SUBMITTAL SHEET

Messer Construction Co.
203630-000 – Vega Americas - Mason

Project: 203630-000
Vega Americas – Mason

Spec Section Num: 237300
Submittal: 237300.01
Revision: 0
Date: 04/07/2021

Submittal Title: Air Handling Units
Submittal Detail: Product Data
Response Due By: 04/21/2021

Contractor:
Connor Watson
Messer Construction Co.

Contractor's Stamp

REVIEWED FOR SUBMITTAL
Messer
Submittal Number: 238119.02
Messer Job #: 203630-000
Date: 04/07/2021
Reviewed By: Connor Watson

Architect:
Lynn Wyrick
BHDP Architecture

Architect's Stamp

Response:
Comment:

REVIEWED BY HEAPY

FOR GENERAL CONFORMANCE WITH INFORMATION PRESENTED IN THE CONTRACT DOCUMENTS ONLY.

APPROVED AS SUBMITTED

BY: Logan Delk DATE: 4/9/2021

Submittal #23 73 00-1.2
23 73 00 - Modular Air Handling Units

Feldkamp Enterprises, Inc.
3642 Muddy Creek Rd
Cincinnati, Ohio 45238
Phone: 513-347-4500

Project: 1329 - Vega Americas BP3

Air Handling Units

REVISION:	2	**SUBMITTAL MANAGER:**	Heather Wyatt **(Feldkamp Enterprises, Inc.)**
STATUS:	Open	**DATE CREATED:**	03/24/2021
ISSUE DATE:	03/24/2021	**SPEC SECTION:**	23 73 00 - Modular Air Handling Units
RESPONSIBLE CONTRACTOR:	Johnson Controls inc.	**RECEIVED FROM:**	Alexander Jung
RECEIVED DATE:	04/5/2021	**SUBMIT BY:**	03/29/2021
FINAL DUE DATE:	04/19/2021	**LOCATION:**	
		COST CODE:	
		TYPE:	Product Information
APPROVERS:	Heather Wyatt **(Feldkamp Enterprises, Inc.)**, Bruce Blacklidge **(Messer Construction)**		

Manufacturer:
York

BALL IN COURT:
Heather Wyatt **(Feldkamp Enterprises, Inc.)**

DISTRIBUTION:
Rob Bush **(Feldkamp Enterprises, Inc.)**, Greg Reinert **(Feldkamp Enterprises, Inc.)**, Matt Flower **(Feldkamp Enterprises, Inc.)**

DESCRIPTION:
2.9 Units shall be manufactured by Trane, Daikin, Carrier, JCI, or AirZone.

SUBMITTAL WORKFLOW

NAME	SENT DATE	DUE DATE	RETURNED DATE	RESPONSE	ATTACHMENTS	COMMENTS
Alexander Jung	03/24/2021	03/29/2021	04/02/2021	Submitted	AHU-1 ReSubmittal For Approval.pdf (Current) AHU-3 ReSubmittal For Approval.pdf (Current) AHU-5 ReSubmittal For Approval.pdf (Current) AHU-4 ReSubmittal For Approval.pdf (Current) AHU-2 ReSubmittal For Approval.pdf (Current)	
Charles Lewis		03/29/2021		Pending		
Heather Wyatt	04/02/2021	04/05/2021		Pending		
Bruce Blacklidge		04/19/2021		Pending		

BY **DATE** **COPIES TO**

Equipment ReSubmittal For Approval Rev 2

Project:

VEGA AMERICAS

York Solution XTI Indoor Air Handling Unit (AHU-1)

SUBMITTED TO:
FELDKAMP ENTERPRISES

ATTENTION: HEATHER WYATT

DATE:
March 30, 2021

SUBMITTED BY:

CHARLES E. LEWIS
SYSTEMS APPLICATION ENGINEER
Johnson Controls
Equipment Sales – Cincinnati, OH

TABLE OF CONTENTS

Submittal Comments

- **Verify Filter Access From Front Is Available**
  Verified Filter Access Will Be From The Front.

- **AHU-1 Supply Opening To Be Moved Up As High As Possible On The End Of The Unit.**
  Supply Air Opening Moved As High As Possible On The End Of The Unit

- **Verify Single Point Power Connection, Required For Unit.**
  AHU Can Not Be Single Point Power. JCI Is Not Providing Motor Control For Either The Supply Fan Or Return Fan. Please Coordinate With Electrical Contractor.

- **Unit Shall Have 65K SCCR For Supply Fans**
  The Supply Fan Will Be Supplied With 65kA SCCR MMP.

- **Verify APD Was For Unit At Full 29,000 CFM Of Unit, Not Reduced Heating Airflow**
  APD Are Calculated With The Design CFM

- **Cooling Coil: Provide Minimum 974.7 Total MBH And 769.1 Sensible MBH Per Schedule**
  JCI Has ReSelected Coil To Meet Capacity Requirements On Schedule

- **Coordinate Transitions From Unit Opening To Relief Air Duct**
  JCI Will Coordinate With Install Contractor

- **Verify Updated Unit Dimensions Do Not Conflict With Anything In Model**
  JCI Will Coordinate With Install Contractor

- **Coordinate Both Relief Air and Return Air Connections**
  JCI Will Coordinate With Install Contractor

Submittal Notes

- JCI has officially announced a 2.5% price increase for the AHUs provided in this submittal. In order to avoid the price increase JCI will need to receive approved submittals and a release of the AHUs by 4-23-21 in order to process and meet the required factory release date of 4-30-21. If JCI receives this AHU submittal approved after 4-23-21, JCI will required a 2.5% price increase to meet costs driven by macro-economic factors.
- All air intake and relief dampers are provided with Tampco 9000 SC as specified.
- AHU-1 and AHU-2 are provided with 65kA SCCR supply fan circuit ratings.
- Lead Time is approximately 13 weeks from time of approved submittal.
- Before release, Feldkamp is to verify that all split sections are as required for AHUs to be maneuvered on site.
- Field installed VFD's will be furnished and installed by FEI per spec section 237300, 2.10 A.
- All controls to be field mounted on the AHU by JCI controls division.
- Outside airflow measuring station provided and field installed by JCI controls division.
- AHU is provided with base rail height per detail drawing M200. Feldkamp to provide any changes before release on returned submittal.
- Field leakage testing is not included or available per ASHRAE 111 standards. Any field leakage testing is to be provided by Feldkamp. AHU will conform to ASHRAE Standard 111 Class 6 low-leak casing design.
- AHUs will include a 5 year parts and labor warranty from time of substantial completion of startup.
- Due to the short filter section scaled on detail drawing M200, some filters will be provided as front loading with no side access door. The front access provides better access to all of the filters due to the deep width of these units. Providing side access will increase the overall length to the AHUs that are currently exceeding the maximum length specified.
- All AHUs and their current sizes with connected ductwork have been plotted using Feldkamp's shop drawings. Currently there does not seem to be anything that could cause an issue due to some of the AHU units being longer or wider.
- All fan segments are sized for fan/motor removal.
- Three sets of filters will be provided for each AHU.
- **Feldkamp to verify unit handing configuration before release**
- **Feldkamp to verify overall unit dimensions for space before release.**

- **Feldkamp to verify required shipping splits before release. Every additional shipping split will increase the length by 3”**
- **Feldkamp to verify all duct connections before release.**
- Disconnects are furnished on all supply fans via MMP panel.

PERFORMANCE

YORK® Solution™ Air Handling Unit Performance Report

Job Summary

Project Name:	VEGA Americas - Bid Day		
Unit Tag(s):	AHU-1		
Quantity:	1	**Environment:**	Indoor

Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
XTI-90x138	29,000	1,004	13,819

Segment Sequence

(DP FS)(CC-2 CC-1)(RF EE)(EE FR)(MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Bulkhead Material
MB , FR , EE , RF , CC-1 , CC-2 , FS , DP	2	None	STD Ga. G-90 Galvanized	STD Ga. G-90 Galvanized	2" Foam	Galvanized

Base Details

Segment(s)	Base		Floor				
	Material	Paint	Gauge and Material	Paint	Insulation	Attachment	Tread Plate
MB , FR , EE , RF , CC-1 , CC-2 , FS , DP	Standard Formed Steel	None	STD Ga. G-90 Galvanized	None	N/A	-	None

Unit Electrical

Circuit Details

Circuit #	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	Manual Motor Protection	460/3/60	72.4	76.9	90.0
2	Manual Motor Protection	460/3/60	26.8	28.5	35.0
3	Lights and Outlets	120/1/60	-	-	15.0

Electrical Details

Minimum Unit SCCR	5 kA rms Symmetrical	**ETL Label (UL1995/NEC-2002)**	Yes

Unit Light Type	Unit Light Switch
Vaporproof LED	External

Supply Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	II	222	80	100	4	29,000	1,004	5.62	3.50	2,445	10.97

Drive Type	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Isolation Type	Total Eficiency (%)	Outlet Velocity (ft/s)	Max Speed (RPM)
Direct Drive	SWSI	Airfoil	Aluminum	Galvanized Steel	Blank-off Plate	Yes (K=2458.00)	Rubber Pad	58.35	6,776	2,675

Motor Details

Type	Manufacturer	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	Motor Speed (RPM)	Frame Size	Full Load Amps (Amps)	Efficiency	Location
TEFC	Baldor	15.0	460/3/60	4	H	1,800	254	18.10	Premium	Direct Drive

At Motor Synchronous Details

TSP (in w.g.)	Total Air Flow (CMF)	Fan Speed (RPM)	Motor Correction Factor(%)	Fan Power (BHP)	Total Eficiency (%)
5.62	7,250	2,445	92.4	10.97	58.35

Return Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	II	182	120	100	4	29,000	1,004	0.85	0.75	2,228	3.7

Max RPM	Fan Power with Drive Loss (HP)	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints
3,300	-	SWSI	Airfoil	Aluminum	Galvanized Steel	Blank-off Plate	Yes (K=1671.00)	-	Rubber Pad	-

Drive Type	Drive SF	Spare Belts	Spare Sheave	Inlet Screen	Fan Cage	Belt Guard	Lube Lines	Bearings	Fan Stand	Motor Removal Rail	Seismic Snubber
Direct Drive	-	-	-	Yes	-	-	None	-	-	-	-

Motor Details

Type/MFG	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	RPM	Frame Size	FLA (Amps)	Efficiency	Location	SGR
TEFC/Baldor	5.0	460/3/60	4	H	1,800	184	6.70	Premium	Direct Drive	Yes

Water Coil(s)

Performance[1] Details

Coil	Fluid Type	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
							DB	WB	DB	WB									
CC-1	Water	1	8	4	364	364	45.9	-	66.7	-	16,000	235	0.03	11.5	150.0	85.3	1.0	.6	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size (in)	
CC-1	0	Right	0	Steel	0	MPT	2	1-1/2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-1	2	Full	78.50	125	68.1	AL	.006	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-1	-	324	78	1.3	Copper	Galvanized	304 Stainless Steel	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)

Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7H
- CDW Tube Spacing: 1.50 x 1.30
- CC-1[1][0]: This coil is 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.

Glycol Coil(s)

Performance[1] Details

Coil	Glycol Type	Glycol %	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
								DB	WB	DB	WB									
CC-2	Propylene	30%	10	11	8	991	774	78.1	65.1	53.5	53.5	29,000	426	1.02	150.6	45.0	58.8	2.7	8.4	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size	
CC-2	0	Right	0	Steel	0	MPT	2	3	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-2	2	Full	78.50	125	68.1	AL	.010	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-2	-	2622	743	11.5	Copper	Galvanized	304 Stainless Steel	-

Coil Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-2[1][0]: This coil is 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.

Drain(s)

Details			
Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
EE	Galvanized	Right	None
CC-1	Galvanized	Right	None
CC-2	Stainless Steel	Right	None

Filter(s)

Details							
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material
RF	Pre-Filter	2"	Upstream	Pleated 30% (MERV 8)	2	Pleated 30% (MERV 8)	Galvanized
RF	Primary Filter	4" Mini-Pleat	Upstream	80-85% Eff, (MERV 13)	2	80-85% Eff, (MERV 13)	Galvanized

Sizes						Filter Gauge Details		
Segment	Filter	1st Filter Size H x W (in)	1st Qty	2nd Filter Size H x W (in)	2nd Qty	Location	Type	Range (in w.g)
RF	Pre-Filter	20x20	16	20x24	8	Door	Magnehelic	0 - 2
RF	Primary Filter	20x20	16	20x24	8	Door	Magnehelic	0 - 2

Damper(s)

Details													
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area	CFM	Minimum Allowable OA CFM	Damper Type	Damper Config	Model	Material	Blade Orientation	Actuator Type	Fail Position
EE	Exhaust Air	21.00 x 112.00		1,776		29,000	-	Control	100%	CD50	Aluminum	Parallel	-	-
EE	Outside Air	32.50 x 120.00		1,071		29,000		Insulated	100%	CDTI50	Aluminum	Parallel	-	-
EE	Mixed Air	32.50 x 120.00		1,071		29,000	-	Control	100%	CD50	Aluminum	Parallel	-	-

Door(s)

Details										
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	Test Port	Spare Gasket	Thermal Break	Safety Latch	Noncontact Safety Interlock
MB	Right	Outward	Upstream Side	78 x 24 x 2	STD Double Pane	-	-	-	-	-
EE, DP	Right	Outward	Upstream Side	78 x 24 x 2	STD Double Pane	Yes	-	-	Yes	-
EE	Right	Outward	Upstream Side	78 x 24 x 2	STD Double Pane	Yes	-	-	-	-
CC-1	Right	Outward	Upstream Side	78 x 18 x 2	STD Double Pane	-	-	-	-	-
CC-2	Right	Outward	Downstream Side	78 x 18 x 2	STD Double Pane	Yes	-	-	-	-

Motor Control(s)

Details										
Segment	Type	MMP	V/Ph/Hz	Input/Output Amps*	Efficiency	Heat Loss (at 100% load)	Enclosure	Bypass	Disconnect Type	RFI/EMI EMC Filter
FR	MMP only	Yes	460/3/60	31.0/31.0	-	540	NEMA 3R	-	None	No
FS	MMP only	Yes	460/3/60	87.0/87.0	-	1090	NEMA 3R	-	None	No

Notes
*Drives are rated for use below 3,000 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.42-EGI (212) for use above these limits.
Storage Temperature: -40°F to 158°F
Humidity: MAX 95% RH non-condensing
Altitude: 3,300 ft. without derate (1% derate for each additional 330 ft.)
Overload Current Rating: 100% for 1 minute every 10 minutes.
The Class 10 trip rating of the MMP device will not withstand an across-the-line start of a fan and should not be used with VFDs with bypass circuits.
The customer must provide a platform or catwalk for accessing the power-disconnect.
Copper Conductors Only.

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (sq. ft)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	Opening	0.0	29,000	0.00	0.00	0.00
FR	External Static - User Entered	0.0	29,000	0.00	0.00	0.75
EE	Opening	0.0	29,000	0.00	0.00	0.00
EE	Control Aluminum (CD50)	0.0	29,000	0.00	0.00	0.10
EE	Opening	0.0	29,000	0.00	0.00	0.00
EE	Insulated Aluminum (CDTI50)	0.0	29,000	0.00	0.03	0.00
RF	2" Pleated 30% (MERV 8)	71.1	29,000	408.00	0.20	0.00
RF	Dirty Filter Allowance - Prefilter	0.0	29,000	0.00	0.20	0.00
RF	4" Mini-Pleat 80-85% Eff, (MERV 13)	71.1	29,000	408.00	0.44	0.00
RF	Dirty Filter Allowance	0.0	29,000	0.00	0.20	0.00
CC-1	Heating 1 rows 8 fins	68.1	29,000	235.00	0.03	0.00
CC-2	Cooling 10 rows 11 fins	68.1	29,000	426.00	1.02	0.00
FS	External Static - User Entered	0.0	29,000	0.00	3.50	0.00
DP	Opening	0.0	29,000	0.00	0.00	0.00
				Total	5.62	0.85

Dimensions and Weight

Details					
Segment	Description	Length[1] (in)	Width[2] (in)	Height (in)	Weight (lbs)
MB	Mixing Box	30	138	90	768
FR	Multiple Return Fan - SWSI	43	138	90	2,485
EE	Economizer	94	138	90	885
RF	High Efficiency Filter	13	138	90	383
CC-1	Variable Length Cooling Coil	30	138	90	1,119
CC-2	Variable Length Cooling Coil	41	138	90	3,598
FS	Multiple Supply Fan - SWSI	46	138	90	3,874
DP	Discharge Plenum	30	138	90	707
Overall[3]		327			13,819

Notes

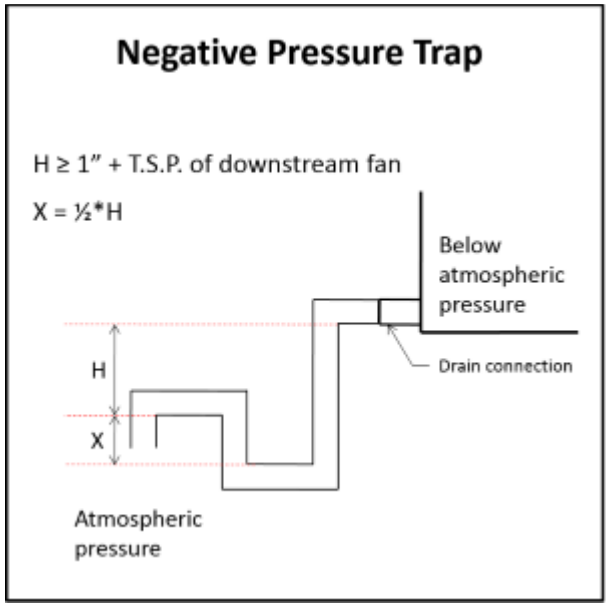
[1]The length includes bottom tier segments only

[2]The 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.

[3]Unit level and other loose components may be excluded from segment weights and overall segment weights. For total unit weight reference Unit Overview.

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	
EE	Supply Fan	5.62	Negative	6.62	3.31	9.93	6.75	10.25	6"
CC-1	Supply Fan	5.62	Negative	6.62	3.31	9.93	6.75	10.25	6"
CC-2	Supply Fan	5.62	Negative	6.62	3.31	9.93	6.75	10.25	6"



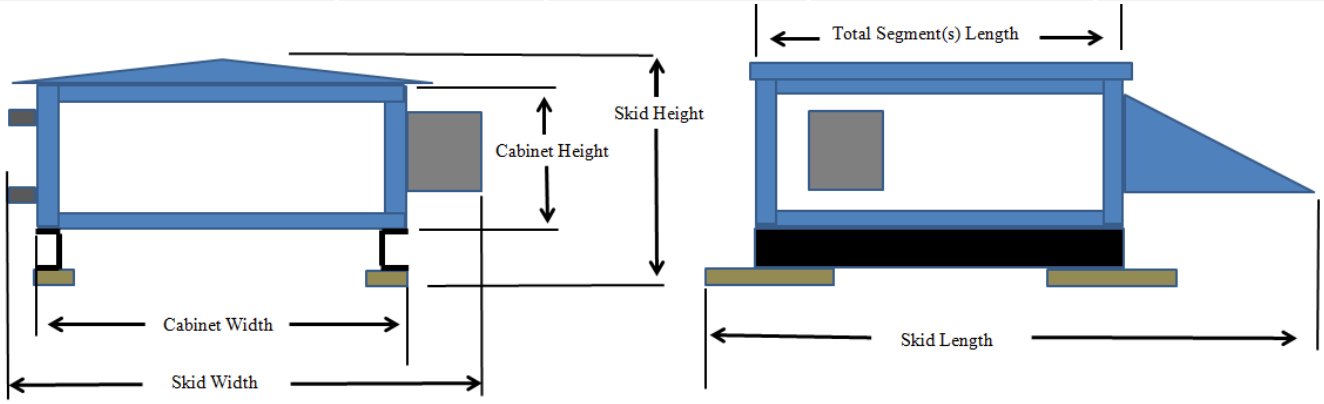
Notes
Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.
Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details
YORK® Solution XT AHU's meet IBC seismic requirements for non-critical equipment (Ip = 1.0) for locations with design spectral response Sds <= 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 SubmittalDrawing 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)**	**Skid Weight (lbs)**
(DP FS)	76	100	143	4,581
(CC-2 CC-1)	71	100	146	4,717
(RF EE)	99	100	144	389
(EE FR)	99	100	143	3,364
(MB)	30	100	143	768



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).

Special Quote(s)

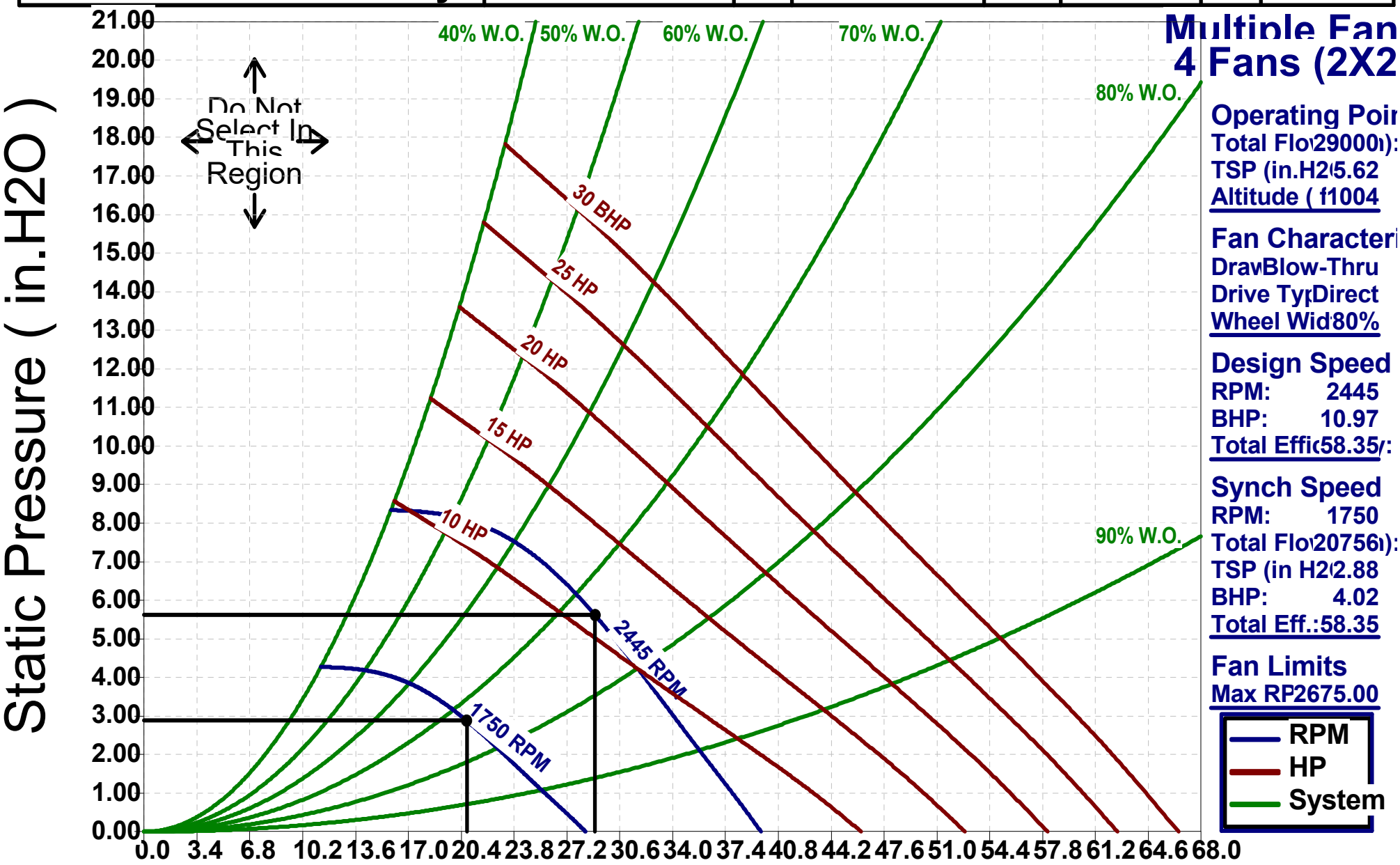
Details		
Segment	**SQ Number**	**Resolution**
Unit	SQ21-000373-001	AE-KR, ENG-SV MLP deduct for the factory to provide the following modifications: Shorten MB segment by 6", making it 24"L. Provide 18"W door in lieu of YW selected. Delete shipping split between FR and MB segments. Shorten FR segment by 3", making it 40" (core). Shorten EA portion of EE (EE1) by 29", making it 27"L. Crosscheck locations of EE parts. Maintain EE door, allowing it to infringe upstream into FR segment. ADD 3" to EE-2, making it 41". Ref. SQ-011 for Tamco dampers in EE-1 and EE-2. Shorten DP segment by 6", making it 24"L. Maintain DP door, allowing it to infringe upstream into FS segment. Resultant overall unit length to be 286"L. Ref. submittal drawing for layout.
FS	SQ21-000373-005	***LONG LEAD TIME ITEM*** Item has a 7 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install a 65kA MMP panel in FS segment in lieu of YW selected. Factory to wire supply fans to MMP panel. DRC Ref Number: JOHNCO-004743 NEMA 1 Enclosure Enclosure Dim: 25"Hx15"Wx8.3"D See attached submittal from DRC.
Unit	SQ21-000373-006	***Information ONLY*** Unit is at minimum length. Ref. SQ-001 for details.
Unit	SQ21-000373-007	***Information ONLY*** Unit is at minimum length. Ref. SQ-001 for details.
EE	SQ21-000373-008	AE-KR, ENG-N/A MLP add for the factory to provide and install a light in EE-1 and EE-2.
FR	SQ21-000373-009	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
FS	SQ21-000373-010	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
EE	SQ21-000373-011	***LONG LEAD TIME ITEM*** Tamco dampers have a 5 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install 32.5"Hx120"W Tamco PB 9000 OA damper in lieu of YW selected. Locate damper 6" downstream of shipping split and centered in unit width. Provide and install 21"Hx112"W Tamco PB 9000 EA damper in lieu of YW selected. Locate damper 6" upstream of shipping split and 17" from LHS. Dampers include: Extruded Aluminum Frame Extruded Aluminum Blades Extruded EPDM Blade seals (SC option) Extruded silicon frame seals (SC option) Celcon bearings Leakage Class 1A at 1â W.G. static pressure differential Jackshafts
Unit	SQ21-000373-013	***Information ONLY*** Access door is 24"W for fan section. Panels can be removed if fan/motor assembly needs to be completely removed.
Unit	SQ21-000373-014	AE-KR, ENG-N/A AE approved break the rules unit. All skids follow shipping rules.
MB	SQ21-000373-014	AE-KR, ENG-SV Shorten MB segment by 6", making it 24"L. Provide 18"W door in lieu of YW selected. Ref. SQ-001 for details.
FR	SQ21-000373-015	AE-KR, ENG-SV Delete shipping split between FR and MB segments. Shorten FR segment by 3", making it 40" (core). Ref. SQ-001 for details.
EE	SQ21-000373-016	AE-KR, ENG-SV Shorten EA portion of EE (EE1) by 29", making it 27"L. Crosscheck locations of EE parts. Maintain EE door, allowing it to infringe upstream into FR segment. Ref. SQ-001 for details.
EE	SQ21-000373-017	AE-KR, ENG-SV ADD 3" to EE-2, making it 41". Ref. SQ-011 for Tamco dampers in EE-1 and EE-2. Ref. SQ-001 for details.
DP	SQ21-000373-018	AE-KR, ENG-SV Shorten DP segment by 6", making it 24"L. Maintain DP door, allowing it to infringe upstream into FS segment. Ref. SQ-001 for details.
Unit	SQ21-000373-019	***Information ONLY*** See attached CAD drawing.

