WHAT IT DOES

A radiometer is generally used to monitor the output of a UGI system. It measures the UV intensity produced by UV lamps. This type of radiometer is designed to indicate *relative* UV output and, therefore, does not display in microwatts of UV intensity or in UV dosage. Rather, it should be calibrated (i.e. set) to “100” when the lamps are new and operating under normal air conditioning system operation. As the life of the lamps progresses, or if an unusual event such as a burned out lamp occurs, the relative UV output will show significantly lower.

Several factors affect the output of UV lamps, including:

- Air temperature
- Air velocity
- Reflectivity and cleanliness of system and lamps
- Age of lamps

To obtain a meaningful reading from this radiometer, measurements must be taken under the exact operating conditions that the radiometer was calibrated/set at. (For your convenience, a sticker for this information is included with your unit. It is recommended that when the radiometer is calibrated, the system conditions be recorded and this sticker adhered near the radiometer for future reference.)

A typical UV lamp will have a life of about 9,000 hours (1 year at constant operation) or more. As the lamp ages, the UV output will decrease. Once the lamps drop below 70% of their original output, they should be replaced.

Assuming the UV system was sized and installed properly, sufficient UV output was provided to allow for the normal reduction of UV from “wind chill” due to the air velocity and temperature. **It is mandatory that calibration and measurements be taken at the same velocity and temperature.** This should be at the system’s coldest and highest airflow operating condition. If this is done properly, when the relative reading is 70 or less, the lamps need attention.

CAUTION: This stationary radiometer is not the same as a piece of laboratory equipment calibrated to a known standard. It is intended to indicate relative output and when lamp replacement is indicated. Radiometer sensors degrade over time with constant exposure to UV. If an accurate measurement of UV intensity is required, a calibrated laboratory radiometer should be used.

Application

The Stationary Radiometer in conjunction with a UV sensor is designed for monitoring UV lamps.

Technical Description

The Stationary Radiometer is a wall mount device. Terminals for power supply, UV sensor, relay contact and analog output are located on the lower side of the housing. Three LED's on the front side display the actual relative UV intensity in steps of "> 70%"; "50...70%" and "<50%" of an initial setting of 100% (new lamps).

The relay contact can be programmed for UV intensities between 20% (position 0) and 95 % (position F) in 5%-steps. A time delay of about 1 sec. prevents the relay contact from switching at short UV fluctuations. The switch for programming the relay contact switch point is located close to the terminal row and can be operated with a small screwdriver.

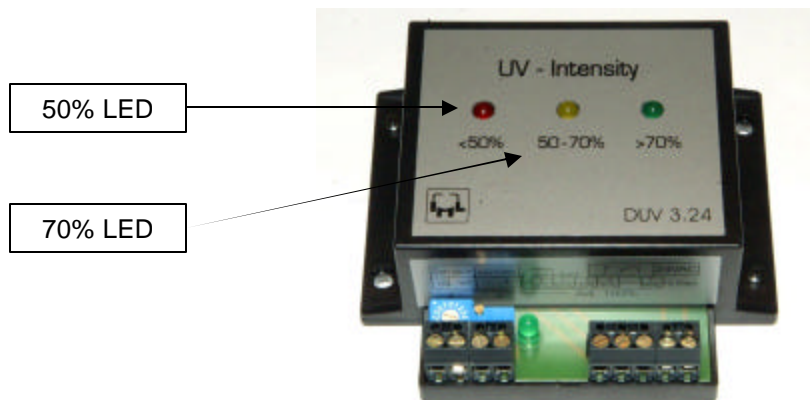
A blinking function of the LED's indicates mal-functions:

50% LED Blinking =

- Sensor Cable Broken
- UV Lamp Off
- UV Intensity Below 10% of Nominal.