FAN CURVE

Johnson Controls

Solution XT Fan Rating Curve

Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-1	1	XTI-90x138	FS	PL-SF	II	222-9-8(



Multiple Fan
4 Fans (2X2

Operating Poir
Total Flo 29000i):
TSP (in.H2(5.62
Altitude (f 1004

Fan Characteri
Draw Blow-Thru
Drive Ty Direct
Wheel Wid 80%

Design Speed
RPM: 2445
BHP: 10.97
Total Effic 58.35/:

Synch Speed
RPM: 1750
Total Flo 20756i):
TSP (in H2(2.88
BHP: 4.02
Total Eff.: 58.35

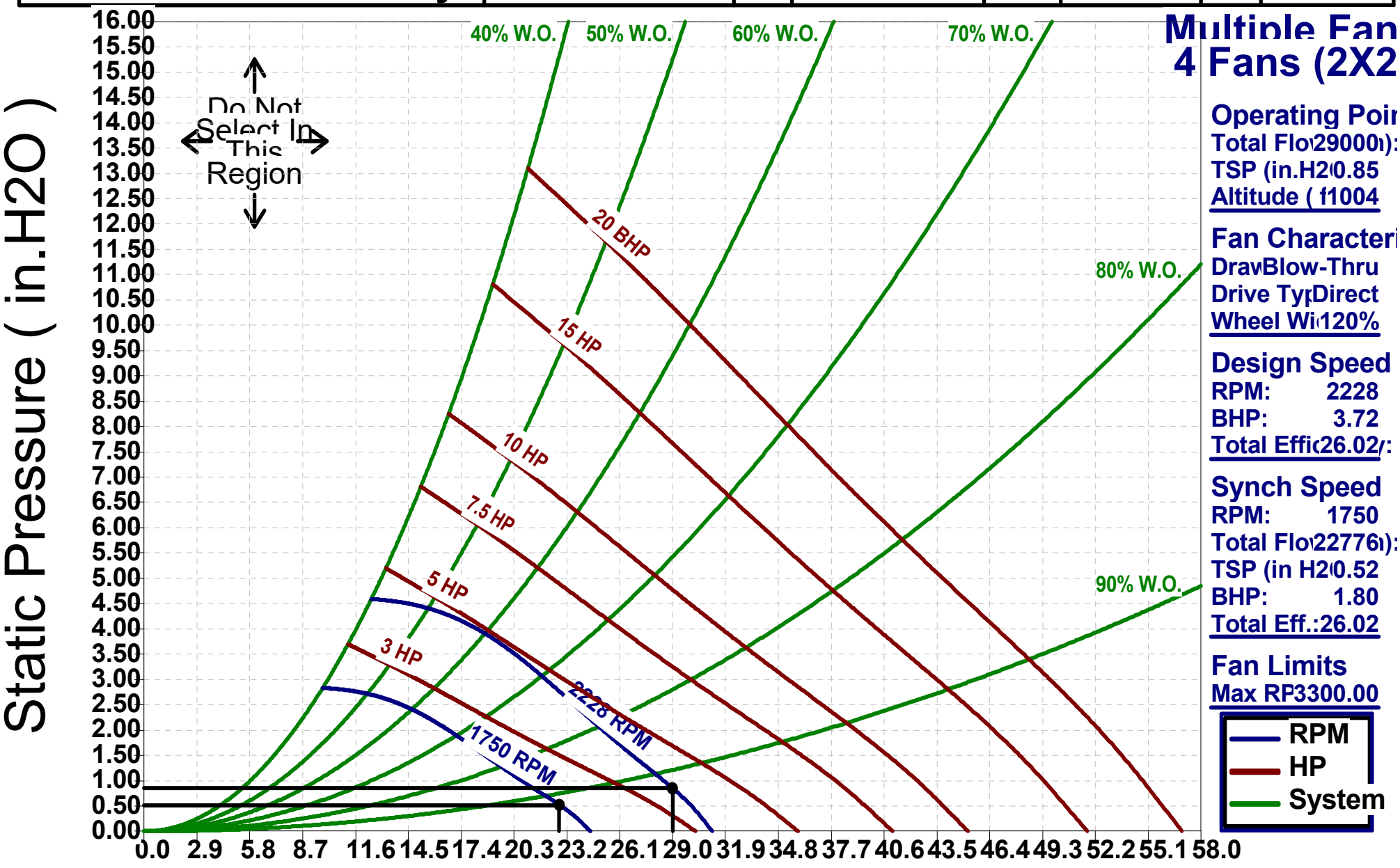
Fan Limits
Max RP 2675.00

RPM
HP
System

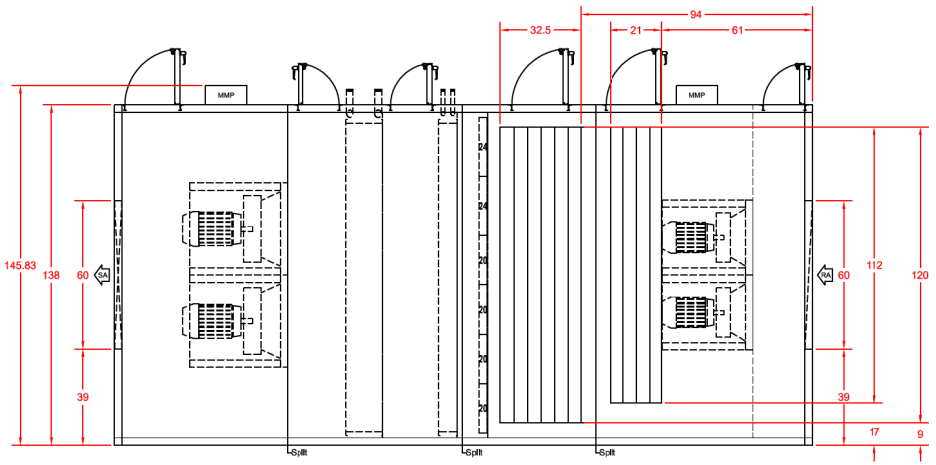
Johnson Controls

Solution XT Fan Rating Curve

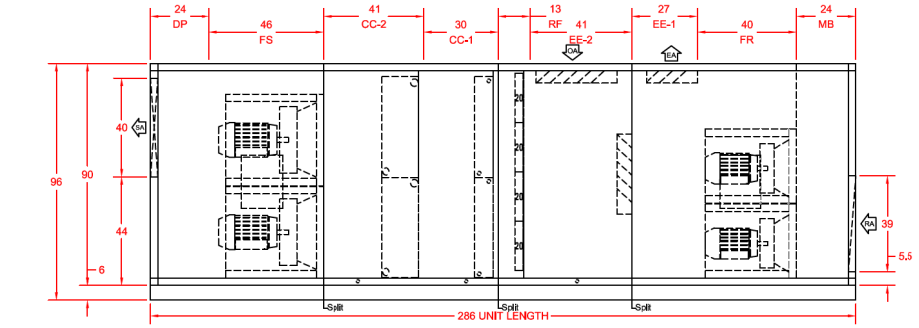
Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-1	1	XTI-90x138	FR	PL-SF	II	132-9-12



UNIT AND WIRING DRAWINGS



PLAN VIEW



* NOTE: MAX HEIGHT

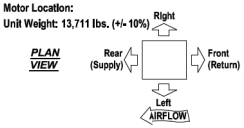
ELEVATION VIEW

UNIT CONSTRUCTION

Model: Solution-XTI-90x138 **Construction: Indoor**

Motor Location:

Unit Weight: 13,711 lbs. (+/- 10%)



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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

(SL) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	3"	3"
CC	MPT	Right	1 Sup 1 Ret	3"	3"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
FR	Return Fan - 182 - SF
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 222 - SF
DP	Discharge Plenum

DWG #	S21-2389
Version:	2
Ver. Date:	3/25/21
SQ:	21-000373
DRN BY:	KR
CKD BY:	1
SHEET:	1

PRODUCT DRAWING
SOLUTION XT AIR HANDLING UNIT DETAIL
MODEL: Solution-XTI-90x138
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

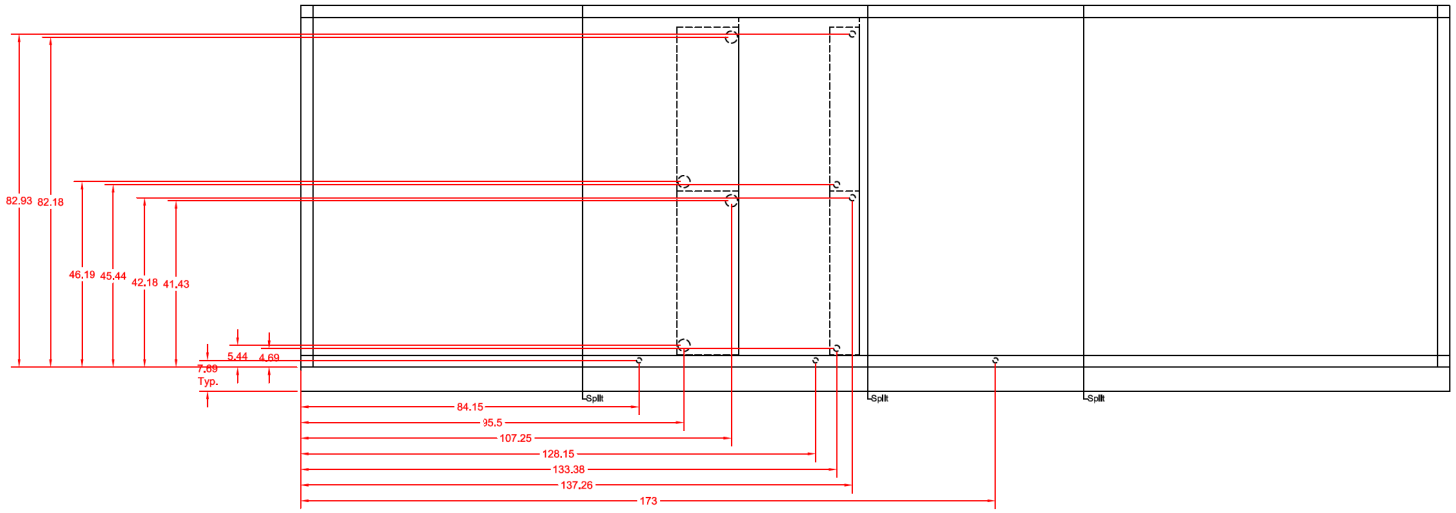
Sold To:
Cust Purch Order#:
Contract#:
UNIT TAG: AHU-1 - Sheet 1

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls

YORKworks Version: 21.00 Drawing Generator Version : 01:00:19906



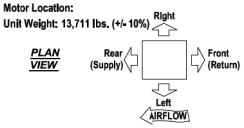
Coil Connections

UNIT CONSTRUCTION

Model: Solution-XTI-90x138 **Construction: Indoor**

Motor Location:

Unit Weight: 13,711 lbs. (+/- 10%)



NOTES

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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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

(SL) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	3"	3"
CC	MPT	Right	1 Sup 1 Ret	3"	3"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
FR	Return Fan - 182 - SF
EE-1	Economizer
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RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 222 - SF
DP	Discharge Plenum

DWG #	S21-2389
Version:	COIL
Ver. Date:	2/23/21
SQ:	21-000373
DRN BY:	KR
CKD BY:	1
SHEET:	2

PRODUCT DRAWING
SOLUTION XT COIL CONNECTION DETAIL
MODEL: Solution-XTI-90x138
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

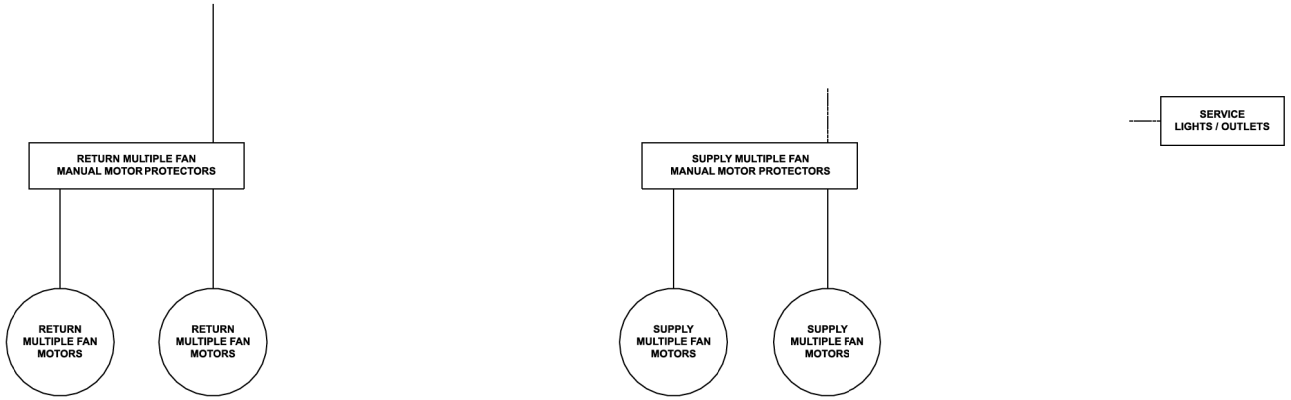
Sold To:
Cust Purch Order#:
Contract#:
UNIT TAG: AHU-1 - Sheet 2

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls

YORKworks Version: 21.00a Drawing Generator Version : 01:00:19906



PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-1 - Sheet 1	Date: 3/26/2021 8:18:23 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

SCHEMATIC LEGEND SYMBOLS

TERMINAL IN PANEL

FUSE BLOCK

1 POLE
CIRCUIT BREAKER

2 POLE
CIRCUIT BREAKER

3 POLE
CIRCUIT BREAKER

R — CONTROL RELAY COIL

TDR — CONTROL TIMER COIL

24 HR — 24 HOUR PIN TIMER

HM — MOTOR HOUR METER

CC — MOTOR CYCLE COUNTER

FLOAT SWITCH CLOSES
ON RISING LEVEL

FLOAT SWITCH OPENS
ON RISING LEVEL

PRESSURE SWITCH CLOSES
ON RISING PRESSURE

PRESSURE SWITCH OPENS
ON RISING PRESSURE

TEMPERATURE SWITCH OPENS
ON RISING TEMPERATURE

TEMPERATURE SWITCH CLOSES
ON RISING TEMPERATURE

FLOW SWITCH CLOSES
ON INCREASING FLOW

NORMALLY OPEN RELAY CONTACT

NORMALLY CLOSED RELAY CONTACT

NORMALLY OPEN TIMER CONTACT

NORMALLY CLOSED TIMER CONTACT

FIELD WIRING

NORMALLY OPEN PUSHBUTTON
MOMENTARY

NORMALLY CLOSED PUSHBUTTON
MOMENTARY

NORMALLY CLOSED EMERGENCY
STOP PUSHBUTTON

THREE POSITION H.O.A.
SELECTOR SWITCH
(ILLUMINATED ON NON-ILLUMINATED)

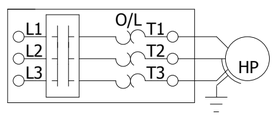
SELECTOR SWITCH
(ADDITIONAL CONTACTS MAY BE ADDED)

DISTRIBUTION BLOCK

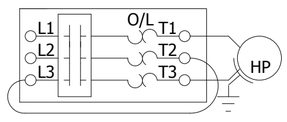
SOLENOID VALVE

WIRE CONTINUATION

DISCONNECT



3 %%C MOTOR STARTER
WITH OVERLOAD



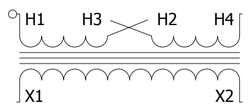
1 %%C MOTOR STARTER
WITH OVERLOAD

M — MOTOR STARTER/CONTACTOR
COIL

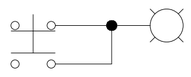
CONTACTOR

GROUND

DUPLEX RECEPTACLE



TRANSFORMER



PUSH-TO-TEST
PILOT LIGHT

PILOT LIGHT

CONTROL PANEL WIRE COLOR CODING

BLACK	ALL UNGROUNDED CONTROL CIRCUIT CONDUCTORS OPERATING AT THE SUPPLY VOLTAGE
RED	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE
BLUE	UNGROUNDED DC CONTROL CIRCUITS
YELLOW	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE (CLASS 2)
WHITE OR NATURAL GRAY	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH BLUE STRIPE	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH YELLOW STRIPE	GROUNDED AC CONTROL CIRCUIT CURRENT-CARRYING CONDUCTOR THAT REMAINS ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION
LIGHT BLUE	INTRINSICALLY SAFE WIRING CONTROL CIRCUIT CONDUCTOR

Previous page:

Next page: 1

Johnson Controls

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Legend

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Engineer: Electrical Engineer

Checked By:

DRC Ref Number: JOHNCO-004743

Date: 2021.02.23

Designed by: orders

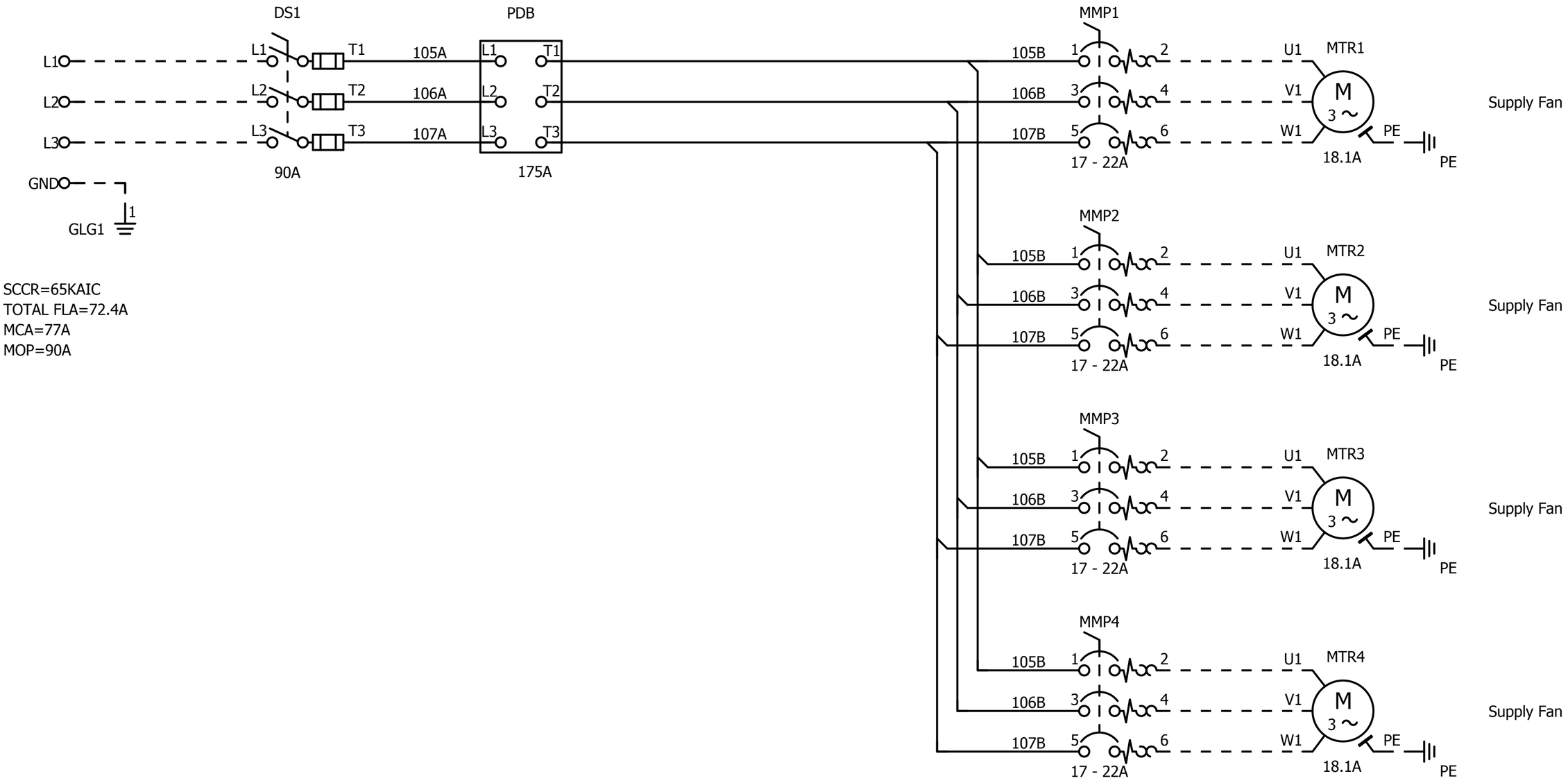
Revision B

Job Name: VEGA Americas - Bid Day

Sheet: 0

Page: 0

480Y/277V, 3 Phase, 60Hz



SCCR=65KAIC
TOTAL FLA=72.4A
MCA=77A
MOP=90A

Previous page: 0

Next page: 100

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Electrical Schematics

Project Description: AHU-1

Order No.: SQ21-000373

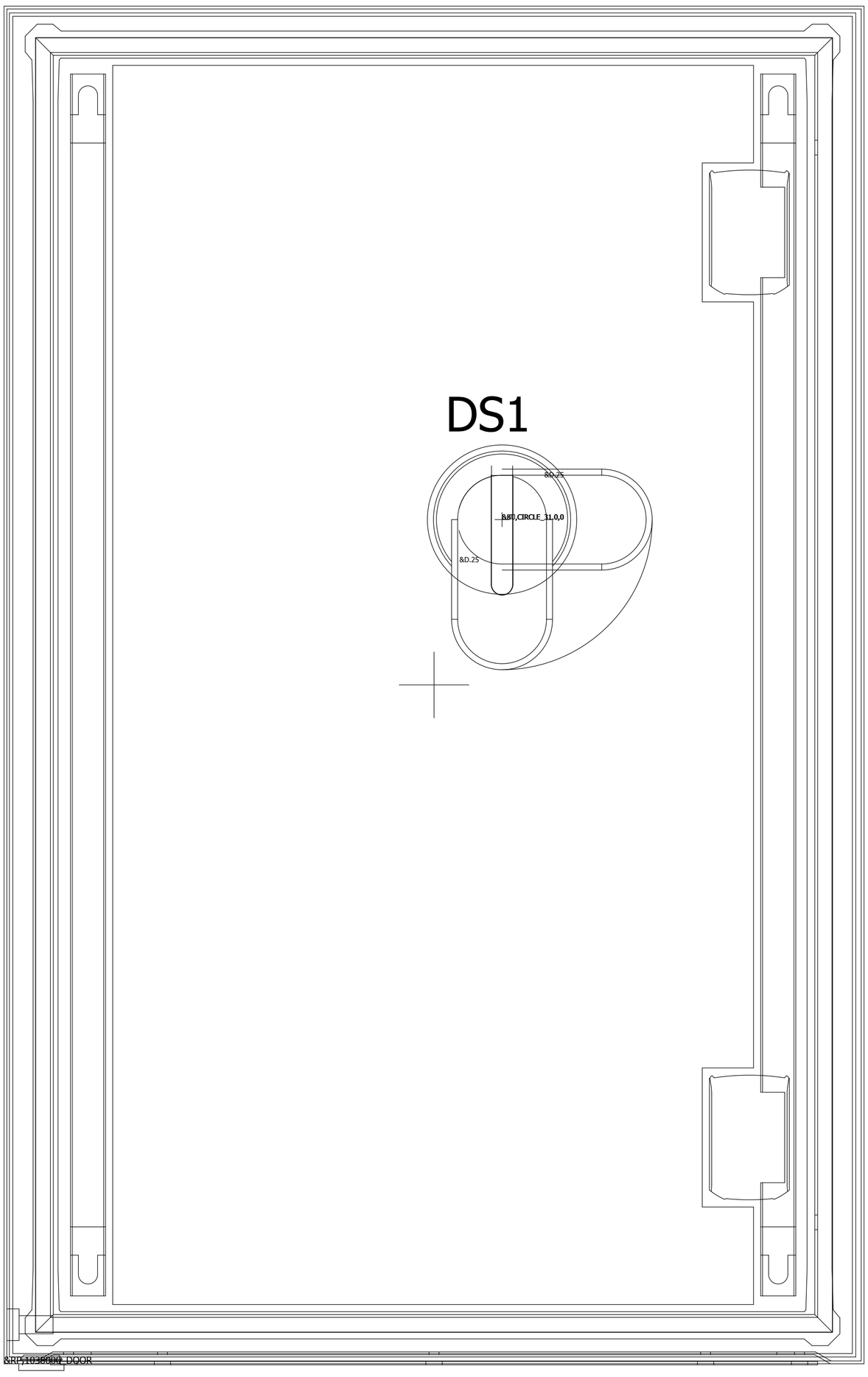
Total Sheets: 4

Job Name: VEGA Americas - Bid Day

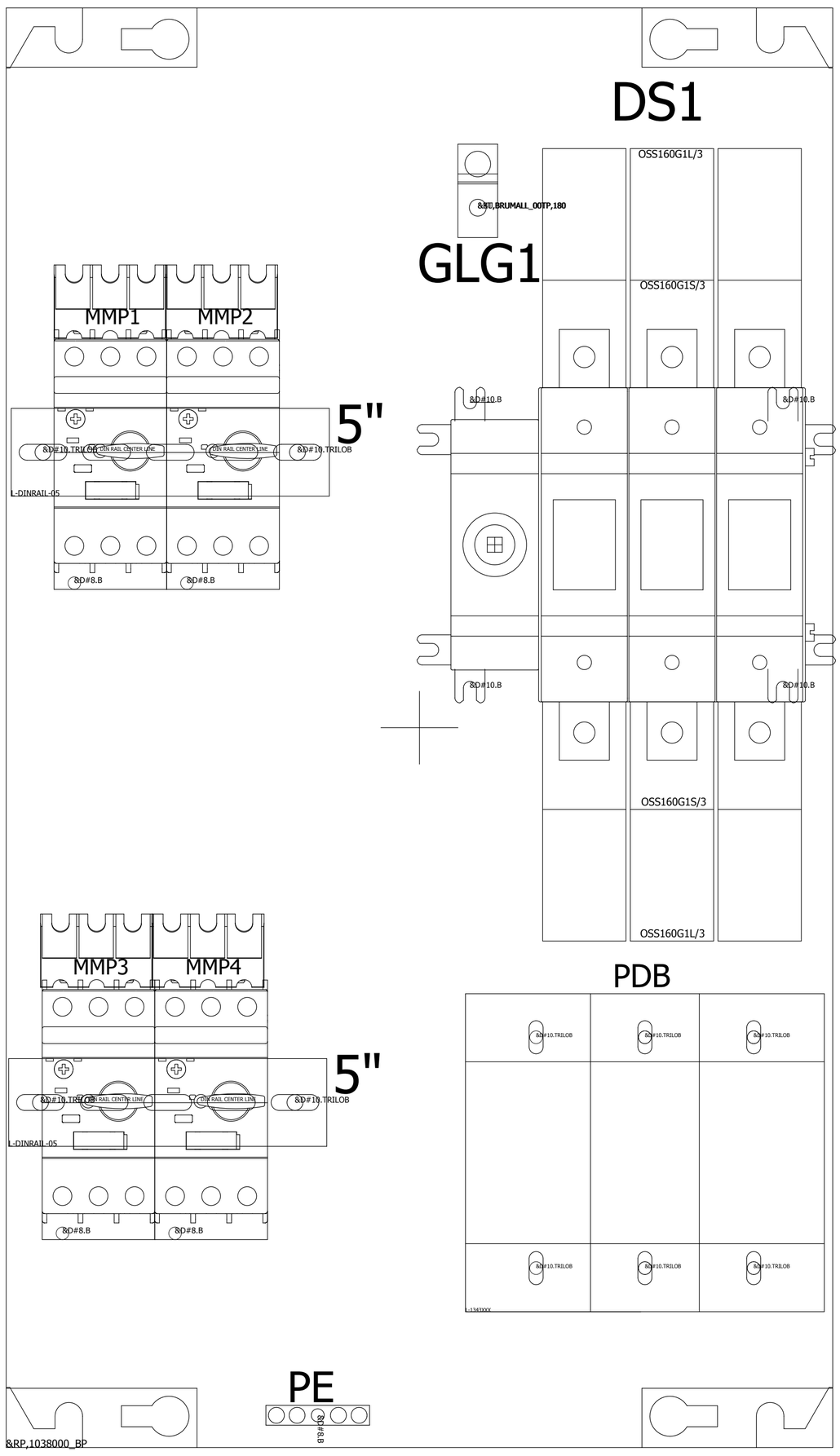
Sheet: 1

Page: 1

DOOR



24"H X 15"W X 8"D Type 1



Previous page: 1 Next page: 101

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Panel Layout | Project Description: AHU-1 | Order No.: SQ21-000373 | Total Sheets: 4