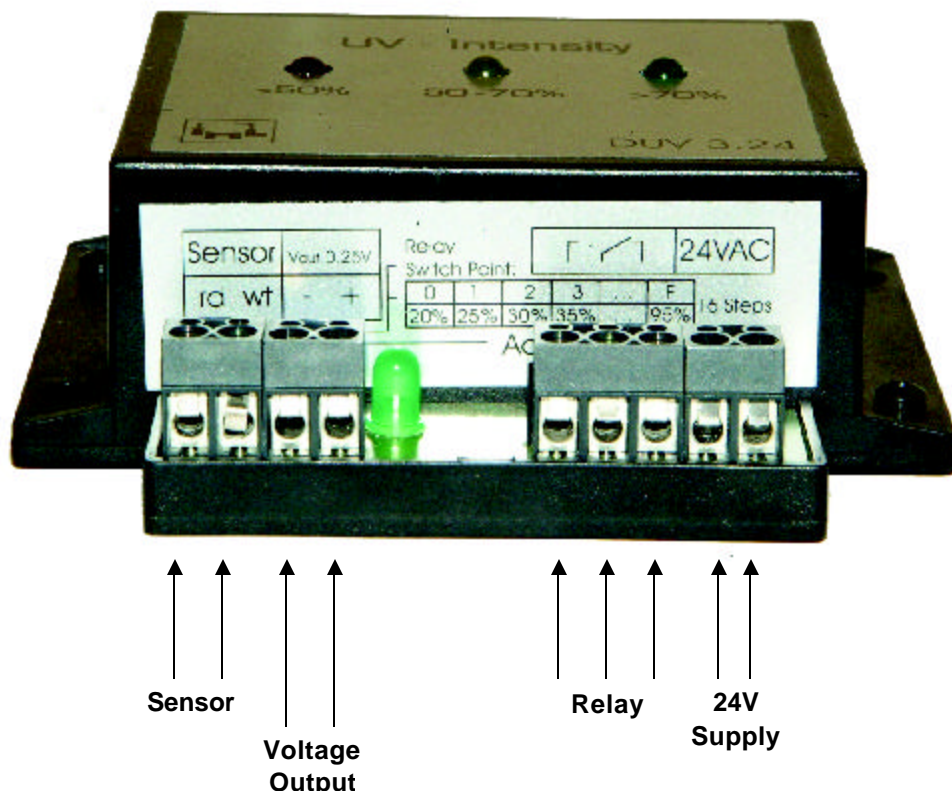
70% LED Blinking =

- UV intensity above adjustable range



Installation and start of operation

The monitor is to be wall or external duct mounted using the two mounting holes, on each side of the housing. Power supply, UV sensor; relay contact and analog output are to be connected to the terminals (see diagram below). **Note: UV sensor and analog output are critical in their polarity.**



Note:

1. Before calibration, the system should be run for four days or more to stabilize.
2. Set the system into its maximum cooling mode.
3. It is helpful to record the system conditions on the enclosed label for future reference.
4. Recalibrate the radiometer each time lamps are replaced.

Power on all three LED's and the relay contact are activated for a few seconds to test their operational status.

The potentiometer, "Adj." is used to adjust the nominal value (100%) after new lamps are installed. Turn the potentiometer slowly. The green LED close to the potentiometer starts to blink when the potentiometer is near the 100% level. When the 100% level is reached the green LED is permanently on. Exceeding 100% is indicated with a blinking green LED at a higher blinking rate.

If a permanent on of the green LED cannot be reached, change the position of the UV sensor relative to the UV lamps. Finally the switch point of the relay contact can be set with the 16-step switch using a small screwdriver. Position "0" sets the switch point to 20% of nominal. Each step increases the switch point value by 5% as noted below.