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

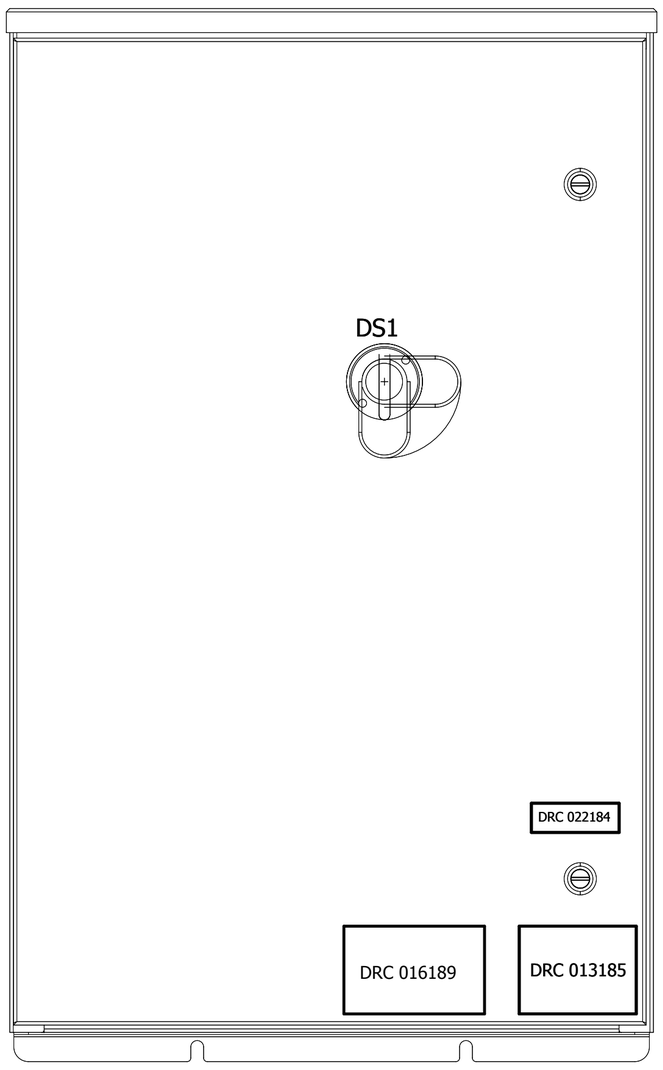
Revision B

Job Name: VEGA Americas - Bid Day

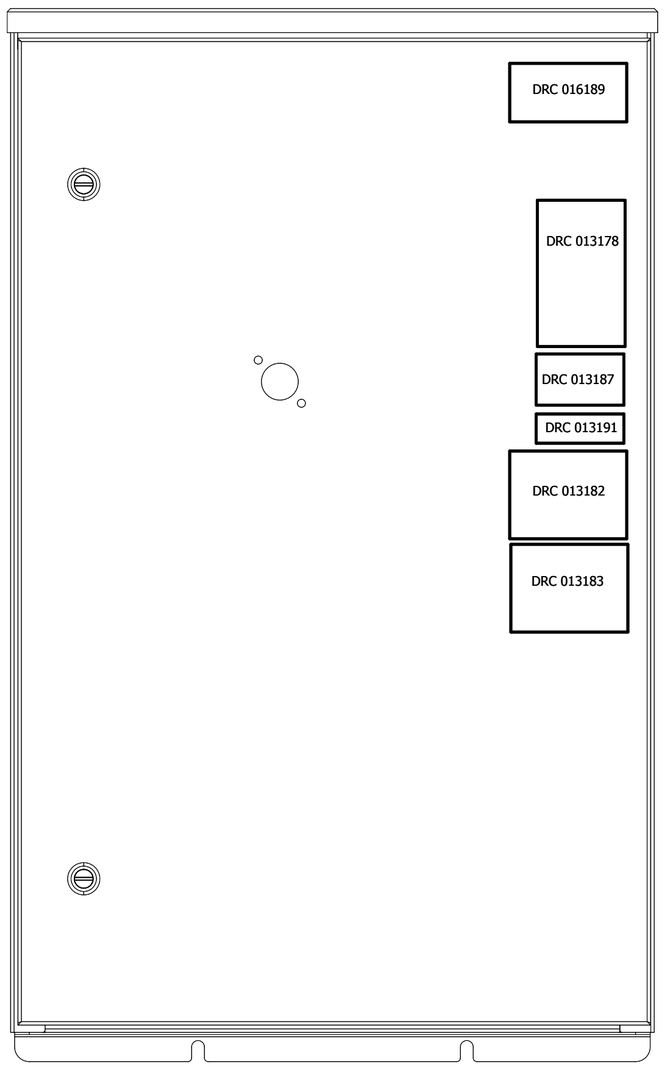
Sheet: 100 Page: 100

GENERIC LABELS LAYOUT

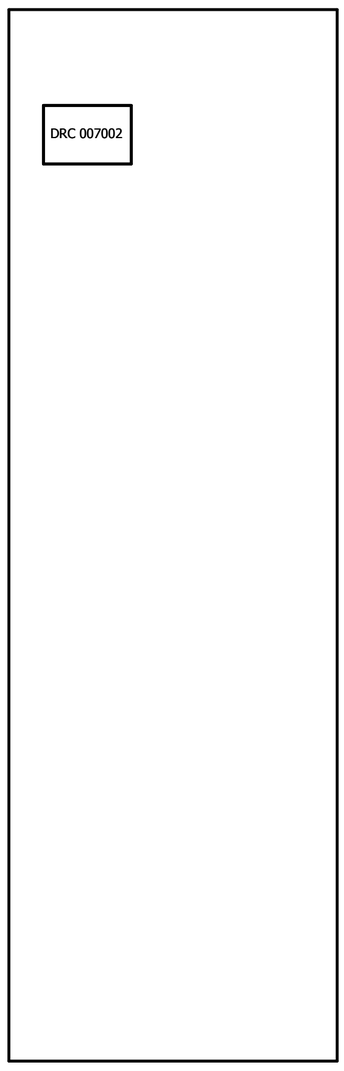
Outside Door



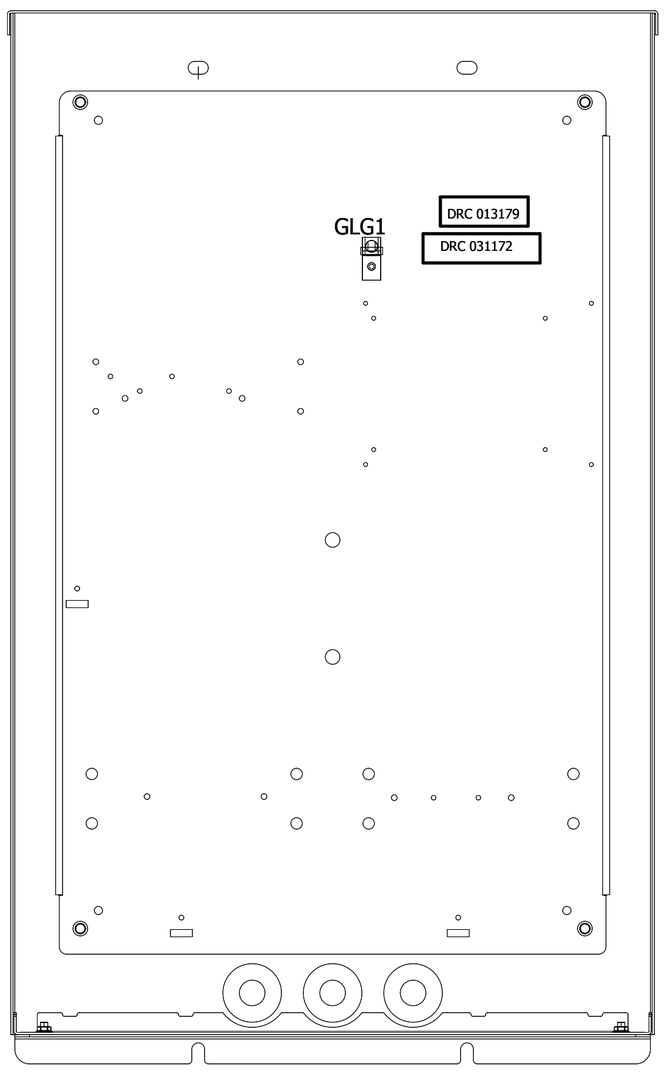
Inside Door



INSIDE LEFT SIDE



BACK PANEL



CONTROL BOX DIMENSION (INCHES) AND WEIGHT (POUNDS):

Wall Mount: 24"Hx15"Wx8.3"D, Estimated Weight: 100 Pounds

Previous page: 100

Next page:

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Label Layout

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Job Name: VEGA Americas - Bid Day

Sheet: 101

GENERAL PRODUCT DETAILS

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite™

Self-Supporting Extended Surface Pleated Filter

High performance MERV 8 mechanical air filter media is self-supporting and requires no metal support grid downstream. No metal components means the filter is completely incinerable after use.

Exclusive vForm™ Pleating Technology maintains uniform pleat spacing in every filter. In addition, vForm™ Pleating Technology insures the same pleat configuration used for decades in our original Multi-Pleat products. Same aerodynamic v-shaped pleat design, same superior performance.

Sturdy, moisture-resistant, beverage board perimeter frame and cross-braces provide structural integrity even in difficult operating conditions.

The media used in the Multi-Pleat Elite is extraordinarily resilient and is engineered to endure the rigors of shipping, handling, installation and operation.

Multi-Pleat Elite earns the Koch Green Icon for one or more following categories: Earns LEED Points, Reduces Energy Costs, Extends Filter Lifecycles, Conserves Resources, and Improves Indoor Environmental Quality.

Features:

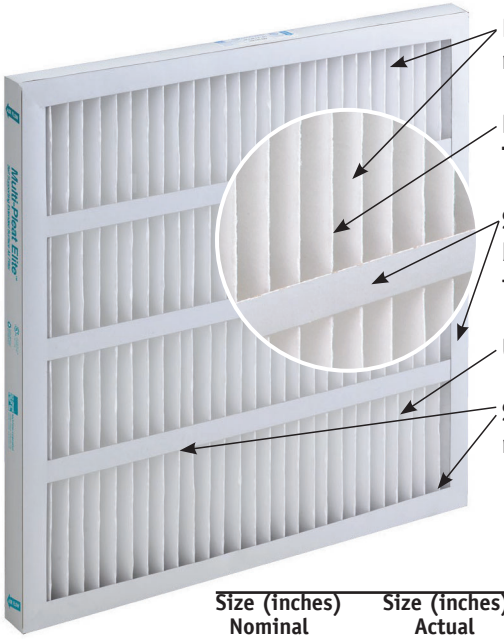
- Exclusive vForm™ Pleating Technology
- MERV 8 performance rating
- Self-supporting pleats requires no metal reinforcement
- Low resistance to airflow reduces energy costs
- Moisture-resistant beverage board frame
- Completely incinerable

Koch Filter Corporation…Durable. Reliable. Versatile.

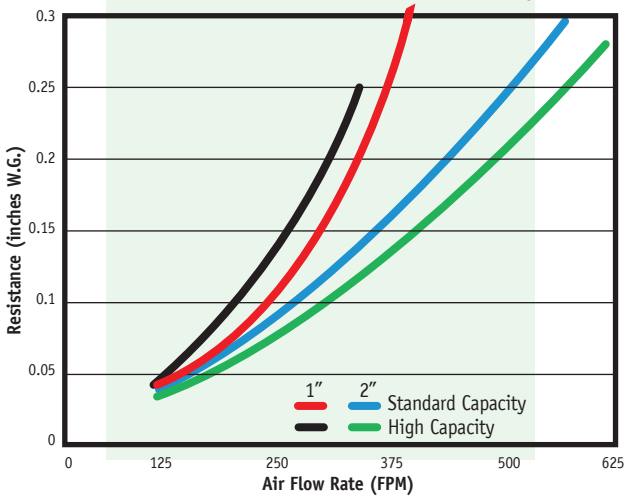
Bulletin No. K-MPE10

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite Technical Data



Initial Resistance vs. Filter Face Velocity



Additional Multi-Pleat Elite Product Information
ASHRAE Test Standard 52.2-2007.
Recommended maximum continuous operational temperature is 150° F (93°C).
Multi-Pleat Elite filters are classified as Underwriter's Laboratories Class 2 according to U.L. Standard 900.

Size (inches) Nominal W x H x D	Size (inches) Actual W x H x D	Capacity (CFM)	Standard Capacity Elite Initial Resistance (in. W.G.)	Standard Capacity Elite Media Area (Sq. Ft.)	High Capacity Elite Initial Resistance (in. W.G.)	High Capacity Elite Media Area (Sq. Ft.)
12 x 24 x 1	$11^{3/8}$ x $23^{3/8}$ x $^{3/4}$	600	0.29	3.3	0.20	3.8
14 x 20 x 1	$13^{1/2}$ x $19^{1/2}$ x $^{3/4}$	590	0.29	3.4	0.20	3.8
14 x 25 x 1	$13^{1/2}$ x $24^{1/2}$ x $^{3/4}$	730	0.29	4.3	0.20	4.8
15 x 20 x 1	$14^{1/2}$ x $19^{1/2}$ x $^{3/4}$	630	0.29	3.6	0.20	4.1
16 x 20 x 1	$15^{1/2}$ x $19^{1/2}$ x $^{3/4}$	670	0.29	3.8	0.20	4.3
16 x 24 x 1	$15^{1/2}$ x $23^{3/8}$ x $^{3/4}$	800	0.29	4.6	0.20	5.2
16 x 25 x 1	$15^{1/2}$ x $24^{1/2}$ x $^{3/4}$	840	0.29	4.8	0.20	5.4
20 x 20 x 1	$19^{1/2}$ x $19^{1/2}$ x $^{3/4}$	840	0.29	4.7	0.20	5.4
20 x 24 x 1	$19^{1/2}$ x $23^{3/8}$ x $^{3/4}$	1000	0.29	5.7	0.20	6.5
20 x 25 x 1	$19^{1/2}$ x $24^{1/2}$ x $^{3/4}$	1050	0.29	6.0	0.20	6.8
24 x 24 x 1	$23^{3/8}$ x $23^{3/8}$ x $^{3/4}$	1200	0.29	7.1	0.20	8.1
12 x 24 x 2	$11^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	1000	0.26	5.4	0.20	7.8
14 x 20 x 2	$13^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	980	0.26	5.5	0.20	7.9
14 x 25 x 2	$13^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1215	0.26	6.9	0.20	9.9
15 x 20 x 2	$14^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1050	0.26	6.0	0.20	8.4
16 x 20 x 2	$15^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1115	0.26	6.5	0.20	8.8
16 x 24 x 2	$15^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1340	0.26	7.8	0.20	10.6
16 x 25 x 2	$15^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1400	0.26	8.1	0.20	11.0
18 x 24 x 2	$17^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1500	0.26	8.4	0.20	12.3
20 x 20 x 2	$19^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1400	0.26	8.0	0.20	11.1
20 x 24 x 2	$19^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1675	0.26	9.6	0.20	13.4
20 x 25 x 2	$19^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1740	0.26	10.0	0.20	14.0
24 x 24 x 2	$23^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	2000	0.26	11.4	0.20	16.2
25 x 25 x 2	$24^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	2170	0.26	12.5	0.20	17.4

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Koch Filter Corporation
Filtration Products Crafted with Pride

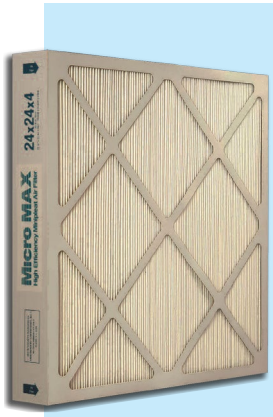
MicroMax™

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

Bulletin No. K-195-B

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 thress-per-carton. This multiple packaging means substantial reductions in shipping costs.

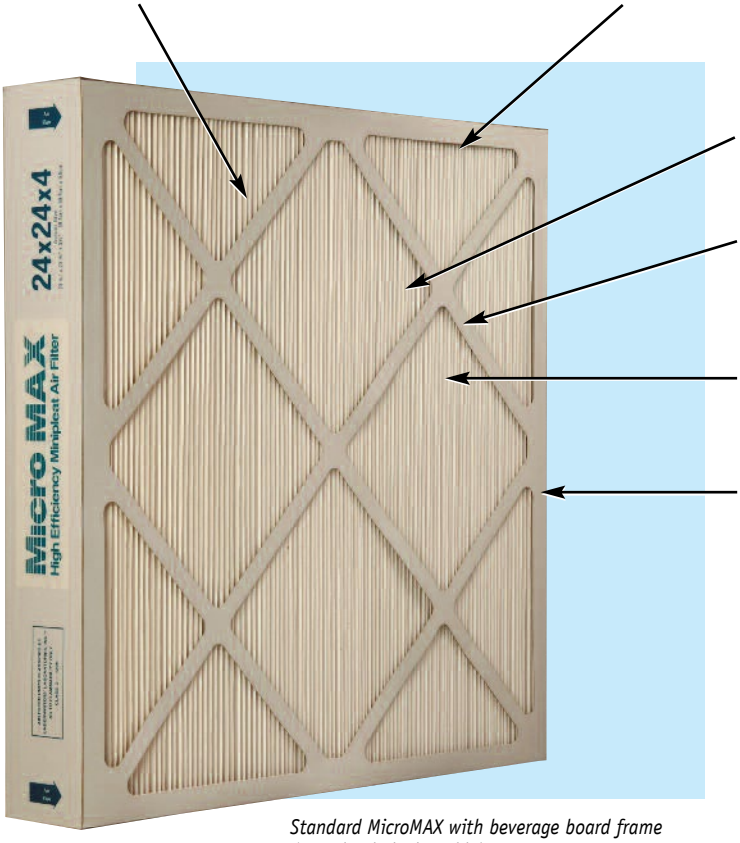
...Saves Space

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.

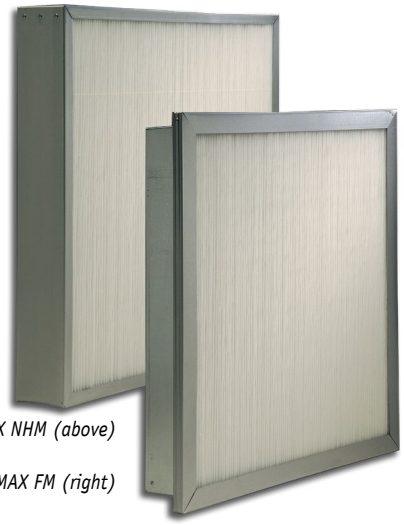
Specially-formulated adhesive bead insures even airflow and filter strength.

Available with double-walled, moisture resistant, beverage board frame (completely incinerable) or galvanized stell 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

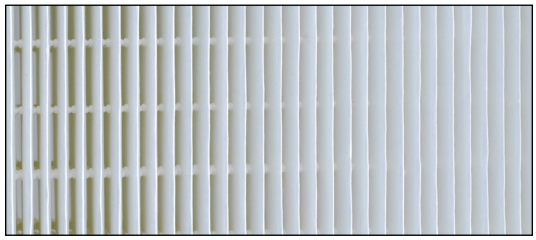
The media used in MicroMAX minipleat filters is composed of microfiberglass paper, treated with a specially-formulated, water-repllent binder. Millions of fibers are constructed into a Graded Density mat, with coarse fibers upstream and finer fibers on the air-exiting side. This dual-density insures 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 seprators uniformly secure the pleats to allow maximum air flow with minimal pressure drop.



Koch Filter Corporation
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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	23-3/8x23-3/8x3-3/4	2000	0.68	1.5	120	20
MX-9-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.68	1.5	111	18
MX-9-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.68	1.5	106	16
MX-9-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.68	1.5	95	11
MX-9-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.68	1.5	70	9
MX-9-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.68	1.5	63	19
MicroMAX 80 - 85% (MERV 13)								
MX-8-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.59	1.5	120	20
MX-8-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.59	1.5	111	18
MX-8-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.59	1.5	106	16
MX-8-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.59	1.5	95	11
MX-8-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.59	1.5	70	9
MX-8-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.59	1.5	63	19
MicroMAX 60 - 65% (MERV 11)								
MX-6-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.40	1.5	120	20
MX-6-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.40	1.5	111	18
MX-6-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.40	1.5	106	16
MX-6-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.40	1.5	95	11
MX-6-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.40	1.5	70	9
MX-6-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.40	1.5	63	19

1 . Shipping weights listed above apply to MicroMAX with beverage board frames. Add 10 lbs. per carton for metal framed models.

2. Data based on ASHRAE 52.1 and 52.2.

3. MicroMAX filters are classified as U.L. Class 2. Testing conducted according to U.L. Standard 900.

4. Width and height dimensions are interchargeable. MicroMAX filters may be installed with pleats in either direction.

5. Filters may be operated at up to 125% of rated face velocity.

6. MicroMAX filters should be used with a perfilters for maximum performance.

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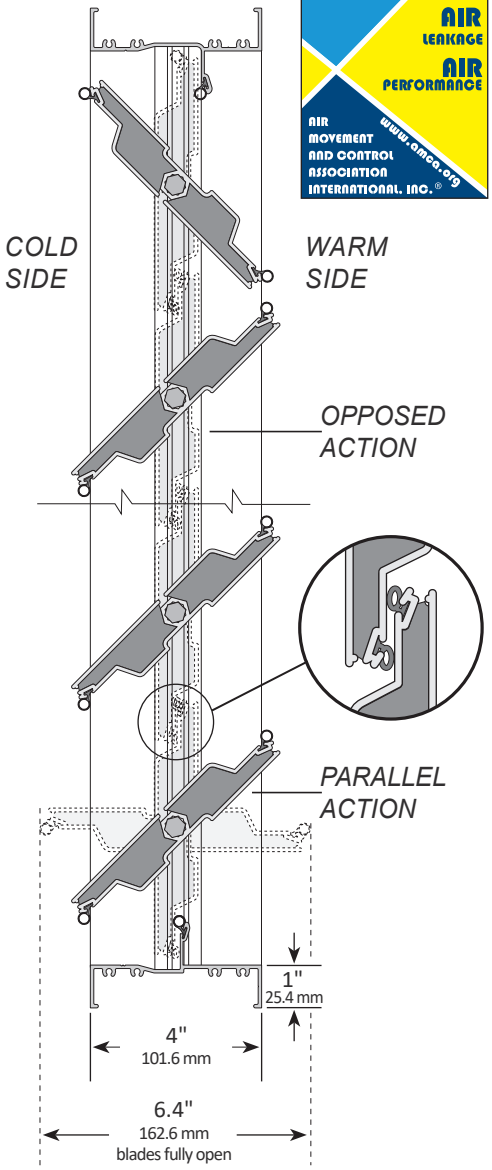
*Denotes manufacturing site.

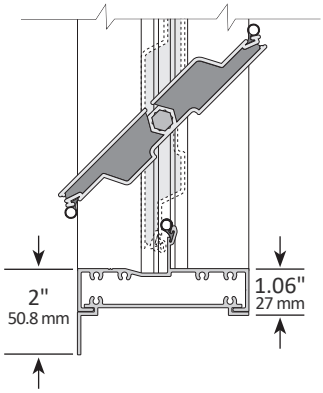
SUBMITTAL DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

Tampco 9000 SC dampers are provided on all AHU outside air intake and relief dampers as specified.