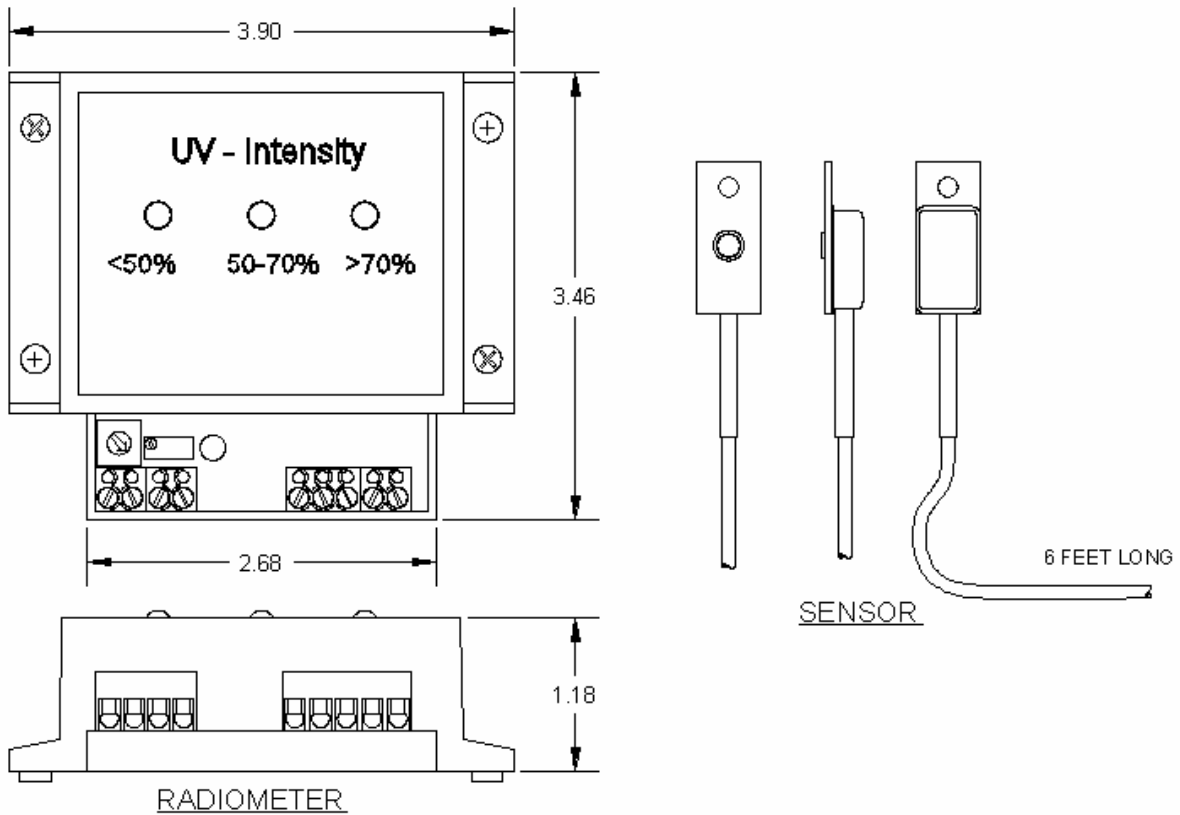
Position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Switch point	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %

Installation of the UV sensor

The UV sensor may be mounted with a single screw. The aperture angle of the sensor is 60°. Connect the red wire to the “rd” terminal, the white wire to the “wt” terminal.

Technical Specification

Mechanical Dimensions: 100mmW x 90mmH x 33mmD
 Mass: ca. 220 g
 Power supply: 24 V AC / 0.2A; 50/60 Hz
 Relay contact: 127 V/6A
 Analog output: 0...0.25 V @ 110%
 Operating temperature: 0° to 50°C