In Duct or Flanged to Duct Install Types



Extended Rear Flange Install Type



1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted.
3. Blade seals are extruded EPDM. Frame seals are extruded silicone. Seals are secured in an integral slot within the aluminum extrusions. Blade and frame seals are mechanically fastened to prevent shrinkage and movement over the life of the damper.
4. Bearings are composed of a Celcon inner bearing - fixed around a 7/16" *(11.11 mm)* aluminum hexagon blade pivot pin - rotating within a polycarbonate outer bearing inserted in the frame. This eliminates action between metal-to-metal or metal-to-plastic riding surfaces.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are zinc-plated steel. These provide a positive connection to blades and linkage.
6. Aluminum and corrosion-resistant zinc-plated steel linkage hardware is installed in the frame side, complete with cup-point trunnion screws for a slip-proof grip.
7. Dampers are designed for operation in temperatures ranging from -40°F *(-40°C)* to 212°F *(100°C)*.
8. Leakage Class 1A at 1 in. w.g. *(0.25 kPa)* static pressure differential. Standard air leakage data is certified under the AMCA Certified Ratings Program.
9. Dampers are custom made to required size, without blanking off free area. The blade stop is set at a fixed height and is a continuous and integral part of the top and bottom frames.
10. Dampers are available with either opposed blade action or parallel blade action.
11. Dampers are available in four install types: Installed In Duct, Flanged to Duct, Extended Rear Flange, and Square to Round Transition. *(See Install Type pages for details.)*
12. Installation of dampers must be in accordance with TAMCO's current on-line installation guidelines. *(Printed installation guidelines are provided with each damper shipment, however all technical information available on TAMCO's web site at www.tamcodampers.com supersedes information contained within printed versions.)*
13. Intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. *(See TAMCO Aluminum Damper Installation Guidelines.)*

OPTIONS FOR SP – STANDARD PROFILE:
For each option listed, replace the lines above with their corresponding lines below.

SC - SEVERE COLD TEMPERATURE OPTION:

3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.

MR - MOISTURE RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Frame is assembled using stainless steel screws.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

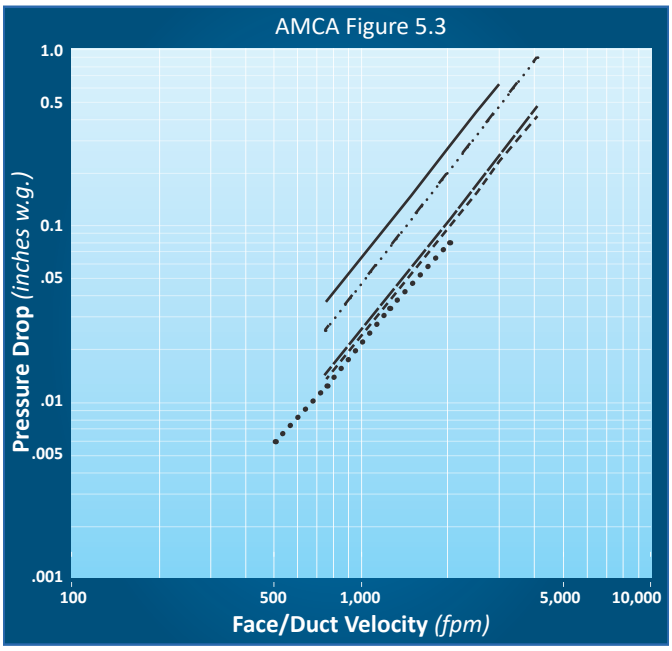
SW - SALT WATER RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Aluminum frame is clear anodized to a minimum depth of 0.7 mil *(18 microns)*. Frame is assembled using stainless steel screws.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted. Extruded aluminum blades are clear anodized to a minimum depth of 0.7 mil *(18 microns)*.
3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Clear anodized aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With no Option or with MR Option

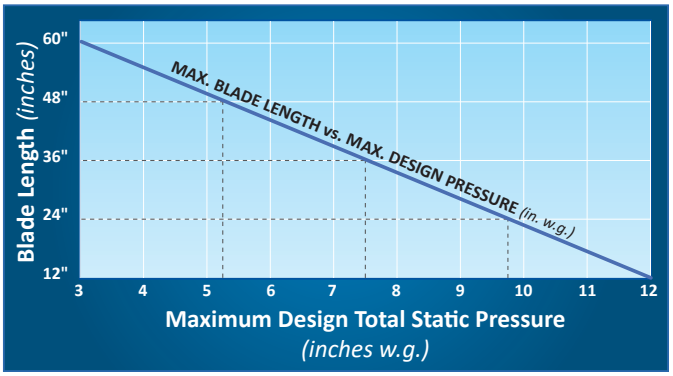
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" – – – *(610 mm x 610 mm))*
48" x 12" –·–·– *(1220 mm x 305 mm)*
12" x 48" — — *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, no Option or MR Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1
12.1 to 36.0 *(306 to 915)*	1A	1
36.1 to 48.0 *(916 to 1220)*	1A	1
48.1 to 60.0 *(1221 to 1524)*	1A	1

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* and a minimum of 70 in-lb *(7.9 N-m)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with no Option or MR Option, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

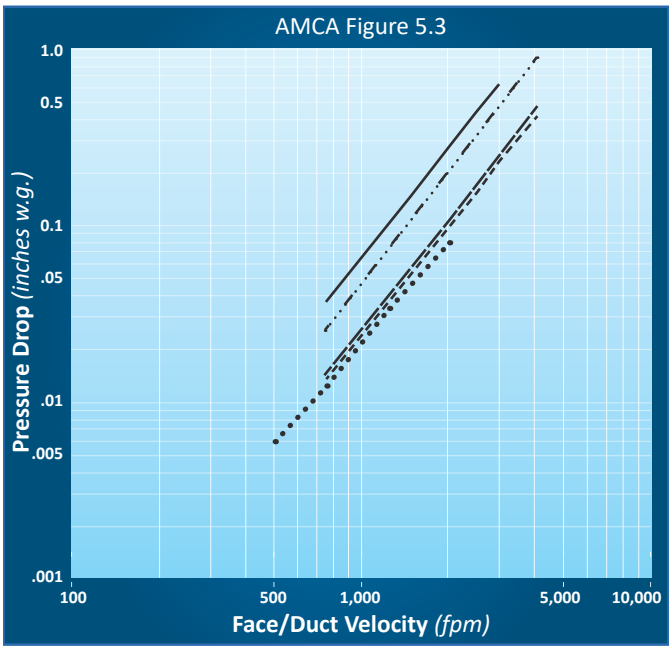
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)*	
	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
1A	3 *(15.2)*	n/a
1	4 *(20.3)*	8 *(40.6)*
2	10 *(50.8)*	20 *(102)*
3	40 *(203)*	80 *(406)*

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With SC or SW Options

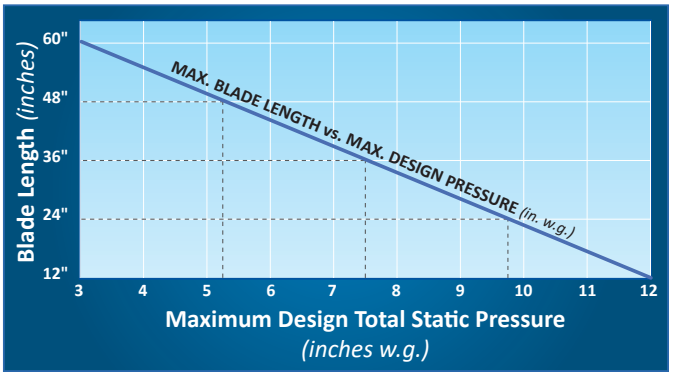
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" - - - *(610 mm x 610 mm))*
48" x 12" -·-·- *(1220 mm x 305 mm)*
12" x 48" —— *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

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FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1	1	1
12.1 to 36.0 *(306 to 915)*	1A	1	1	1
36.1 to 48.0 *(916 to 1220)*	1A	1	1	1
48.1 to 60.0 *(1221 to 1524)*	1A	1	n/a	n/a

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with SC or SW Options, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

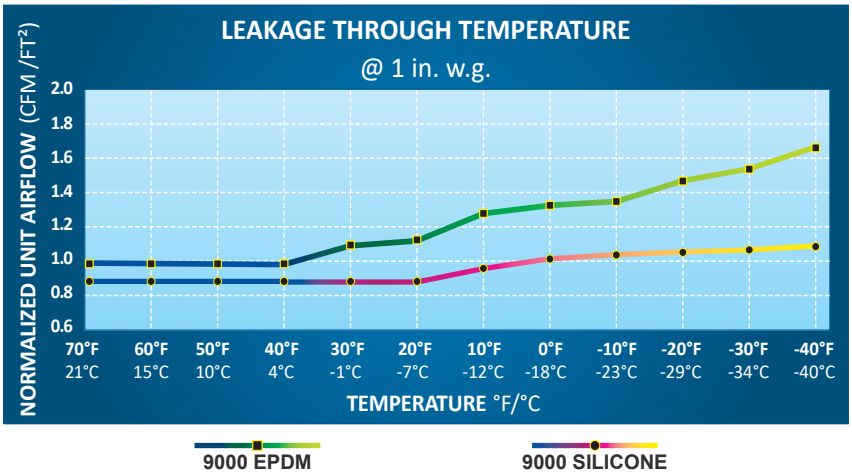
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)* 1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
1A	3 *(15.2)*	n/a	n/a	n/a
1	4 *(20.3)*	8 *(40.6)*	9.8 *(49.8)*	11.3 *(57.4)*
2	10 *(50.8)*	20 *(102)*	24.5 *(125)*	28.3 *(144)*
3	40 *(203)*	80 *(406)*	98 *(498)*	113 *(574)*

***NOTE:** TAMCO Leakage Class Rating is not provided for dampers measuring more than 48" *(1220 mm)* wide at 6 in. w.g. *(1.5 kPa)* and at 8 in. w.g. *(2.0 kPa)*, as the recommended blade length is exceeded at these static pressures. *(Refer to the Blade Design Pressure Limitations Chart.)*

EPDM VS. SILICONE UPGRADE OPTION BLADE SEALS

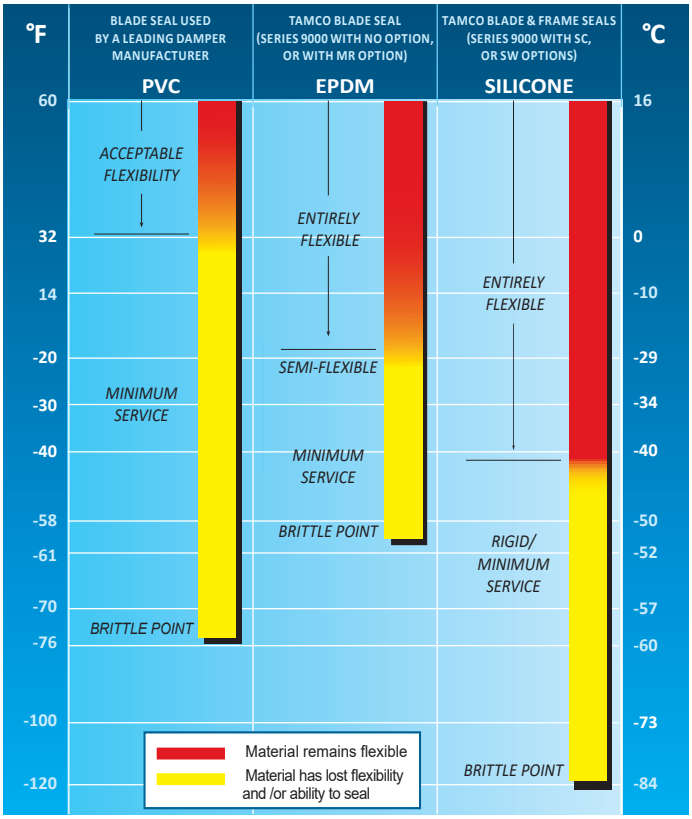
LEAKAGE COMPARISON GRAPH



Damper tests were conducted in a laboratory cold room to determine the effects of colder and severe cold temperatures *(down to -40°F (-40°C))* on sealing gaskets and leakage rates.

NOTE: Leakage rates shown in this graph are not licensed to bear the AMCA Seal. There is no AMCA standard dealing with the testing of leakage in temperatures below 32°F (0°C).

SEAL PERFORMANCE COMPARISON GRAPH



Minimum service temperatures and brittle points are as stated by material manufacturers. Flexibility, rigidity, and suitability status of various materials were determined by observation and operation of dampers in both cold room and cold box environments.

Provided on Mixed air dampers.

RUSKIN®

AMCA LICENSED
See Page 2

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

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 stystems. 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

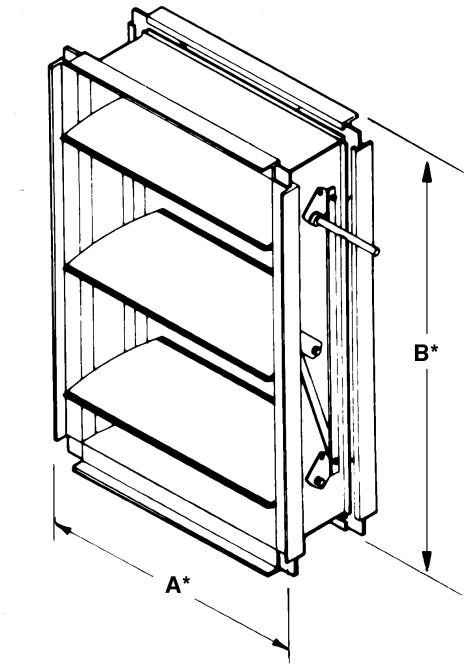
- Airfoil blade design for low pressure drop and less noise generation.
- Positive lock axles, noncorrosive bearings and shake proof linkage for low maintenance operation.
- Blade edge seals mechanically lock into the blade for superior sealing.

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.

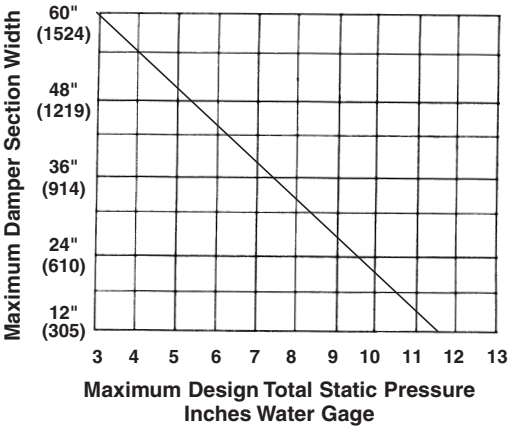
NOTE: Dimensions shown in parenthesis ( ) indicate millimeters.

*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.

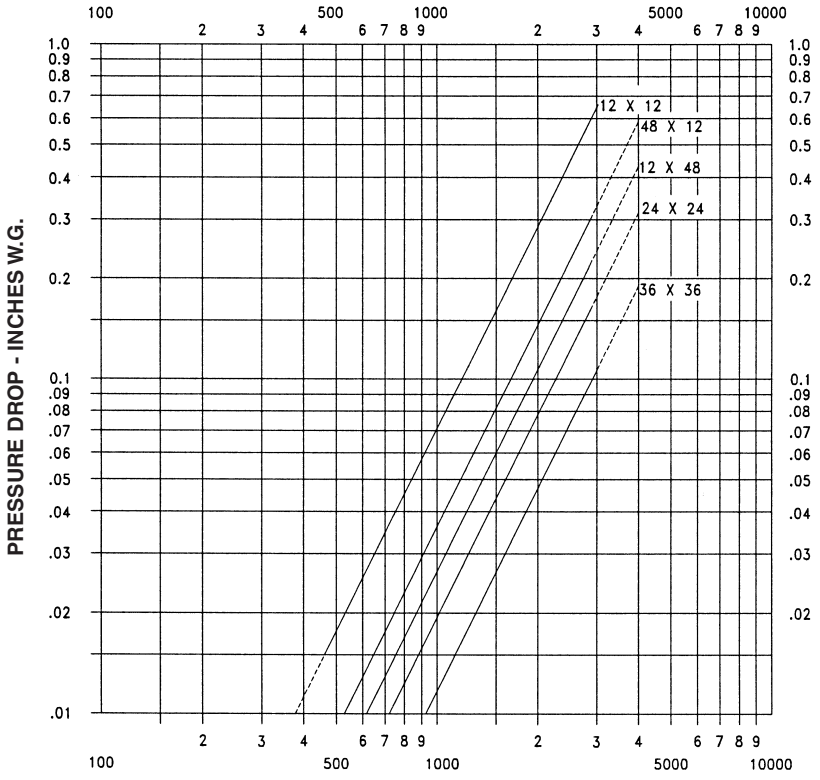
Ruskin Company certifies that the CD50 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA International Certified Ratings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

Pressure/ Class	Leakage, L/s/m² (ft³/min/ft²)			
	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



FACE VELOCITY - FEET/MINUTE
AMCA FIG. 5.3

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.

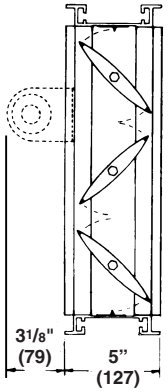
SOUND RATINGS

CD50 SOUND RATINGS

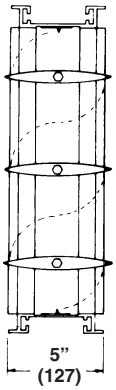
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12 (305 x 305)	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18 (457 x 457)	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125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

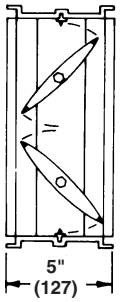
DIMENSIONAL INFORMATION



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.

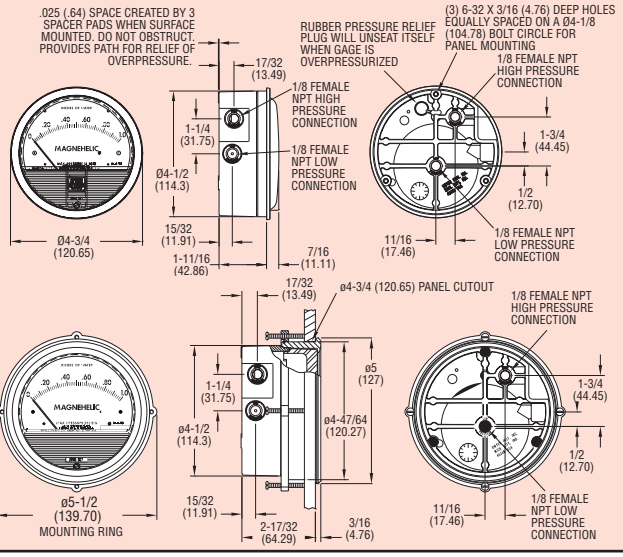
Blade edge seals shall be extruded double edge design with inflatable pocket which enables air pressure from either direction to assist in blade to blade seal off. Blades seals shall be mechanically locked in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade 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.

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%

RoHS



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.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of 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, standhang bracket and terminal tube with holder.

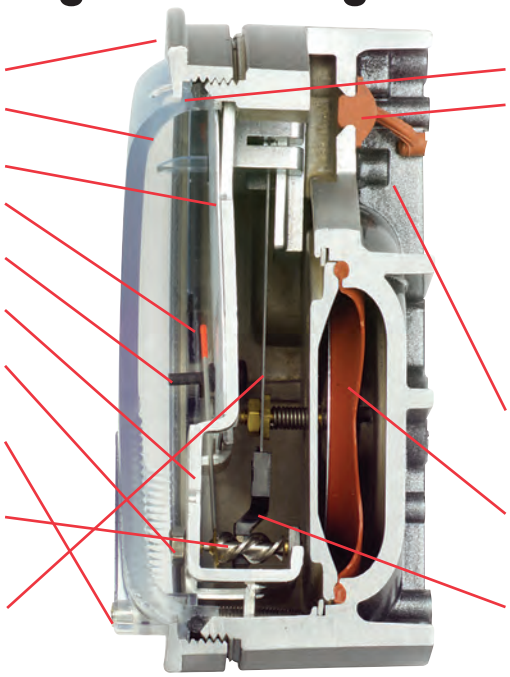
Model A-605 Air Filter Gage Accessory Kit
Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4″ aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings 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

Series 2000

Magnehelic® Gage Models & Ranges



Bezel provides flange for flush mounting in panel.

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

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

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

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

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

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

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

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

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

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

OVERPRESSURE PROTECTION
Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads. The blowout plug is not used on models above 180″ of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm. The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

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

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

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

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10

Model	Range, Pa
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-1000
Zero Center Ranges	
Model	Range, Pa
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, in w.c.	Range, Pa or kPa
2000-00D†••	0-.25	0-62 Pa
2000-0D†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

VELOCITY AND VOLUMETRIC FLOW UNITS
Scales are available on the Magnehelic® that read in velocity units (FPM, m/s) or volumetric flow units (SCFM, m^3/s, m^3/h). Stocked velocity units with dual range scales in inches w.c. and feet per minute are shown above. For other ranges contact the factory.
When ordering volumetric flow scales please specify the maximum flow rate and its corresponding pressure. Example: 0.5 in w.c. = 16,000 CFM.

ACCESSORIES
A-321, Safety Relief Valve
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-135, Rubber gasket for panel mounting

A-310A 3-Way Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A

ADVANCED DIRECT DRIVE PLENUM FANS

ENERGY STAR PARTNER

ISO9001 CERTIFIED

NO APPLICATION IS TO 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.

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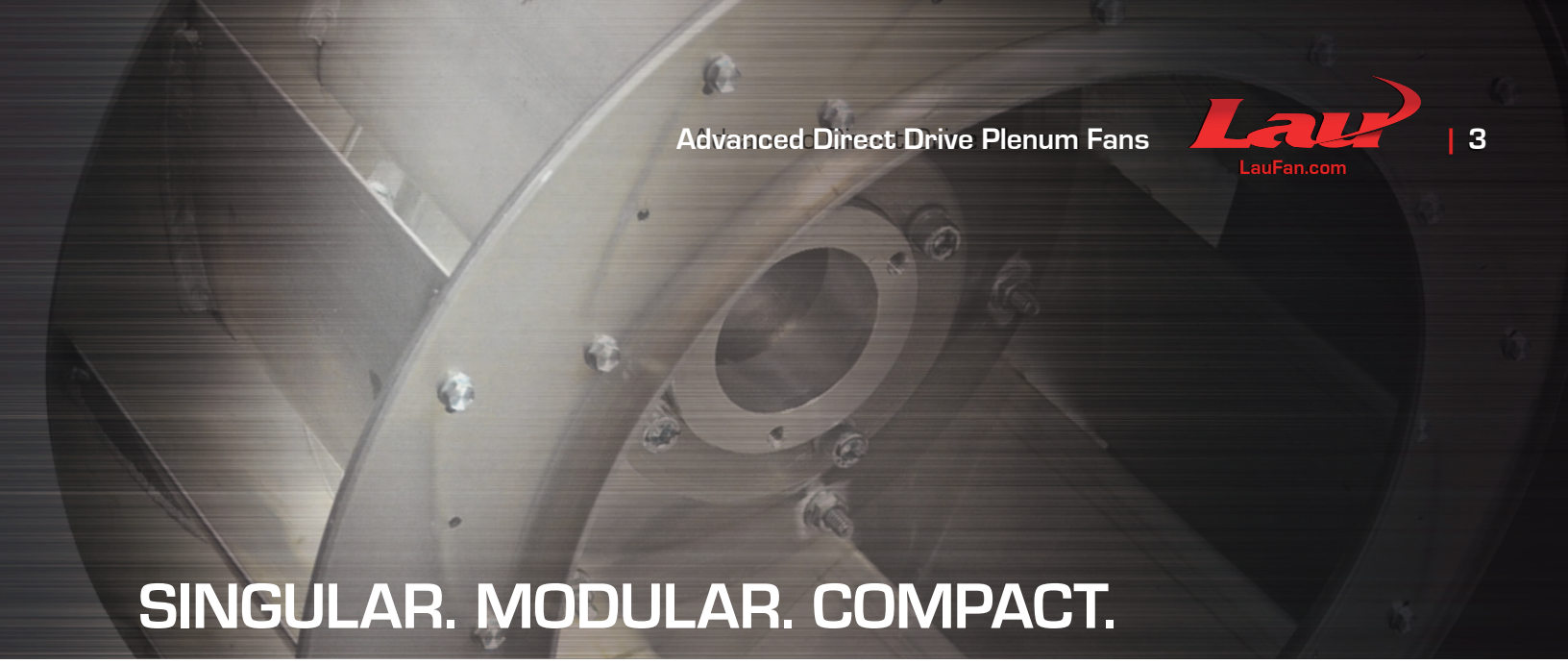


SINGULAR. MODULAR. COMPACT.

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.

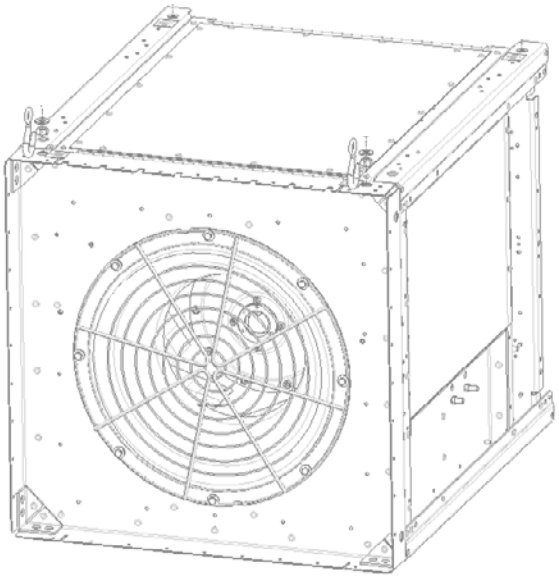
Eliminates all resonance conditions.

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.

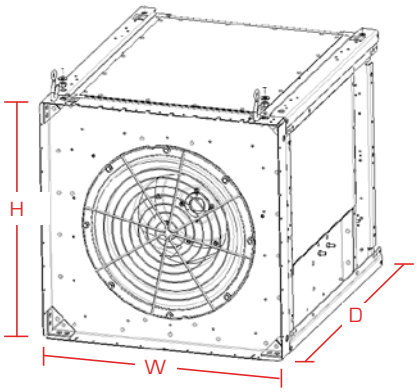
SIMPLE, STACKABLE APPLICATION

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

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

WARRANTY

STANDARD LIMITED WARRANTY
ENGINEERED SYSTEMS EQUIPMENT

SERVICE POLICY Supersedes: 50.05-NM2 (812) Form 50.05-NM2 (1212)

POLICY STATEMENT

Johnson Controls (JCI) warrants all equipment and associated factory supplied materials or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of eighteen (18) months from date of shipment, or twelve (12) months from date of start up, whichever occurs first. Subject to the exclusions listed below, Johnson Controls, at its option, will repair or replace, FOB point of shipment, such products or components as it finds defective.

Except for reciprocating replacement compressors, which Johnson Controls warrants for a period of twelve (12) months from date of shipment, Johnson Controls warrants Johnson Controls reconditioned or replacement materials, or installation or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of (90) days from date of shipment.

The above represents the minimum warranty policy Johnson Controls will extend to customers. Additional product specific coverage is provided as outlined in related warranty policies. No warranty repairs or replacements will be made until payment for all equipment, materials, or components has been received by Johnson Controls.

EXCLUSIONS:

Unless specifically agreed to in the contract documents, this warranty does not include the following costs and expenses:

1. Labor to remove or reinstall any equipment, materials or components.

2. Shipping, handling or transportation charges, including cranes, safety walks or other safety requirements specific to jobsites.

3. Cost of refrigerant.

4. Freight damage.

5. Field applied coatings added to any surface or heat exchanger.

6. Rental Chillers.

ALL WARRANTIES ARE VOID IF:

1. Equipment is used with refrigerants, oil, additives, or antifreeze agents other than those authorized by supplying factory.

2. Equipment is used with any material or any equipment such as evaporators, tubing, other low side equipment or refrigerant controls not approved by supplying factory.

3. Equipment has been damaged by freezing because it was not properly protected during cold weather or damaged by fire or any other conditions not ordinarily encountered.

4. Equipment is not installed, operated, maintained and serviced in accordance with instructions issued by Johnson Controls.

5. Equipment is damaged due to dirt, air, moisture, or other foreign matter entering the refrigerant system.

6. Equipment is not properly stored, protected, or inspected by the customer during the period from date of shipment to date of initial start-up.

7. Field coating of coil has occurred.

8. Equipment is damaged due to acts of god, abuse, including shipping damage, neglect, sabotage, or acts of terrorists.

9. Equipment has modifications carried out that have an effect on the original design of the product without such work being authorized by the factory. Any on site design changes or unit modification/replacement shall be authorized in advance by the factory.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIAL OR EQUIPMENT INVOLVED, NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT, (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS SUPPLIERS AND SUBCONTRACTORS.

Reference: BOS 03-23.105.BEGTM

P.O. Box 423, Milwaukee, WI 53203
www.johnsoncontrols.com

Printed in USA 50.05-NM2 (1212)
Replaces: 50.05-NM2 (812)

STANDARD LIMITED LABOR WARRANTY
SOLUTION XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: SOLUTION XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for eighteen (18) months from the date of shipment from Seller's facility or twelve (12) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

Notification of defect and any warranty claim must be made in writing, postage paid, with a brief written description of the problem to Buyer's local Johnson Controls' sales/service office. Nothing herein us intended to provide warranty coverage to lessees or anyone other than Buyer and no third-parties are intended to be beneficiaries of this warranty.

BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

(Product Code Ref: 8513

5 YEAR PARTS & LABOR LIMITED WARRANTY YORK®
SOLUTION™ XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: YORK® SOLUTION™ XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for sixty-six (66) months from the date of shipment from Seller's facility or sixty (60) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

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BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

RECEIVING/RIGGING

RECEIVING / RIGGING INSTRUCTIONS

The installing contractor is responsible to provide Johnson Controls / YORK with a contact to coordinate the delivery of the equipment in this submittal. Please fill out the information requested in the Submittal Approval Form section in the back of this submittal.

It is the installing contractor's responsibility to verify the following prior to signing the bill of lading presented by the transportation company:

- Ensure everything on the bill of lading was delivered.
- Visually perform a thorough inspection of all equipment for any signs of shipping damage

Any short-shipments or shipping damage must be noted on the bill of lading prior to signing.

The transportation company will provide you withinstructions for filing a claim. It is the installing contractor's responsibility to work directly with the transportation company to resolve any shipping claims.

1.0 PRE-INSTALLATION

RECEIVING

All units leaving the plant have been inspected to ensure the shipment of quality products. All reasonable means are utilized to properly package the air handling units.

CAUTION

Johnson Controls will NOT be responsible for any damage or loss of parts in shipments or at the job site. Receiver is solely responsible for noting Bill of Lading and filing freight claims IMMEDIATLY. Refer to Shipping Damage Claims Form 50.15-NM available from Johnson Controls Sales representative.

RIGGING OF INDOOR AND OUTDOOR UNITS

WARNING

All lifting points must be used to avoid personal injury or death and to avoid damage to the equipment.

NOTE

SHIPPED LOOSE DAMPERS. When large units are ordered with MZ segments in rear discharge location (on the end of the unit), the units will ship with the top section (hot deck) separated. In these cases, the complete multizone damper assembly (hot deck and cold deck together) will ship loose.

FIG. 1-1 – RECOMMENDED LIFTING WITH FOUR LIFTING POINTS

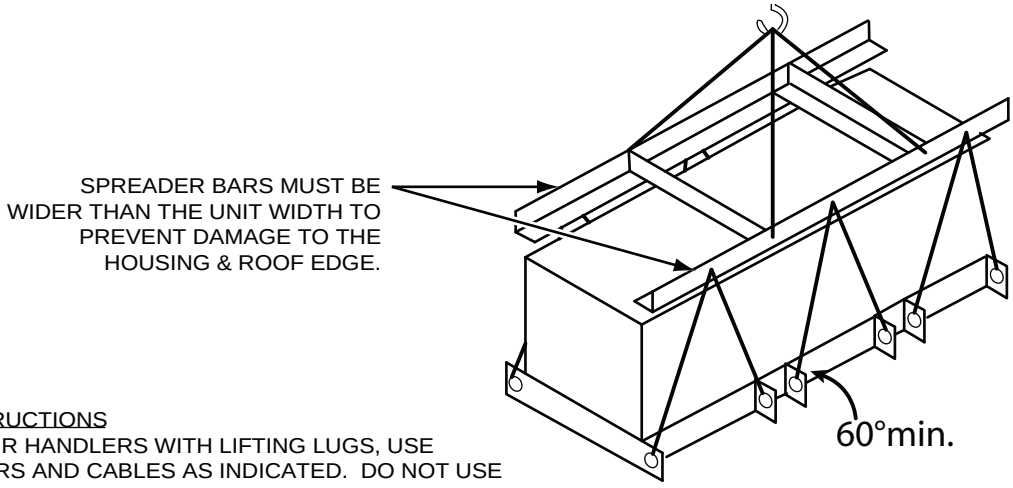


FIG. 1-2 – RECOMMENDED LIFTING WITH MULTIPLE POINTS

OFF-LOADING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the air and watertight seams in the unit casing. Prevent unnecessary jarring or rough handling.

For lifting air handling units with lifting lugs or corner connectors; proper spreader bars and hoisting line must be used when rigging to prevent damage to the unit casing *(see Fig. 1-1)*. When lifting long units a special system must be used to insure a minimum 60° angle between lifting lug and spreader bar/frame *(see Fig. 1-2 & Table 1-1)*. It is also mandatory that an experienced and reliable rigger be selected to handle unloading and final placement of the equipment. The rigger must be advised that the unit contains internal components and that it be handled in an upright position. Care must be exercised to avoid twisting the equipment structure.

NOTE

Refer to the submittal for the section weights.

TABLE 1-1 - SPACING REQUIREMENTS FOR OFFLOADING LONG UNITS		
UNIT HT.	MAX. LIFTING LUG SPACING	MIN. LIFTING STRAP LENGTH
≤ 72"	120"	120"
> 72"	192"	192"

NOTE

All lifting lugs must be used to avoid damage to unit. If unit does not have lifting lugs, use bottom corner connectors and intermediate raceway lifting lugs. Do not use top corner connectors.

Unit section weights are furnished on the job submittal. Due to the variance in weight of each unit design, it is not possible to list unit weights in this instruction. The submittal must be referred to when selecting a crane for rigging and figuring roof weight loads. Contact your Johnson Controls Sales representative if you have any questions regarding unit weights.

CRANE AND SPREADER BARS

See Fig's 1-1 and 1-2.

FORK LIFT

Forklifts should not be used to off-load air handlers except in special circumstances. If moving air handling equipment with a fork lift or similar means becomes necessary, always make sure the lifting forks are long enough to reach from the fork truck to the opposite side and slightly beyond. It is helpful to leave the shipping blocks attached to the bottom of the equipment until in its final location. There is no structural support under the equipment except what is visible from the perimeter.

COME-A-LONGS OR POWER PULL

See Fig1-3.

LD09613

FIG. 1-3 – TYPICAL COME-A-LONG TYPES

SHACKLES

Refer to Fig. 1-4 for proper lifting with hook and shackle at corners. Refer to Fig. 1-5 for proper lifting with hook and shackle at lifting lugs.

NOTE

Fig's 1-4 and 1-5 show YORK Solution unit without baserails. When baserails are present, always use all lifting lugs pre-mounted on baserails. Do not lift by corners.

LD13767

FIG. 1-4 – PROPER LIFTING WITH SHACKLE AT CORNER

LD13768

FIG. 1-5 – PROPER LIFTING WITH SHACKLE AT LIFTING LUG

LD13766

FIG. 1-6 – RECOMMENDED LIFTING WITH BASERAIL

INSPECTION

CHECK FOR DAMAGE

RECEIVER RESPONSIBILITY

Receiver is solely responsible for noting freight bill and filling freight claims IMMEDIATLY *(see "Receiving" in this section).*

Visible damage should be noted on the signed and dated bill of lading with a request that the carrier inspect the damage within 72 HRS. of notification. The shipping wrapper must be removed and replaced with a tarp or similar protective covering. Any concealed damaged reported after 15 days will compromise a claim settlement. Inspection requests may be done by telephone or in person, but should be confirmed in writing. If assistance is needed with the claim process, contact your Johnson Controls Sales representative.

INDOOR UNITS

It is Johnson Controls intention that a shipping wrapper be applied to unpainted indoor units for protection from weather, road dirt, etc. during inland transit and that the wrapper be removed at the time of delivery to allow for a thorough inspection, both inside and out.

OUTDOOR UNITS

Outdoor units are not fully wrapped. Exposed openings are covered for protection from weather, road dirt, etc. during inland transit. A thorough inspection, both inside and out, should be done at the time of delivery.

CHECKING FOR NON MOUNTED PARTS

- Check the packing list for non-mounted ship loose parts. (Check inside all segments.)
- Packing list will note how many and type of parts.
- Shortages must be reported within 10 days after receipt of order.

See Ship Loose Parts, Fig 2-8 thru 2-14

STORAGE

SHORT-TERM STORAGE

Indoor Units:

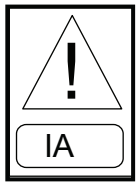
Under no circumstances should outdoor storage be used

Outdoor Units:

Be sure all shipping covers are reapplied after inspection, or tarps are used during storage.

Short-term storage is considered six (6) months or less from date of shipment. Storage maintenance during this time is usually limited to the following.

- Rotate fans every four (4) weeks beginning upon arrival to prevent moisture from damaging bearing.
- If the units are to be stored out-of-doors, prior to installation, special care must be taken to cover and protect the units from dust, rain, snow and rodents. The units must be protected from constant exposure to rain and snow.
- Store on a firm, flat surface to prevent distortion. Block the unit off the ground to protect components from water.



Protect all parts and porous materials from rain and other sources of moisture. Decontaminate or replace as needed to ensure microbial growth is not introduced to the air handler.

- The unit must also be protected from damage to the exterior of the cabinet or coil connections by construction vehicles and personnel.

Equipment ReSubmittal For Approval Rev 2

Project:

VEGA AMERICAS

York Solution XTI Indoor Air Handling Unit (AHU-2)

SUBMITTED TO:
FELDKAMP ENTERPRISES

ATTENTION: HEATHER WYATT

DATE:
April 1, 2021

SUBMITTED BY:

CHARLES E. LEWIS
SYSTEMS APPLICATION ENGINEER
Johnson Controls
Equipment Sales – Cincinnati, OH

TABLE OF CONTENTS

Submittal Comments

- **Verify Filter Access From Front Is Available**
  Verified Filter Access Will Be From The Front.

- **Verify Single Point Power Connection, Required For Unit.**
  AHU Can Not Be Single Point Power. JCI Is Not Providing Motor Control For Either The Supply Fan Or Return Fan. Please Coordinate With Electrical Contractor.

- **Unit Shall Have 65K SCCR For Supply Fans**
  The Supply Fan Will Be Supplied With 65kA SCCR MMP.

- **Verify APD Was For Unit At Full 23,000 CFM Of Unit, Not Reduced Heating Airflow**
  APD Are Calculated With The Design CFM

- **Cooling Coil: Provide Minimum 827.9 Total MBH And 635.6 Sensible MBH Per Schedule And WPD is under 10.0'**
  JCI Has ReSelected Coil To Meet Capacity Requirements On Schedule

- **Coordinate Transitions From Unit Opening To Relief Air Duct**
  JCI Will Coordinate With Install Contractor

- **Verify Updated Unit Dimensions Do Not Conflict With Anything In Model**
  JCI Will Coordinate With Install Contractor

- **Coordinate Both Relief Air and Return Air Connections**
  JCI Will Coordinate With Install Contractor

Submittal Notes

- JCI has officially announced a 2.5% price increase for the AHUs provided in this submittal. In order to avoid the price increase JCI will need to receive approved submittals and a release of the AHUs by 4-23-21 in order to process and meet the required factory release date of 4-30-21. If JCI receives this AHU submittal approved after 4-23-21, JCI will required a 2.5% price increase to meet costs driven by macro-economic factors.
- All air intake and relief dampers are provided with Tampco 9000 SC as specified.
- AHU-1 and AHU-2 are provided with 65kA SCCR supply fan circuit ratings.
- Lead Time is approximately 13 weeks from time of approved submittal.
- Before release, Feldkamp is to verify that all split sections are as required for AHUs to be maneuvered on site.
- Field installed VFD's will be furnished and installed by FEI per spec section 237300, 2.10 A.
- All controls to be field mounted on the AHU by JCI controls division.
- Outside airflow measuring station provided and field installed by JCI controls division.
- AHU is provided with base rail height per detail drawing M200. Feldkamp to provide any changes before release on returned submittal.
- Field leakage testing is not included or available per ASHRAE 111 standards. Any field leakage testing is to be provided by Feldkamp. AHU will conform to ASHRAE Standard 111 Class 6 low-leak casing design.
- AHUs will include a 5 year parts and labor warranty from time of substantial completion of startup.
- Due to the short filter section scaled on detail drawing M200, some filters will be provided as front loading with no side access door. The front access provides better access to all of the filters due to the deep width of these units. Providing side access will increase the overall length to the AHUs that are currently exceeding the maximum length specified.
- All AHUs and their current sizes with connected ductwork have been plotted using Feldkamp's shop drawings. Currently there does not seem to be anything that could cause an issue due to some of the AHU units being longer or wider.
- All fan segments are sized for fan/motor removal.
- Three sets of filters will be provided for each AHU.
- **Feldkamp to verify unit handing configuration before release**
- **Feldkamp to verify overall unit dimensions for space before release.**

- **Feldkamp to verify required shipping splits before release. Every additional shipping split will increase the length by 3”**
- **Feldkamp to verify all duct connections before release.**
- Disconnects are furnished on all supply fans via MMP panel.

PERFORMANCE

YORK® Solution™ Air Handling Unit Performance Report

Job Summary

Project Name:	VEGA Americas - Bid Day		
Unit Tag(s):	AHU-2		
Quantity:	1	**Environment:**	Indoor

Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
XTI-72x126	23,000	1,004	10,779

Segment Sequence

(DP FS)(CC-2 CC-1)(RF EE)(EE)(FR XA MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Bulkhead Material
MB , XA , FR , EE , RF , CC-1 , CC-2 , FS , DP	2	None	STD Ga. G-90 Galvanized	STD Ga. G-90 Galvanized	2" Foam	Galvanized

Base Details

Segment(s)	Base		Floor				
	Material	Paint	Gauge and Material	Paint	Insulation	Attachment	Tread Plate
MB , XA , FR , EE , RF , CC-1 , CC-2 , FS , DP	Standard Formed Steel	None	STD Ga. G-90 Galvanized	None	N/A	-	None

Unit Electrical

Circuit Details

Circuit #	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	Manual Motor Protection	460/3/60	48.0	54.0	70.0
2	Manual Motor Protection	460/3/60	22.0	24.8	35.0
3	Lights and Outlets	120/1/60	-	-	15.0

Electrical Details

Minimum Unit SCCR	5 kA rms Symmetrical	**ETL Label (UL1995/NEC-2002)**	Yes
Unit Light Type		**Unit Light Switch**	
Vaporproof LED		External	

Supply Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	II	245	120	100	2	23,000	1,004	5.45	3.00	1,994	15.80

Drive Type	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Isolation Type	Total Eficiency (%)	Outlet Velocity (ft/s)	Max Speed (RPM)
Direct Drive	SWSI	Airfoil	Aluminum	Galvanized Steel	Blank-off Plate	Yes (K=2941.00)	Rubber Pad	62.34	8,846	2,269

Motor Details

Type	Manufacturer	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	Motor Speed (RPM)	Frame Size	Full Load Amps (Amps)	Efficiency	Location
TEFC	Baldor	20.0	460/3/60	2	H	1,800	256	24.00	Premium	Direct Drive

At Motor Synchronous Details

TSP (in w.g.)	Total Air Flow (CMF)	Fan Speed (RPM)	Motor Correction Factor(%)	Fan Power (BHP)	Total Eficiency (%)
5.45	11,500	1,994	93.0	15.80	62.34

Return Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	II	245	120	100	2	23,000	1,004	0.54	0.50	1,406	3.9

Max RPM	Fan Power with Drive Loss (HP)	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints
2,269	-	SWSI	Airfoil	Aluminum	Galvanized Steel	Blank-off Plate	Yes (K=2941.00)	-	Rubber Pad	-

Drive Type	Drive SF	Spare Belts	Spare Sheave	Inlet Screen	Fan Cage	Belt Guard	Lube Lines	Bearings	Fan Stand	Motor Removal Rail	Seismic Snubber
Direct Drive	-	-	-	Yes	-	-	None	-	-	-	-

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	460/3/60	2	H	1,200	254	11.00	Premium	Direct Drive	Yes

Water Coil(s)

Performance[1] Details

Coil	Fluid Type	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
							DB	WB	DB	WB									
CC-1	Water	1	8	4	389	389	40.5	-	66.0	-	13,800	291	0.04	17.1	150.0	103.6	2.0	2.3	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size (in)	
CC-1	0	Left	0	Steel	0	MPT	1	1-1/2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-1	1	Full	60.50	113	47.5	AL	.006	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-1	-	250	55	.9	Copper	Galvanized	304 Stainless Steel	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)

Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7H
- CDW Tube Spacing: 1.50 x 1.30
- CC-1[1][0]: This coil is 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.

Glycol Coil(s)

Performance[1] Details

Coil	Glycol Type	Glycol %	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
								DB	WB	DB	WB									
CC-2	Propylene	30%	10	10	8	854	644	79.1	65.8	53.2	53.2	23,000	484	1.17	143.0	45.0	57.6	3.3	14.0	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size	
CC-2	0	Left	0	Steel	0	MPT	1	3	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-2	1	Full	60.50	113	47.5	AL	.010	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-2	-	1804	523	8.1	Copper	Galvanized	304 Stainless Steel	-

Coil Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-2[1][0]: This coil is 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.

Drain(s)

Details			
Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
CC-1	Galvanized	Left	None
CC-2	Stainless Steel	Left	None

Filter(s)

Details							
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material
RF	Pre-Filter	2"	Upstream	Pleated 30% (MERV 8)	2	Pleated 30% (MERV 8)	Galvanized
RF	Primary Filter	4" Mini-Pleat	Upstream	80-85% Eff, (MERV 13)	2	80-85% Eff, (MERV 13)	Galvanized

Sizes						Filter Gauge Details		
Segment	Filter	1st Filter Size H x W (in)	1st Qty	2nd Filter Size H x W (in)	2nd Qty	Location	Type	Range (in w.g)
RF	Pre-Filter	20x24	12	20x20	3	Door	Magnehelic	0 - 2
RF	Primary Filter	20x24	12	20x20	3	Door	Magnehelic	0 - 2

Damper(s)

Details													
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area	CFM	Minimum Allowable OA CFM	Damper Type	Damper Config	Model	Material	Blade Orientation	Actuator Type	Fail Position
EE	Exhaust Air	26.75 x 108.00		1,146		23,000	-	Control	100%	CD50	Aluminum	Parallel	-	-
EE	Outside Air	26.75 x 108.00		1,146		23,000		Insulated	100%	CDTI50	Aluminum	Parallel	-	-
EE	Mixed Air	26.75 x 108.00		1,146		23,000	-	Control	100%	CD50	Aluminum	Parallel	-	-

Door(s)

Details										
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	Test Port	Spare Gasket	Thermal Break	Safety Latch	Noncontact Safety Interlock
EE, DP	Left	Outward	Upstream Side	66 x 24 x 2	STD Double Pane	Yes	-	-	Yes	-
EE	Left	Outward	Upstream Side	66 x 24 x 2	STD Double Pane	Yes	-	-	-	-
CC-1	Left	Outward	Upstream Side	66 x 18 x 2	STD Double Pane	Yes	-	-	-	-
CC-2	Left	Outward	Downstream Side	66 x 18 x 2	STD Double Pane	Yes	-	-	-	-

Motor Control(s)

Details										
Segment	Type	MMP	V/Ph/Hz	Input/Output Amps*	Efficiency	Heat Loss (at 100% load)	Enclosure	Bypass	Disconnect Type	RFI/EMI EMC Filter
FR	MMP only	Yes	460/3/60	31.0/31.0	-	540	NEMA 3R	-	None	No
FS	MMP only	Yes	460/3/60	87.0/87.0	-	1090	NEMA 3R	-	None	No

Notes
*Drives are rated for use below 3,000 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.42-EGI (212) for use above these limits.
Storage Temperature: -40°F to 158°F
Humidity: MAX 95% RH non-condensing
Altitude: 3,300 ft. without derate (1% derate for each additional 330 ft.)
Overload Current Rating: 100% for 1 minute every 10 minutes.
The Class 10 trip rating of the MMP device will not withstand an across-the-line start of a fan and should not be used with VFDs with bypass circuits.
The customer must provide a platform or catwalk for accessing the power-disconnect.
Copper Conductors Only.

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (sq. ft)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	Opening	0.0	23,000	0.00	0.00	0.00
FR	External Static - User Entered	0.0	23,000	0.00	0.00	0.50
EE	Opening	0.0	23,000	0.00	0.00	0.00
EE	Control Aluminum (CD50)	0.0	23,000	0.00	0.00	0.04
EE	Opening	0.0	23,000	0.00	0.00	0.00
EE	Insulated Aluminum (CDTI50)	0.0	23,000	0.00	0.04	0.00
RF	2" Pleated 30% (MERV 8)	48.3	23,000	476.00	0.25	0.00
RF	Dirty Filter Allowance - Prefilter	0.0	23,000	0.00	0.20	0.00
RF	4" Mini-Pleat 80-85% Eff, (MERV 13)	48.3	23,000	476.00	0.55	0.00
RF	Dirty Filter Allowance	0.0	23,000	0.00	0.20	0.00
CC-1	Heating 1 rows 8 fins	47.5	23,000	291.00	0.04	0.00
CC-2	Cooling 10 rows 10 fins	47.5	23,000	484.00	1.17	0.00
FS	External Static - User Entered	0.0	23,000	0.00	3.00	0.00
DP	Opening	0.0	23,000	0.00	0.00	0.00
				Total	**5.45**	**0.54**

Dimensions and Weight

Details					
Segment	**Description**	**Length[1] (in)**	**Width[2] (in)**	**Height (in)**	**Weight (lbs)**
MB	Mixing Box	21	126	72	635
XA	Variable Length Access	7	126	72	102
FR	Multiple Return Fan - SWSI	47	126	72	2,436
EE	Economizer	88	126	72	543
RF	High Efficiency Filter	13	126	72	336
CC-1	Variable Length Cooling Coil	30	126	72	980
CC-2	Variable Length Cooling Coil	43	126	72	2,724
FS	Multiple Supply Fan - SWSI	47	126	72	2,468
DP	Discharge Plenum	40	126	72	735
Overall[3]		**336**			**10,959**

Notes

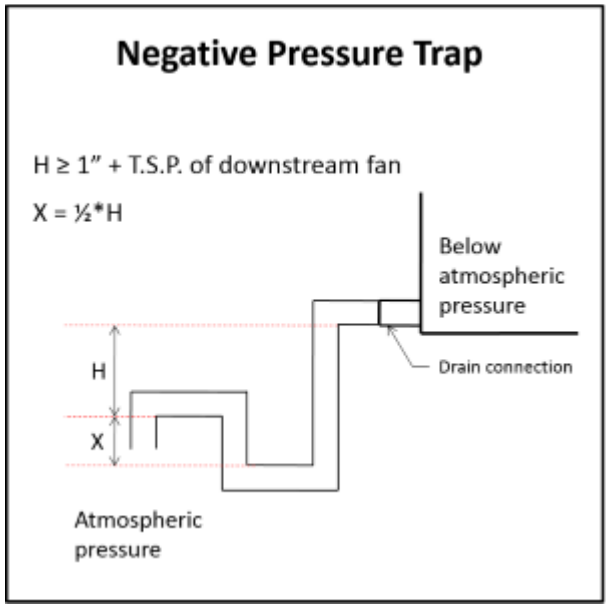
[1]The length includes bottom tier segments only

[2]The 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.

[3]Unit level and other loose components may be excluded from segment weights and overall segment weights. For total unit weight reference Unit Overview.

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-1	Supply Fan	5.45	Negative	6.45	3.23	9.68	6.50	9.75	6"
CC-2	Supply Fan	5.45	Negative	6.45	3.23	9.68	6.50	9.75	6"



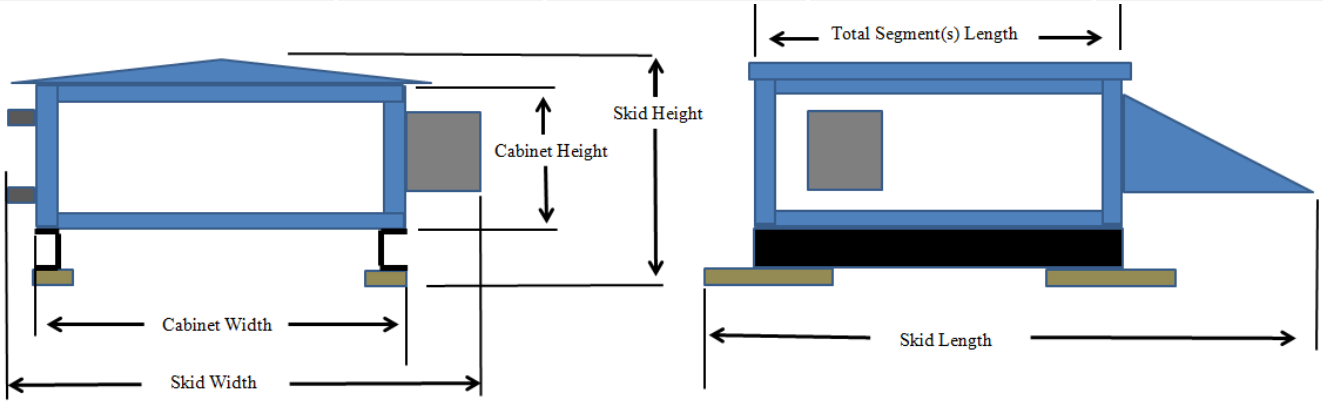
Notes
Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.
Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details
YORK® Solution XT AHU's meet IBC seismic requirements for non-critical equipment (Ip = 1.0) for locations with design spectral response Sds <= 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 SubmittalDrawing 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)**	**Skid Weight (lbs)**
(DP FS)	87	82	131	3,203
(CC-2 CC-1)	73	82	134	3,703
(RF EE)	99	82	131	111
(EE)	63	82	131	768
(FR XA MB)	75	82	130	3,173



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).