NOTES

EQUIPMENT WARRANTY

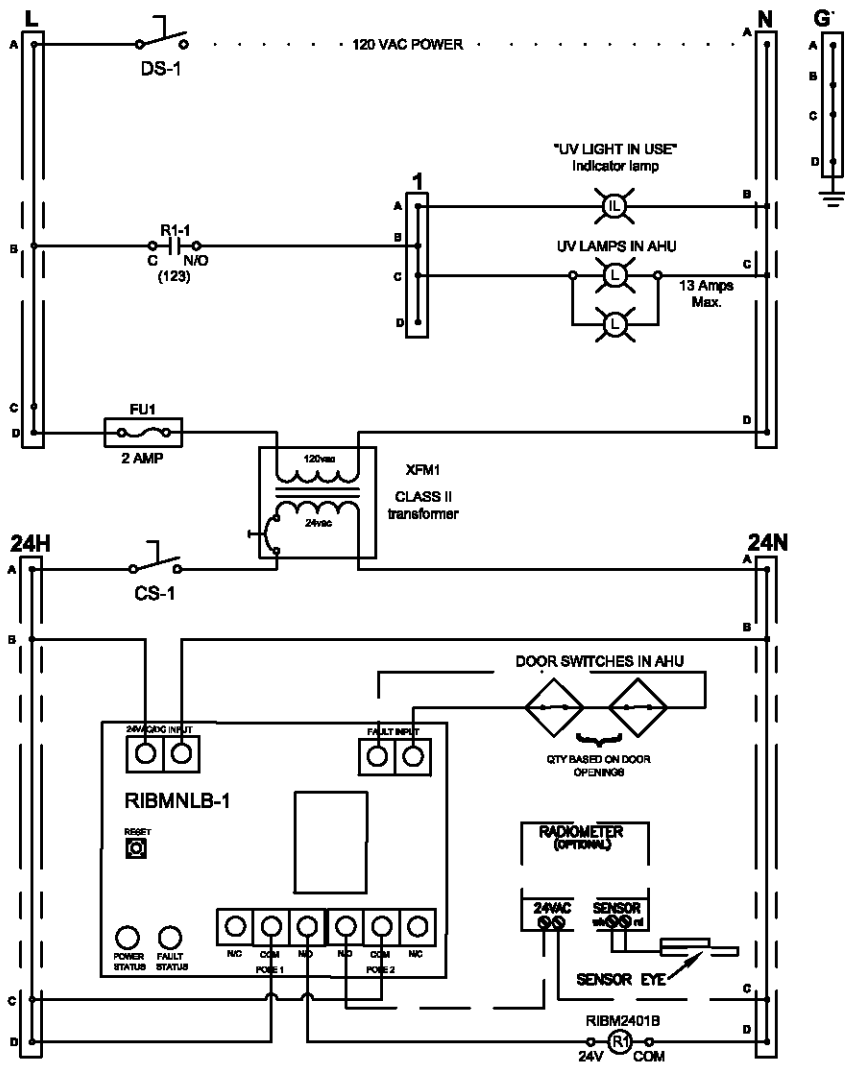
UltraViolet Devices, Inc. (UVDI), warrants to original Buyer for one year from the date of original installation, or eighteen (18) months from date of shipment, whichever comes first, that its goods are free from defect in material and workmanship under normal use and service. **UVDI's** obligation under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

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



**26145 Technology Drive
Valencia, CA 91355
Phone: (877) 787-3882 Fax: (661) 257-4698
www.altruv.com**

18-4052 Rev D, 12/01/06



..... FIELD WIRING.
 _____ PANEL WIRING.
 _____ FACTORY WIRING NOT IN PANEL.
 _____ OPTIONAL WIRING.

Sequence of Operation:
 The Disconnecting Means of UV lighting will be accomplished by "DS-1" internal to the panel. "DS-1" may be locked out by panel latching mechanism.
 "DOOR SWITCHES IN AHU" are proximity switches, which will make when door mounted sensor magnet is within 1/2" of the switch.
 "RIBMNLB-1" is a latching circuit controller which allows the UV lights to be energized upon initial power up but will latch UV lights OFF after any AHU doors are closed, by turning "CS-1" OFF for approximately 3 seconds then back ON or by pressing the "RESET" button located on the circuit board inside of the control panel.
 UV lights may only be re-energized, after all AHU doors are closed, by turning "CS-1" OFF for approximately 3 seconds then back ON or by pressing the "RESET" button located on the circuit board inside of the control panel.
 The "IL" "UV LIGHT IN USE" indicator lamp on the exterior of the control panel enclosure will be illuminated anytime the lights are energized.