Special Quote(s)

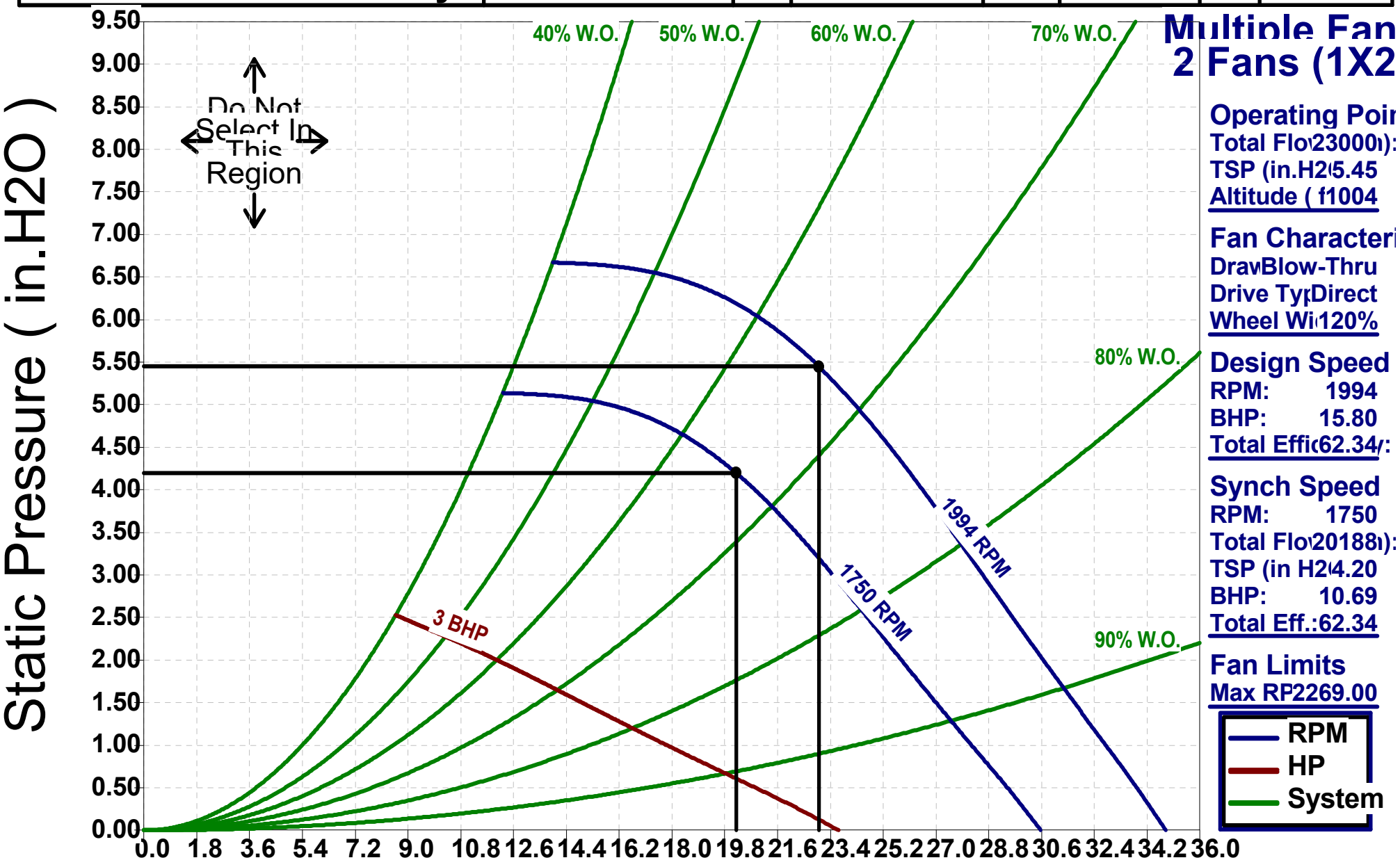
Details		
Segment	**SQ Number**	**Resolution**
Unit	SQ21-000393-001	AE-KR, ENG-SV MLP deduct to provide the following modifications: Delete XA segment in its entirety. Delete shipping split between EE and FR segments. Shorten EA portion of EE (EE1) by 29", making it 27"L. Ref. SQ-007 for Tamco dampers in EE sections. Crosscheck locations of EE parts. Maintain EE door, allowing it to infringe upstream into FR segment. ADD 3" to EE-2, making it 35"L. Shorten DP segment by 6", making it 24"L. Maintain DP door, allowing it to infringe upstream into FS segment. Resultant overall unit length to be 297"L. Ref. submittal drawing for layout.
FS	SQ21-000393-005	***LONG LEAD TIME ITEM*** Item has a 7 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install a 65kA MMP panel in FS segment in lieu of YW selected. Factory to wire supply fans to MMP panel. DRC Ref Number: JOHNCO-004744 NEMA 1 Enclosure Enclosure Dim: 25"Hx15"Wx8.3"D See attached submittal from DRC.
EE	SQ21-000393-007	***LONG LEAD TIME ITEM*** Tamco dampers have a 5 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install 26.75"Hx108"W Tamco PB 9000 OA damper in lieu of YW selected. Locate damper 6" downstream of shipping split and centered in unit width. Provide and install 26.75"Hx108"W Tamco PB 9000 EA damper in lieu of YW selected. Locate damper 6" upstream of shipping split and centered in unit width. Dampers include: Extruded Aluminum Frame Extruded Aluminum Blades Extruded EPDM Blade seals (SC option) Extruded silicon frame seals (SC option) Celcon bearings Leakage Class 1A at 1â W.G. static pressure differential Jackshafts
Unit	SQ21-000393-008	***Information ONLY*** Unit is at minimum length. Ref. SQ-001 for details.
Unit	SQ21-000393-010	***Information ONLY*** Unit is at minimum length. Ref. SQ-001 for details.
Unit	SQ21-000393-011	AE-KR, ENG-N/A MLP add for the factory to provide and install a light in EE-1 and EE-2.
FS	SQ21-000393-012	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
FR	SQ21-000393-013	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
Unit	SQ21-000393-014	***Information ONLY*** Access door is 24"W for fan section. Panels can be removed if fan/motor assembly needs to be completely removed.
EE	SQ21-000393-015	AE-KR, ENG-SV Delete shipping split between EE and FR segments. Shorten EA portion of EE (EE1) by 29", making it 27"L. Ref. SQ-007 for Tamco dampers in EE sections. Crosscheck locations of EE parts. Maintain EE door, allowing it to infringe upstream into FR segment. ADD 3" to EE-2, making it 35"L.
DP	SQ21-000393-016	AE-KR, ENG-SV Shorten DP segment by 6", making it 24"L. Maintain DP door, allowing it to infringe upstream into FS segment.
Unit	SQ21-000393-017	***Information ONLY*** See attached CAD drawing.

FAN CURVE

Johnson Controls

Solution XT Fan Rating Curve

Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-2	1	XTI-72x126	FS	PL-SF	I	245-9-12



Multiple Fan
2 Fans (1X2

Operating Poi
Total Flo 23000):
TSP (in.H2 5.45
Altitude (f 1004

Fan Character
Draw Blow-Thru
Drive Ty Direct
Wheel Wi 120%

Design Speed
RPM: 1994
BHP: 15.80
Total Effic 62.34 :

Synch Speed
RPM: 1750
Total Flo 20188):
TSP (in H2 4.20
BHP: 10.69
Total Eff.: 62.34

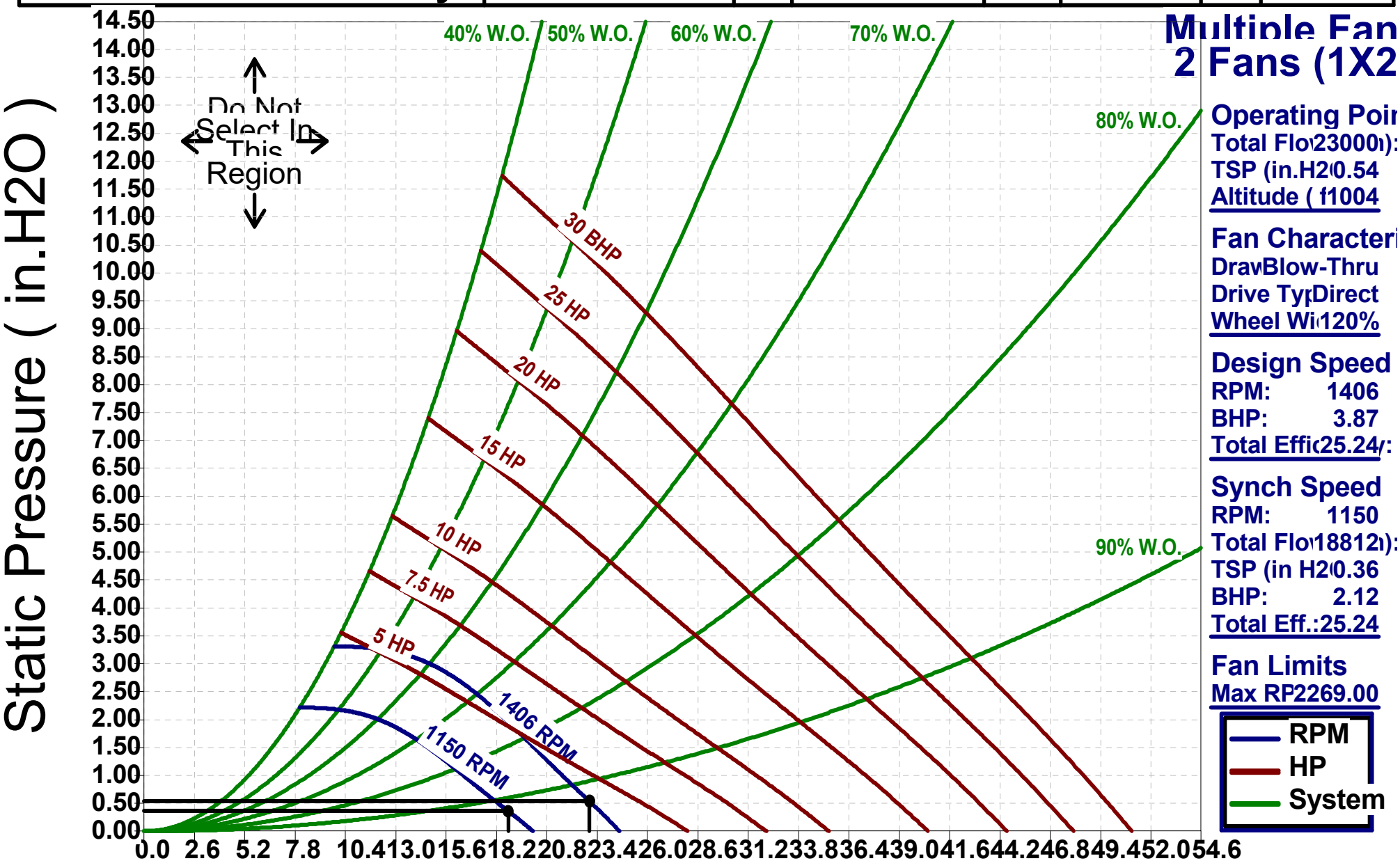
Fan Limits
Max RP 2269.00

RPM
HP
System

Johnson Controls

Solution XT Fan Rating Curve

Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-2	1	XTI-72x126	FR	PL-SF	I	245-9-12



Multiple Fan
2 Fans (1X2

Operating Poi
Total Flo 23000):
TSP (in.H2 0.54
Altitude (f 1004

Fan Characteri
Draw Blow-Thru
Drive Ty Direct
Wheel Wi 120%

Design Speed
RPM: 1406
BHP: 3.87
Total Effic 25.24 :

Synch Speed
RPM: 1150
Total Flo 18812):
TSP (in H2 0.36
BHP: 2.12
Total Eff.: 25.24

Fan Limits
Max RP 2269.00

RPM
HP
System

UNIT AND WIRING DRAWINGS

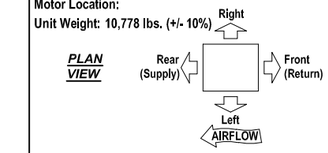
UNIT CONSTRUCTION

Model: Solution-XTI-72x126 **Construction: Indoor**

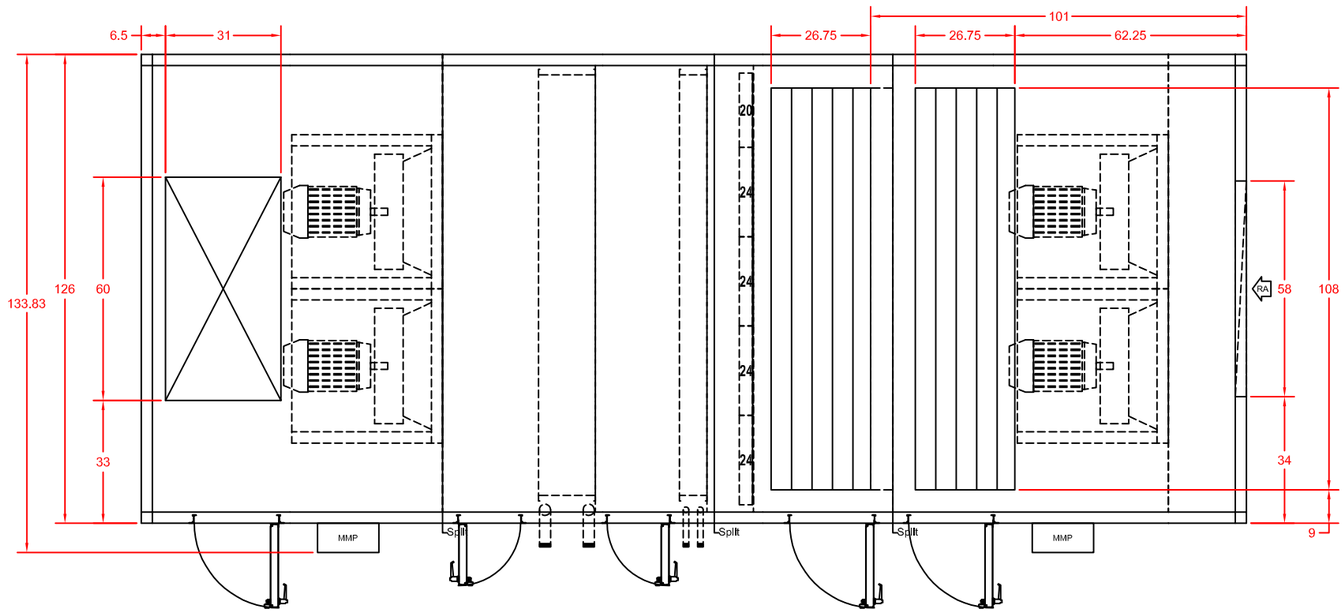
Motor Location:

Unit Weight: 10,778 lbs. (+/- 10%)

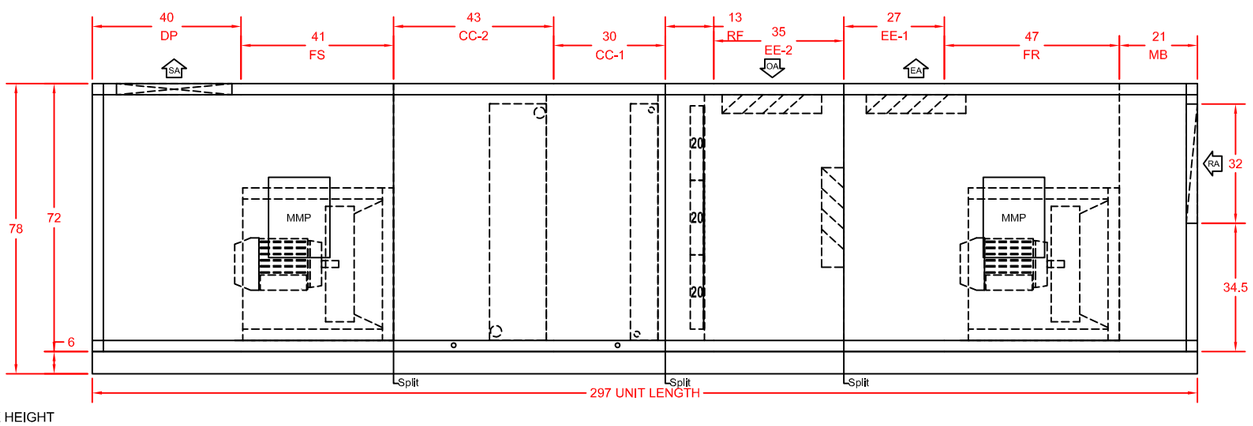
PLAN VIEW



PLAN VIEW



ELEVATION VIEW



* NOTE: MAX HEIGHT

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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

(SL) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Left	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Left	1 Sup 1 Ret	3"	3"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
FR	Return Fan - 245 - SF
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 245 - SF
DP	Discharge Plenum

DWG #	S21-2404
Version:	2
Ver. Date:	3/25/21
SQ:	21-000393
DRN BY:	KR
CKD BY:	1
SHEET:	1

PRODUCT DRAWING

SOLUTION XT AIR HANDLING UNIT DETAIL
MODEL: Solution-XTI-72x126
NOT FOR CONSTRUCTION

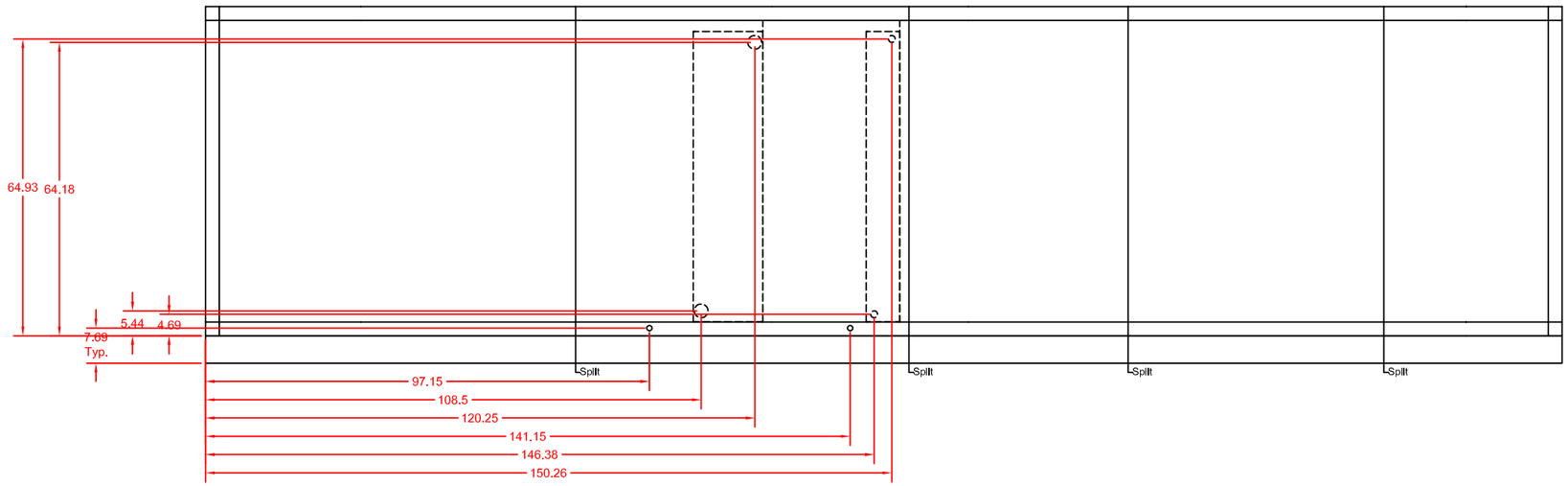
Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#:
UNIT TAG: AHU-2 - Sheet 1

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls



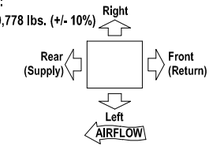
UNIT CONSTRUCTION

Model: Solution-XTI-72x126 **Construction: Indoor**

Motor Location:

Unit Weight: 10,778 lbs. (+/- 10%)

PLAN VIEW



NOTES

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Refer to performance report for shipping split details.

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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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

Ⓢ - Designates Shipped Loose Item(s)

PIPING CONNECTIONS (In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Left	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Left	1 Sup 1 Ret	3"	3"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
XA	Variable Length Access
FR	Return Fan - 245 - SF
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 245 - SF
DP	Discharge Plenum

DWG #	S21-2404
Version:	COIL_v2
Ver. Date:	3/25/21
SQ:	21-000393
DRN BY:	KR
CKD BY:	1
SHEET:	2

Coil Connections

PRODUCT DRAWING

SOLUTION XT COIL CONNECTION DETAIL
MODEL: Solution-XTI-72x126
NOT FOR CONSTRUCTION

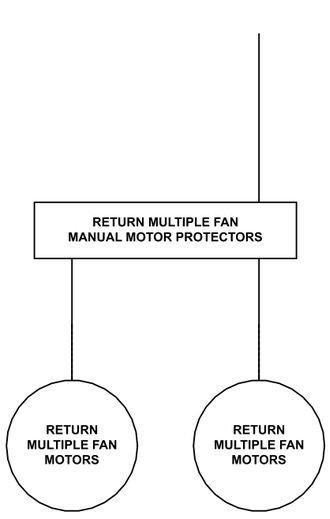
Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

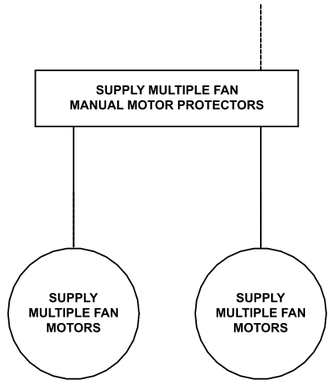
Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-2 - Sheet 2

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls





PRODUCT DRAWING
YORK Custom Field Wiring
MODEL:
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location:
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-2 - Sheet 1

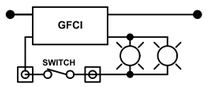
Date: 3/26/2021 8:20:20
Version:
Form No.: 100.09-EG1
Dwg. Lev.: 12/03
Dwg. Scale: NTS

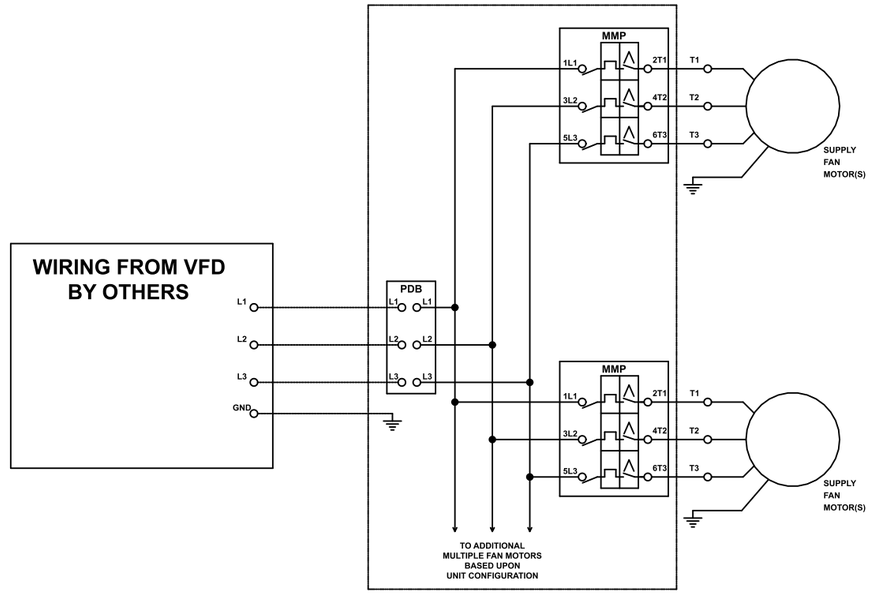
Serial Number:
SQ Database Number:
YORKworks Release:
Dwg. Name:
Dwg. Location:

Johnson Controls

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

NOTE:
CUSTOMER REQUIRED TO PROVIDE BRANCH CIRCUIT PROTECTION AND DISCONNECT MEANS PER NEC AND LOCAL CODES.





IF (2) VFD'S ARE REQUIRED FOR A SUPPLY FAN CONFIGURATION THEN THE SECOND VFD WIRING WILL BE IDENTICAL TO THE FIRST VFD.

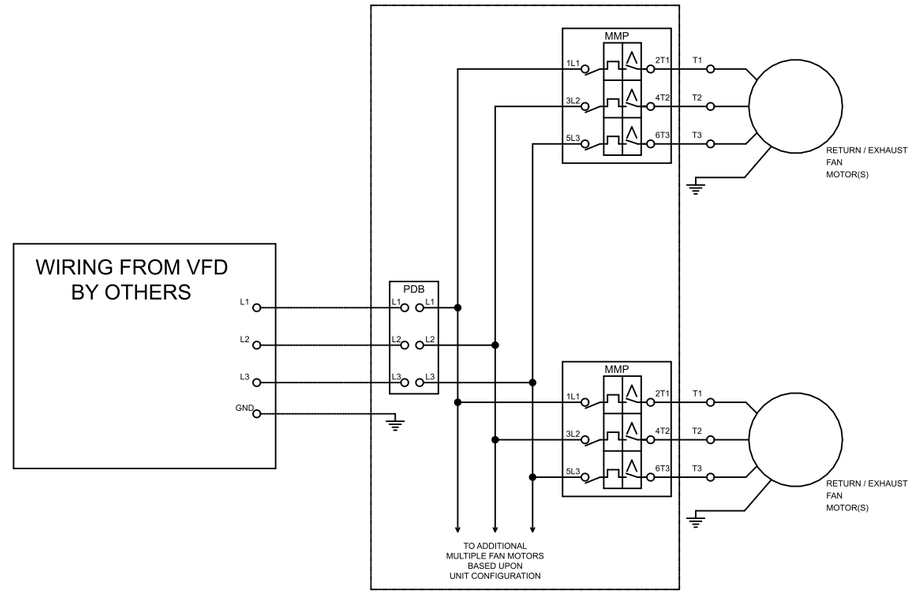
- TERMINAL POINT
- REMOTE DEVICE (BY OTHERS)
- OPTIONAL PANEL COMPONENTS
- FIELD WIRING
- WIRE PER TRANSFORMER LABEL PER VOLTAGE.
* USE MINIMUM 75°C COPPER WIRE ONLY

PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-2 - Sheet 2	Date: 3/26/2021 8:20:20 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

NOTE:
CUSTOMER REQUIRED TO PROVIDE BRANCH CIRCUIT PROTECTION AND DISCONNECT MEANS PER NEC AND LOCAL CODES.

TO SERVICE LIGHTS / OUTLETS SEE ADDITIONAL WIRING DIAGRAM



IF (2) VFD'S ARE REQUIRED FOR A RETURN/EXHAUST FAN CONFIGURATION THEN THE SECOND VFD WIRING WILL BE IDENTICAL TO THE FIRST VFD.

- TERMINAL POINT
- REMOTE DEVICE (BY OTHERS)
- OPTIONAL PANEL COMPONENTS
- FIELD WIRING
- WIRE PER TRANSFORMER LABEL PER VOLTAGE.
* USE MINIMUM 75°C COPPER WIRE ONLY

PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-2 - Sheet 3	Date: 3/26/2021 8:20:20 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

SCHEMATIC LEGEND SYMBOLS

TERMINAL IN PANEL

FUSE BLOCK

1 POLE
CIRCUIT BREAKER

2 POLE
CIRCUIT BREAKER

3 POLE
CIRCUIT BREAKER

R — CONTROL RELAY COIL

TDR — CONTROL TIMER COIL

24 HR — 24 HOUR PIN TIMER

HM — MOTOR HOUR METER

CC — MOTOR CYCLE COUNTER

FLOAT SWITCH CLOSES
ON RISING LEVEL

FLOAT SWITCH OPENS
ON RISING LEVEL

PRESSURE SWITCH CLOSES
ON RISING PRESSURE

PRESSURE SWITCH OPENS
ON RISING PRESSURE

TEMPERATURE SWITCH OPENS
ON RISING TEMPERATURE

TEMPERATURE SWITCH CLOSES
ON RISING TEMPERATURE

FLOW SWITCH CLOSES
ON INCREASING FLOW

NORMALLY OPEN RELAY CONTACT

NORMALLY CLOSED RELAY CONTACT

NORMALLY OPEN TIMER CONTACT

NORMALLY CLOSED TIMER CONTACT

FIELD WIRING

NORMALLY OPEN PUSHBUTTON
MOMENTARY

NORMALLY CLOSED PUSHBUTTON
MOMENTARY

NORMALLY CLOSED EMERGENCY
STOP PUSHBUTTON

THREE POSITION H.O.A.
SELECTOR SWITCH
(ILLUMINATED ON NON-ILLUMINATED)

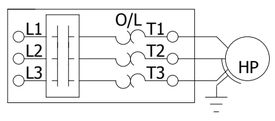
SELECTOR SWITCH
(ADDITIONAL CONTACTS MAY BE ADDED)

DISTRIBUTION BLOCK

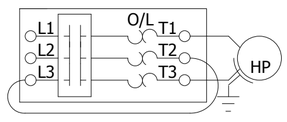
SOLENOID VALVE

WIRE CONTINUATION

DISCONNECT



3 %%C MOTOR STARTER
WITH OVERLOAD



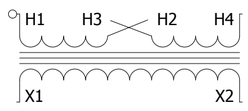
1 %%C MOTOR STARTER
WITH OVERLOAD

M — MOTOR STARTER/CONTACTOR
COIL

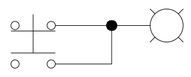
CONTACTOR

GROUND

DUPLEX RECEPTACLE



TRANSFORMER



PUSH-TO-TEST
PILOT LIGHT

PILOT LIGHT

CONTROL PANEL WIRE COLOR CODING

BLACK	ALL UNGROUNDED CONTROL CIRCUIT CONDUCTORS OPERATING AT THE SUPPLY VOLTAGE
RED	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE
BLUE	UNGROUNDED DC CONTROL CIRCUITS
YELLOW	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE (CLASS 2)
WHITE OR NATURAL GRAY	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH BLUE STRIPE	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH YELLOW STRIPE	GROUNDED AC CONTROL CIRCUIT CURRENT-CARRYING CONDUCTOR THAT REMAINS ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION
LIGHT BLUE	INTRINSICALLY SAFE WIRING CONTROL CIRCUIT CONDUCTOR

Previous page:

Next page: 1

Johnson Controls

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Legend

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Engineer: Electrical Engineer

Checked By:

DRC Ref Number: JOHNCO-004743

Date: 2021.02.23

Designed by: orders

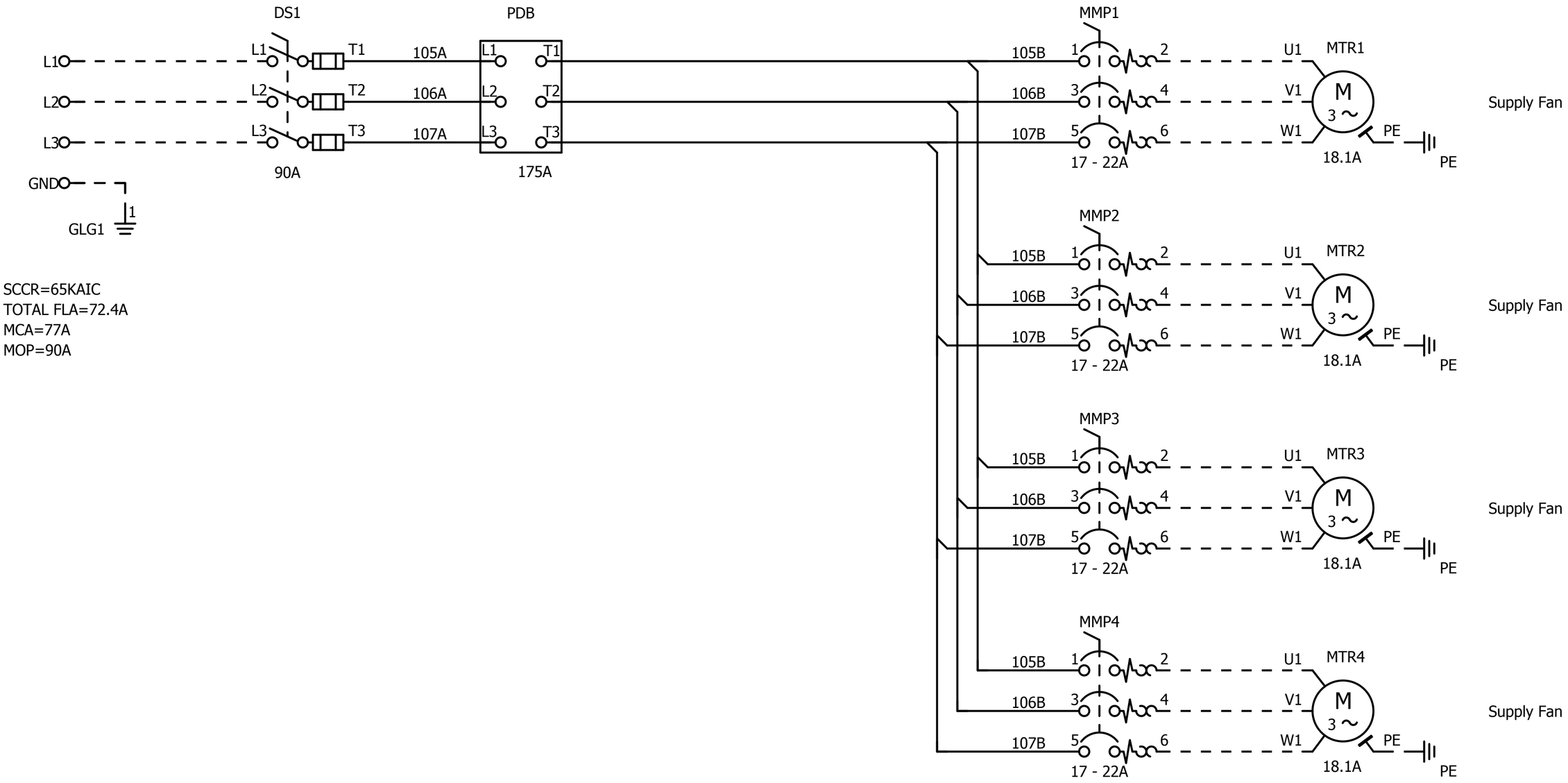
Revision B

Job Name: VEGA Americas - Bid Day

Sheet: 0

Page: 0

480Y/277V, 3 Phase, 60Hz



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TOTAL FLA=72.4A
MCA=77A
MOP=90A

Previous page: 0

Next page: 100

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Electrical Schematics

Project Description: AHU-1

Order No.: SQ21-000373

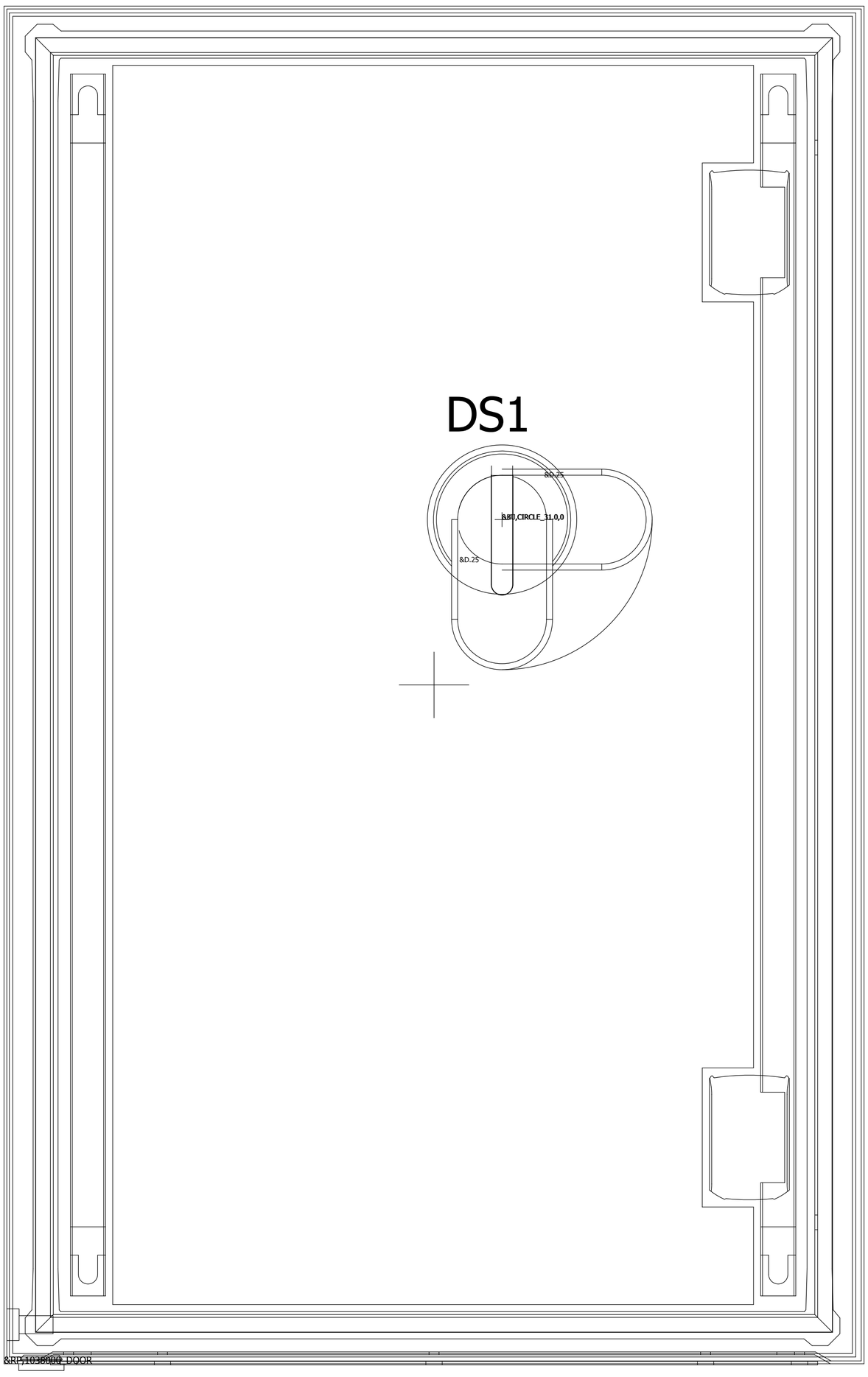
Total Sheets: 4

Job Name: VEGA Americas - Bid Day

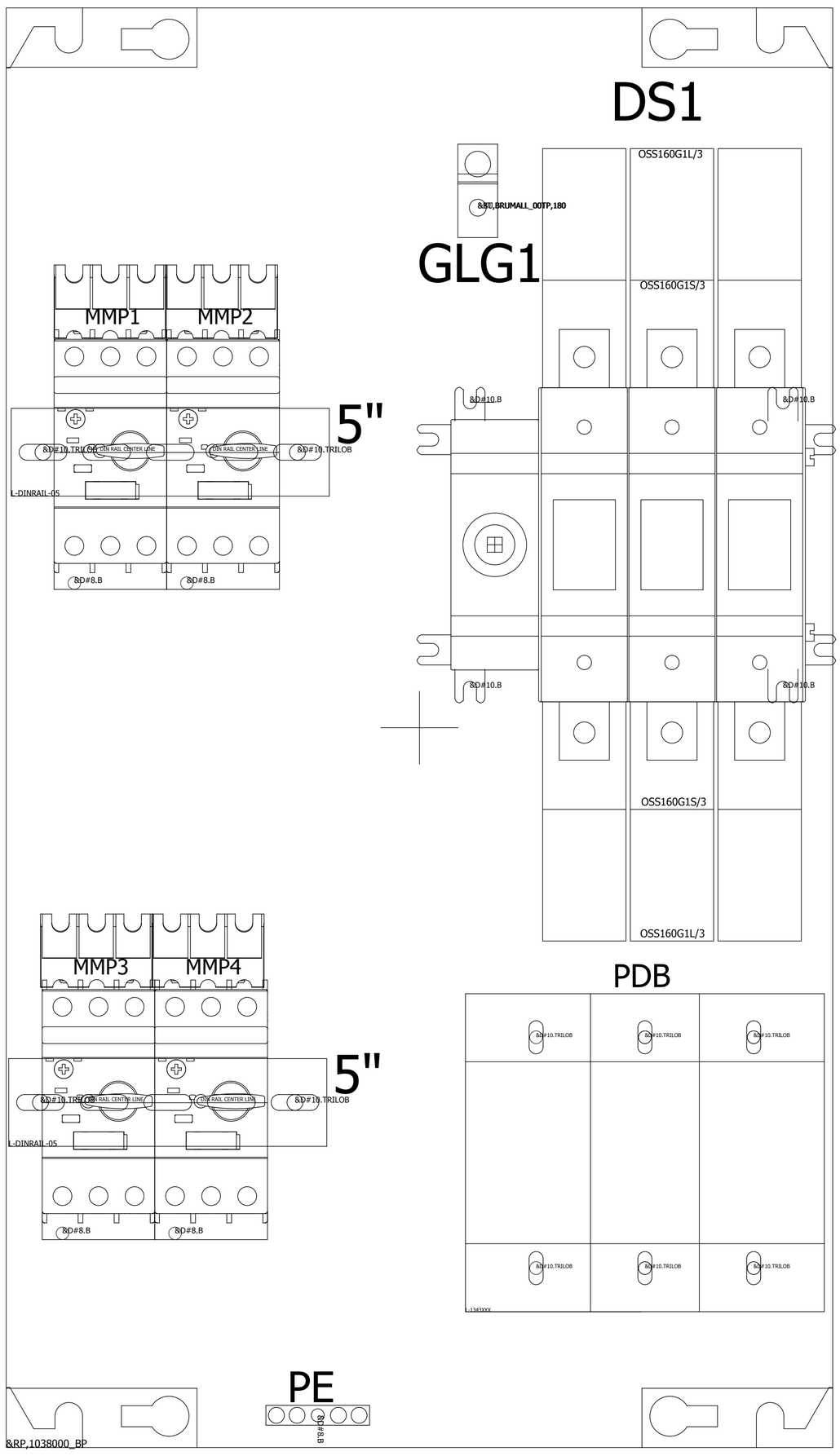
Sheet: 1

Page: 1

DOOR



24"H X 15"W X 8"D Type 1



Previous page: 1 Next page: 101

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Panel Layout | Project Description: AHU-1 | Order No.: SQ21-000373 | Total Sheets: 4

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

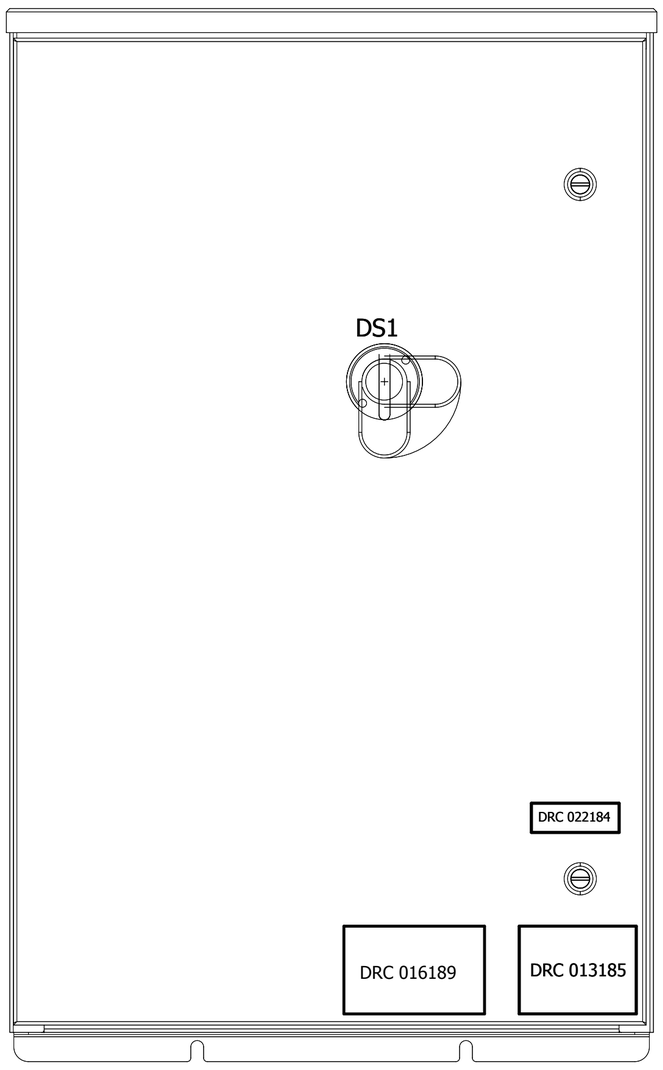
Revision B

Job Name: VEGA Americas - Bid Day

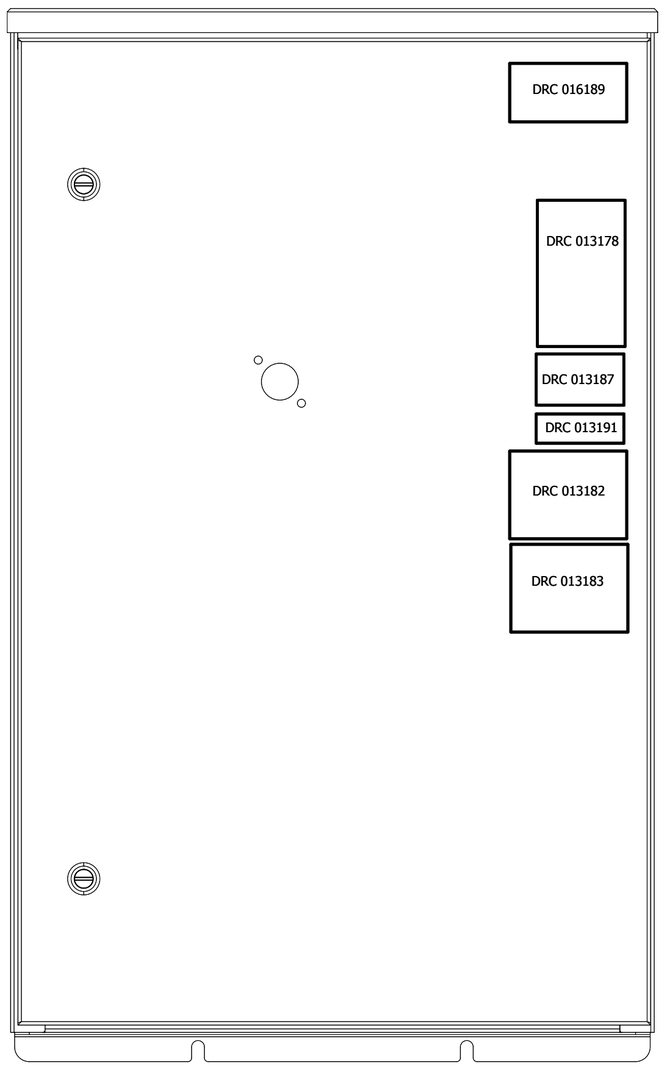
Sheet: 100 Page: 100

GENERIC LABELS LAYOUT

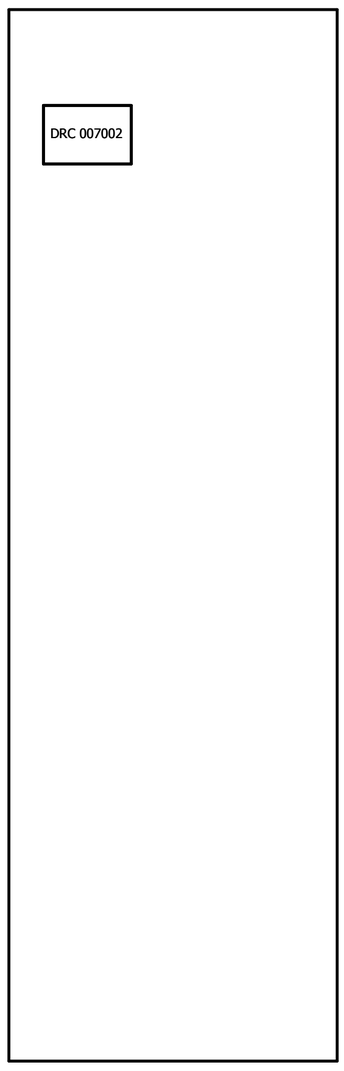
Outside Door



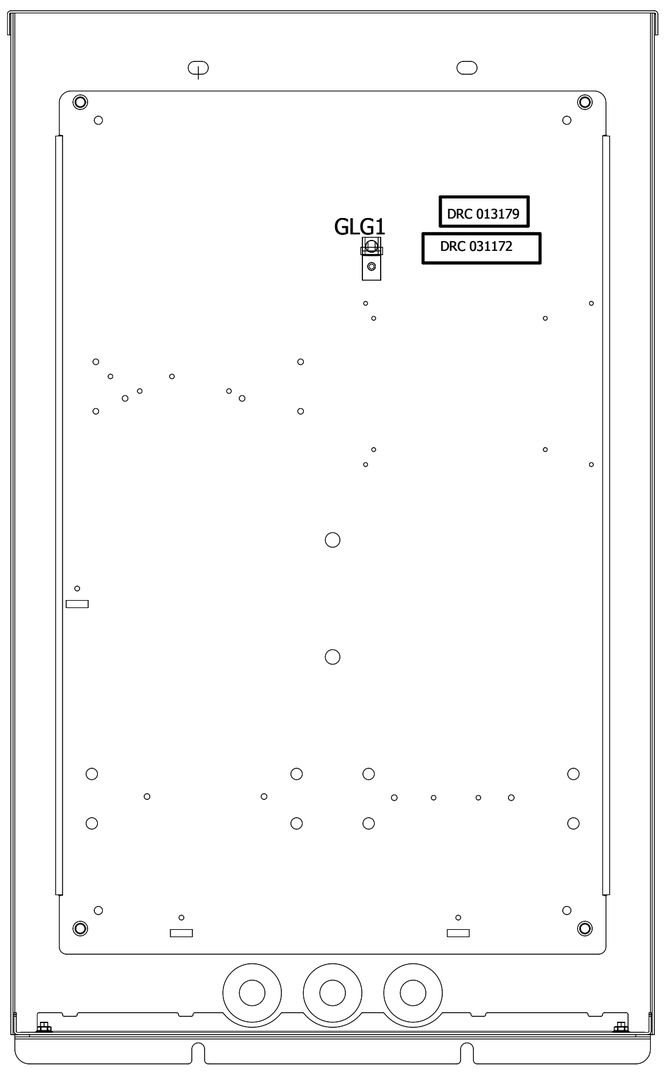
Inside Door



INSIDE LEFT SIDE



BACK PANEL



CONTROL BOX DIMENSION (INCHES) AND WEIGHT (POUNDS):

Wall Mount: 24"Hx15"Wx8.3"D, Estimated Weight: 100 Pounds

Previous page: 100

Next page:

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Label Layout

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Job Name: VEGA Americas - Bid Day

Sheet: 101

GENERAL PRODUCT DETAILS

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite™

Self-Supporting Extended Surface Pleated Filter

High performance MERV 8 mechanical air filter media is self-supporting and requires no metal support grid downstream. No metal components means the filter is completely incinerable after use.

Exclusive vForm™ Pleating Technology maintains uniform pleat spacing in every filter. In addition, vForm™ Pleating Technology insures the same pleat configuration used for decades in our original Multi-Pleat products. Same aerodynamic v-shaped pleat design, same superior performance.

Sturdy, moisture-resistant, beverage board perimeter frame and cross-braces provide structural integrity even in difficult operating conditions.

The media used in the Multi-Pleat Elite is extraordinarily resilient and is engineered to endure the rigors of shipping, handling, installation and operation.

Multi-Pleat Elite earns the Koch Green Icon for one or more following categories: Earns LEED Points, Reduces Energy Costs, Extends Filter Lifecycles, Conserves Resources, and Improves Indoor Environmental Quality.

Features:

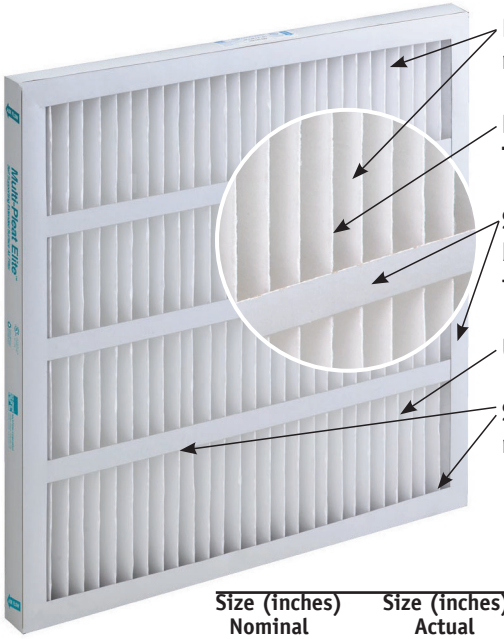
- Exclusive vForm™ Pleating Technology
- MERV 8 performance rating
- Self-supporting pleats requires no metal reinforcement
- Low resistance to airflow reduces energy costs
- Moisture-resistant beverage board frame
- Completely incinerable

Koch Filter Corporation…Durable. Reliable. Versatile.