REV	ECN	INIT.	MM-DD-YY	DESCRIPTION
NEW	14-3318	KLA	11-21-13	NEW

UV Control Panel Wiring
 13 Amp Max

085-013-003

ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER HEREOF ARE RESERVED AND NO PERMISSION IS GRANTED TO REPRODUCE THE PART OR IN WHOLE OR IN PART OR TO DISCLOSE ANY OF THE INFORMATION HEREON TO OTHERS WITHOUT WRITTEN RELEASE BY JOHNSON CONTROLS.

Rigging, Install and Maintenance

Rigging, Installation and Maintenance Information

For the most up to date information on transportation, rigging, installation, long term storage, maintenance recommendations for warranty, startup checklist and all other installation needs please visit these sites.

<https://docs.johnsoncontrols.com/airhandling/r/York/en-US/Solution-documentation-index>

SCOTT FOAM BASE PAD

MATERIAL	SBR bonded granular black recycled rubber and polymer binding agents		
APPEARANCE	Black, Both Sides Non-Porous , Flat One Side Anti-Skid, Wire mesh texture surface on opposite side		
DENSITY	ASTM D 3676	60 LBS/FT3	
TENSILE STRENGTH	ASTM D 412	Minimum 300 psi	
ULTIMATE ELONGATION	ASTM D 412 on 1/8"	83 % minimum	
HARDNESS	ASTM D 2240	Shore A 60 + / - 5	
COEFFICIENT OF FRICTION	ASTM D1894	0.960	
CRITICAL RADIANT FLUX	ASTM E648-94a	0.11 watts/sq. cm	
TEAR RESISTANCE (ppi)	ASTM D624	150	
FLAMMABILITY	Passes Federal Flammability Standard Doc FF 1-70 CPSC		
FLAME SPREAD	(UL 94 Standard, Horizontal Burning Test for Classifying Material 94HB)	0.495"/MIN on 3/4" thick mat	
DIMENSIONAL STABILITY	+0.242% at two hours @ 60°C -0.092% at 48 hours @ 20°C & 65% Rel. Humidity		
THERMAL RESISTANCE	R-Value	3/4"	0.54
THERMAL RESISTIVITY			.72
THERMAL CONDUCTANCE		3/4"	1.85
THERMAL CONDUCTIVITY	K-Value	1.39	
COMPRESSION & RECOVERY	ASTM D575	Immediate 98.1% After 24 hours 99.2% After 48 hours 99.4% After 72 hours 99.7% After 96 hours 99.7%	
ACCELERATED WEATHERING	Fed-Std-191 Method 5804 Carbon Arc Weatherometer except with filters removed for the test	Unexposed Tensile, psi Elongation, %	Full Exposure 344 70

The technical information copied to our company form is information supplied by the supplier. Scott Manufacturing, LLC and/or Scott Foam Technologies, LLC does not provide warranty and/or guarantee to the completeness or accuracy of the information.

Refer to the following documents for information about Solution products:

Document number and link	Description
102.20-N1.pdf	Solution Installation and Assembly
50.20-CL3.pdf	York Long-Term Storage Periodic Checklist and Logs Air Handling Units
50.20-NM1.pdf	York Long-Term Storage Requirements General
50.20-NM3.pdf	York Long-Term Storage Requirement - Field Preparation Air Handling Units
100.00-CL1.pdf	York AHU Start-Up Checklist
102.20-MR1.pdf	Maintenance Recommendations For Solution Air Handler
102.20-M1.pdf	Solution Service Manual
102.20-OM2.pdf	York Operation and Maintenance
100.00-CL2.pdf	Air Handling Units Coil Leak Checklist
102.20-CL1.pdf	Check List - Steps to Protect New Equipment Warranty
102.20-FA1.pdf	Solution Field Assembly and Disassembly, Indoor/Outdoor Modules
50.05-NM2.pdf	Service Policy - Limited Warranty- Engineered Systems
50.07-NM1.pdf	Service Policy - Renewal Parts Availability
100.00-AG5.pdf	A2L Refrigerant and Safety Requirements
SI0620	Solution Membrane Roof Best Practice Service Information Letter