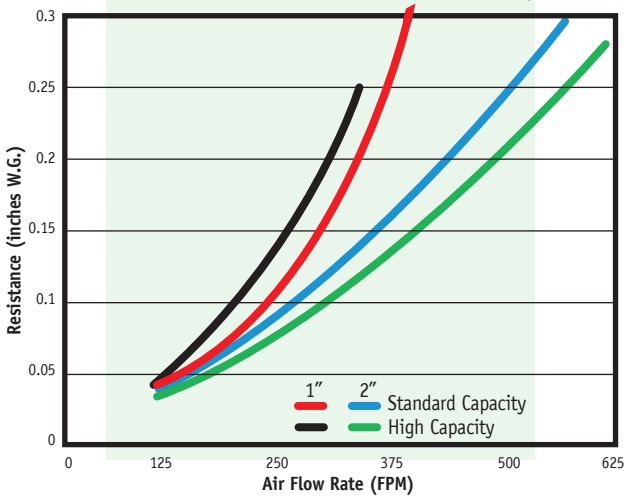
Bulletin No. K-MPE10

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite Technical Data



Initial Resistance vs. Filter Face Velocity



Additional Multi-Pleat Elite Product Information
ASHRAE Test Standard 52.2-2007.
Recommended maximum continuous operational temperature is 150° F (93°C).
Multi-Pleat Elite filters are classified as Underwriter's Laboratories Class 2 according to U.L. Standard 900.

Size (inches) Nominal W x H x D	Size (inches) Actual W x H x D	Capacity (CFM)	Standard Capacity Elite Initial Resistance (in. W.G.)	Standard Capacity Elite Media Area (Sq. Ft.)	High Capacity Elite Initial Resistance (in. W.G.)	High Capacity Elite Media Area (Sq. Ft.)
12 x 24 x 1	$11^{3/8}$ x $23^{3/8}$ x $^{3/4}$	600	0.29	3.3	0.20	3.8
14 x 20 x 1	$13^{1/2}$ x $19^{1/2}$ x $^{3/4}$	590	0.29	3.4	0.20	3.8
14 x 25 x 1	$13^{1/2}$ x $24^{1/2}$ x $^{3/4}$	730	0.29	4.3	0.20	4.8
15 x 20 x 1	$14^{1/2}$ x $19^{1/2}$ x $^{3/4}$	630	0.29	3.6	0.20	4.1
16 x 20 x 1	$15^{1/2}$ x $19^{1/2}$ x $^{3/4}$	670	0.29	3.8	0.20	4.3
16 x 24 x 1	$15^{1/2}$ x $23^{3/8}$ x $^{3/4}$	800	0.29	4.6	0.20	5.2
16 x 25 x 1	$15^{1/2}$ x $24^{1/2}$ x $^{3/4}$	840	0.29	4.8	0.20	5.4
20 x 20 x 1	$19^{1/2}$ x $19^{1/2}$ x $^{3/4}$	840	0.29	4.7	0.20	5.4
20 x 24 x 1	$19^{1/2}$ x $23^{3/8}$ x $^{3/4}$	1000	0.29	5.7	0.20	6.5
20 x 25 x 1	$19^{1/2}$ x $24^{1/2}$ x $^{3/4}$	1050	0.29	6.0	0.20	6.8
24 x 24 x 1	$23^{3/8}$ x $23^{3/8}$ x $^{3/4}$	1200	0.29	7.1	0.20	8.1
12 x 24 x 2	$11^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	1000	0.26	5.4	0.20	7.8
14 x 20 x 2	$13^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	980	0.26	5.5	0.20	7.9
14 x 25 x 2	$13^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1215	0.26	6.9	0.20	9.9
15 x 20 x 2	$14^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1050	0.26	6.0	0.20	8.4
16 x 20 x 2	$15^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1115	0.26	6.5	0.20	8.8
16 x 24 x 2	$15^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1340	0.26	7.8	0.20	10.6
16 x 25 x 2	$15^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1400	0.26	8.1	0.20	11.0
18 x 24 x 2	$17^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1500	0.26	8.4	0.20	12.3
20 x 20 x 2	$19^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1400	0.26	8.0	0.20	11.1
20 x 24 x 2	$19^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1675	0.26	9.6	0.20	13.4
20 x 25 x 2	$19^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1740	0.26	10.0	0.20	14.0
24 x 24 x 2	$23^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	2000	0.26	11.4	0.20	16.2
25 x 25 x 2	$24^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	2170	0.26	12.5	0.20	17.4

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

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.***

Koch Filter Corporation
Filtration Products Crafted with Pride

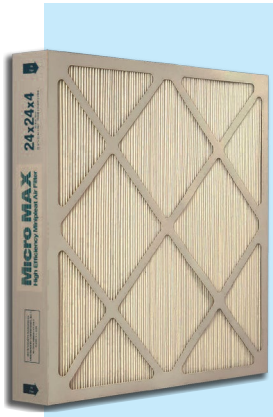
MicroMax™

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

Bulletin No. K-195-B

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 thress-per-carton. This multiple packaging means substantial reductions in shipping costs.

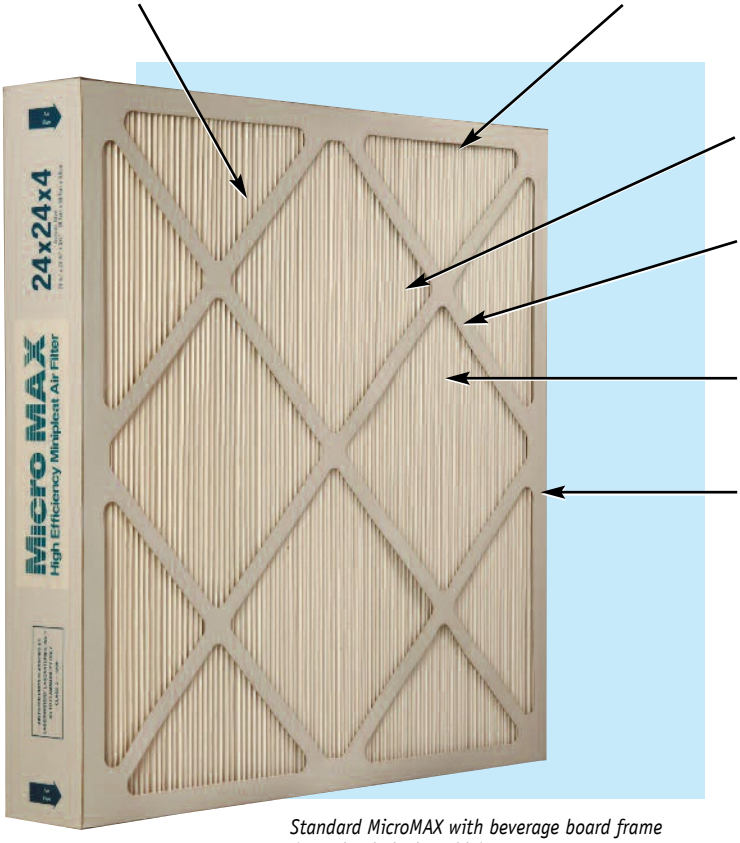
...Saves Space

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.

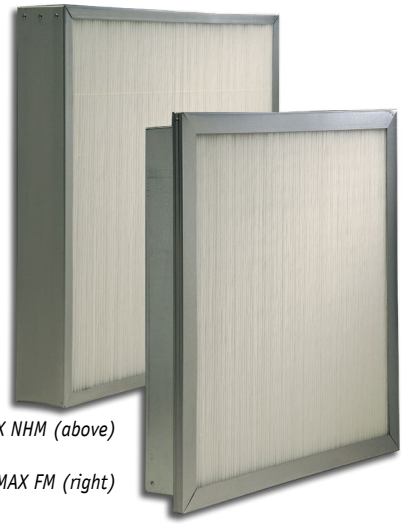
Specially-formulated adhesive bead insures even airflow and filter strength.

Available with double-walled, moisture resistant, beverage board frame (completely incinerable) or galvanized stell 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

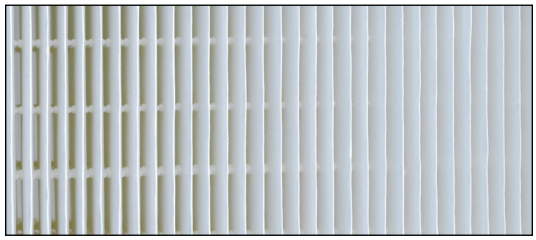
The media used in MicroMAX minipleat filters is composed of microfiberglass paper, treated with a specially-formulated, water-repllent binder. Millions of fibers are constructed into a Graded Density mat, with coarse fibers upstream and finer fibers on the air-exiting side. This dual-density insures 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 seprators uniformly secure the pleats to allow maximum air flow with minimal pressure drop.



Koch Filter Corporation
Filtration Products Crafted with Pride

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	23-3/8x23-3/8x3-3/4	2000	0.68	1.5	120	20
MX-9-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.68	1.5	111	18
MX-9-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.68	1.5	106	16
MX-9-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.68	1.5	95	11
MX-9-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.68	1.5	70	9
MX-9-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.68	1.5	63	19
MicroMAX 80 - 85% (MERV 13)								
MX-8-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.59	1.5	120	20
MX-8-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.59	1.5	111	18
MX-8-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.59	1.5	106	16
MX-8-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.59	1.5	95	11
MX-8-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.59	1.5	70	9
MX-8-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.59	1.5	63	19
MicroMAX 60 - 65% (MERV 11)								
MX-6-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.40	1.5	120	20
MX-6-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.40	1.5	111	18
MX-6-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.40	1.5	106	16
MX-6-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.40	1.5	95	11
MX-6-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.40	1.5	70	9
MX-6-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.40	1.5	63	19

1 . Shipping weights listed above apply to MicroMAX with beverage board frames. Add 10 lbs. per carton for metal framed models.

2. Data based on ASHRAE 52.1 and 52.2.

3. MicroMAX filters are classified as U.L. Class 2. Testing conducted according to U.L. Standard 900.

4. Width and height dimensions are interchargeable. MicroMAX filters may be installed with pleats in either direction.

5. Filters may be operated at up to 125% of rated face velocity.

6. MicroMAX filters should be used with a perfilters for maximum performance.

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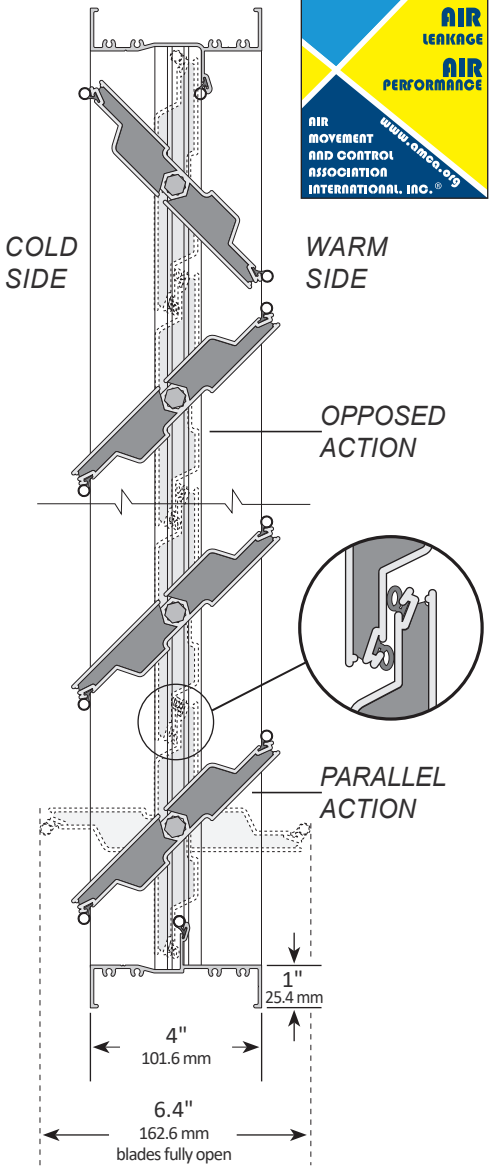
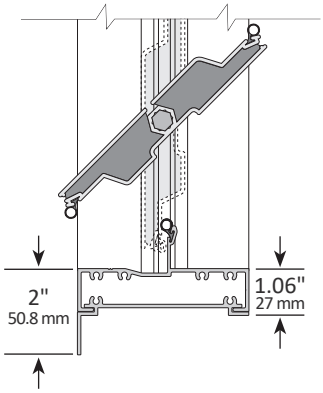
SUBMITTAL DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

Tampco 9000 SC dampers are provided on all AHU outside air intake and relief dampers as specified.

In Duct or Flanged to Duct Install Types



Extended Rear Flange Install Type



1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted.
3. Blade seals are extruded EPDM. Frame seals are extruded silicone. Seals are secured in an integral slot within the aluminum extrusions. Blade and frame seals are mechanically fastened to prevent shrinkage and movement over the life of the damper.
4. Bearings are composed of a Celcon inner bearing - fixed around a 7/16" *(11.11 mm)* aluminum hexagon blade pivot pin - rotating within a polycarbonate outer bearing inserted in the frame. This eliminates action between metal-to-metal or metal-to-plastic riding surfaces.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are zinc-plated steel. These provide a positive connection to blades and linkage.
6. Aluminum and corrosion-resistant zinc-plated steel linkage hardware is installed in the frame side, complete with cup-point trunnion screws for a slip-proof grip.
7. Dampers are designed for operation in temperatures ranging from -40°F *(-40°C)* to 212°F *(100°C)*.
8. Leakage Class 1A at 1 in. w.g. *(0.25 kPa)* static pressure differential. Standard air leakage data is certified under the AMCA Certified Ratings Program.
9. Dampers are custom made to required size, without blanking off free area. The blade stop is set at a fixed height and is a continuous and integral part of the top and bottom frames.
10. Dampers are available with either opposed blade action or parallel blade action.
11. Dampers are available in four install types: Installed In Duct, Flanged to Duct, Extended Rear Flange, and Square to Round Transition. *(See Install Type pages for details.)*
12. Installation of dampers must be in accordance with TAMCO's current on-line installation guidelines. *(Printed installation guidelines are provided with each damper shipment, however all technical information available on TAMCO's web site at www.tamcodampers.com supersedes information contained within printed versions.)*
13. Intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. *(See TAMCO Aluminum Damper Installation Guidelines.)*

OPTIONS FOR SP – STANDARD PROFILE:
For each option listed, replace the lines above with their corresponding lines below.

SC - SEVERE COLD TEMPERATURE OPTION:

3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.

MR - MOISTURE RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Frame is assembled using stainless steel screws.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

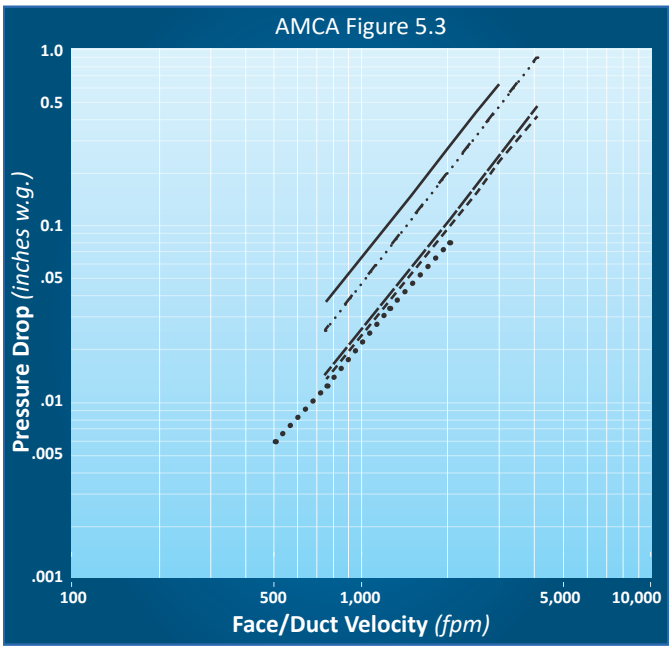
SW - SALT WATER RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Aluminum frame is clear anodized to a minimum depth of 0.7 mil *(18 microns)*. Frame is assembled using stainless steel screws.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted. Extruded aluminum blades are clear anodized to a minimum depth of 0.7 mil *(18 microns)*.
3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Clear anodized aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With no Option or with MR Option

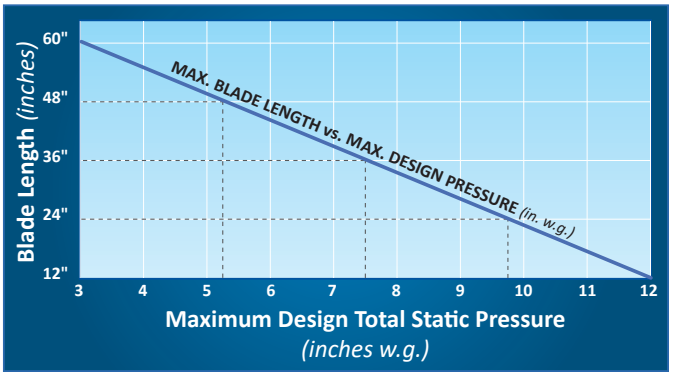
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" – – – *(610 mm x 610 mm))*
48" x 12" –·–·– *(1220 mm x 305 mm)*
12" x 48" — — *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, no Option or MR Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1
12.1 to 36.0 *(306 to 915)*	1A	1
36.1 to 48.0 *(916 to 1220)*	1A	1
48.1 to 60.0 *(1221 to 1524)*	1A	1

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* and a minimum of 70 in-lb *(7.9 N-m)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with no Option or MR Option, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

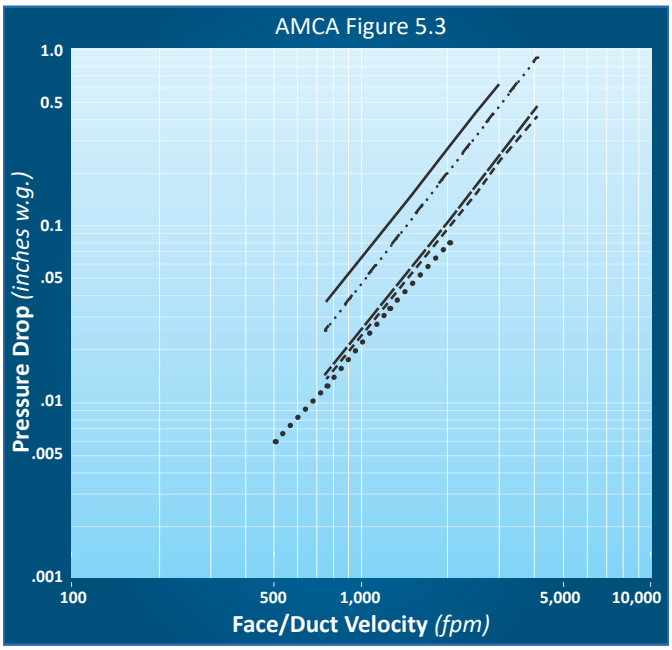
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)*	
	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
1A	3 *(15.2)*	n/a
1	4 *(20.3)*	8 *(40.6)*
2	10 *(50.8)*	20 *(102)*
3	40 *(203)*	80 *(406)*

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With SC or SW Options

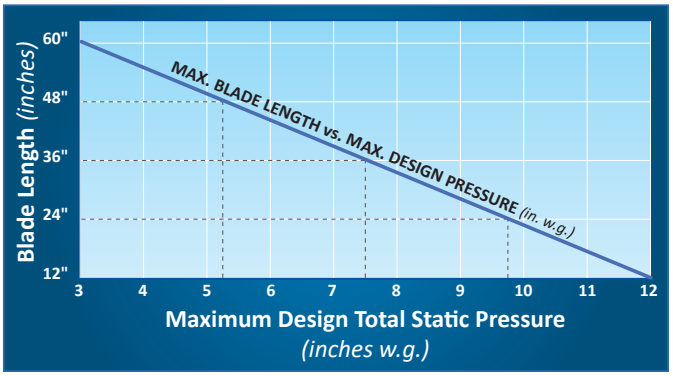
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" - - - *(610 mm x 610 mm))*
48" x 12" -·-·- *(1220 mm x 305 mm)*
12" x 48" —— *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, SC or SW Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1	1	1
12.1 to 36.0 *(306 to 915)*	1A	1	1	1
36.1 to 48.0 *(916 to 1220)*	1A	1	1	1
48.1 to 60.0 *(1221 to 1524)*	1A	1	n/a	n/a

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with SC or SW Options, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

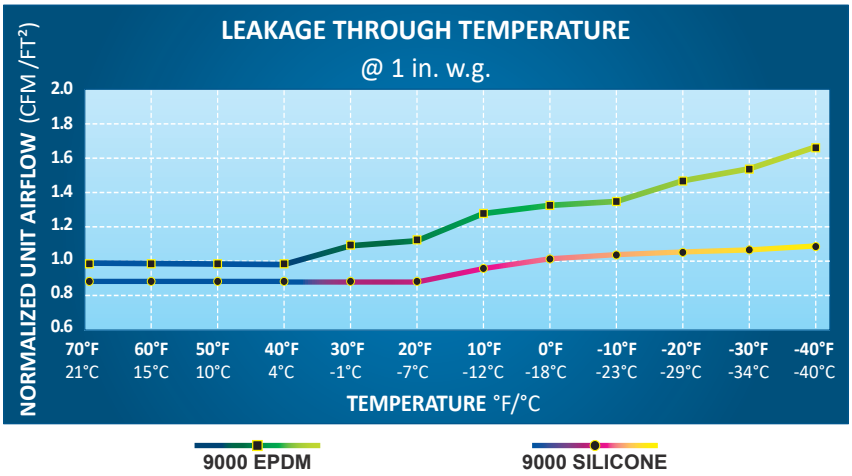
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)* 1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
1A	3 *(15.2)*	n/a	n/a	n/a
1	4 *(20.3)*	8 *(40.6)*	9.8 *(49.8)*	11.3 *(57.4)*
2	10 *(50.8)*	20 *(102)*	24.5 *(125)*	28.3 *(144)*
3	40 *(203)*	80 *(406)*	98 *(498)*	113 *(574)*

***NOTE:** TAMCO Leakage Class Rating is not provided for dampers measuring more than 48" *(1220 mm)* wide at 6 in. w.g. *(1.5 kPa)* and at 8 in. w.g. *(2.0 kPa)*, as the recommended blade length is exceeded at these static pressures. *(Refer to the Blade Design Pressure Limitations Chart.)*

EPDM VS. SILICONE UPGRADE OPTION BLADE SEALS

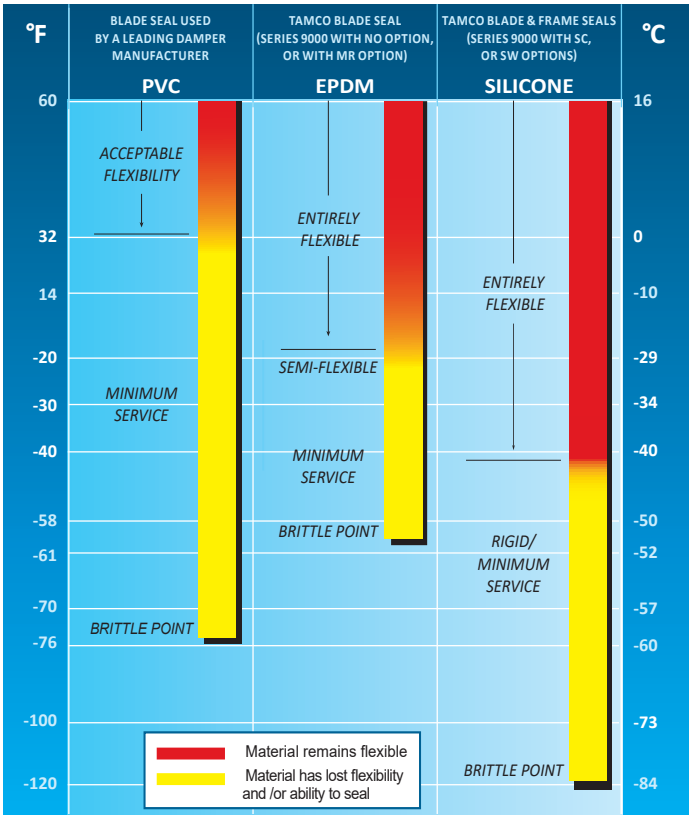
LEAKAGE COMPARISON GRAPH



Damper tests were conducted in a laboratory cold room to determine the effects of colder and severe cold temperatures *(down to -40°F (-40°C))* on sealing gaskets and leakage rates.

NOTE: Leakage rates shown in this graph are not licensed to bear the AMCA Seal. There is no AMCA standard dealing with the testing of leakage in temperatures below 32°F (0°C).

SEAL PERFORMANCE COMPARISON GRAPH



Minimum service temperatures and brittle points are as stated by material manufacturers. Flexibility, rigidity, and suitability status of various materials were determined by observation and operation of dampers in both cold room and cold box environments.

Provided on Mixed air dampers.

RUSKIN®

AMCA LICENSED
See Page 2

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

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 stystems. 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

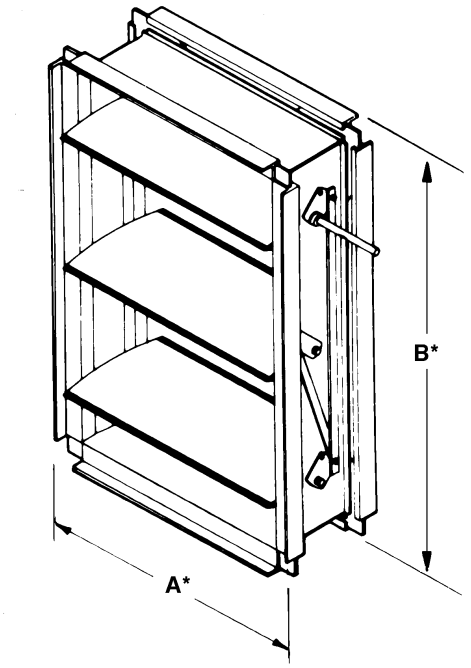
- Airfoil blade design for low pressure drop and less noise generation.
- Positive lock axles, noncorrosive bearings and shake proof linkage for low maintenance operation.
- Blade edge seals mechanically lock into the blade for superior sealing.

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.

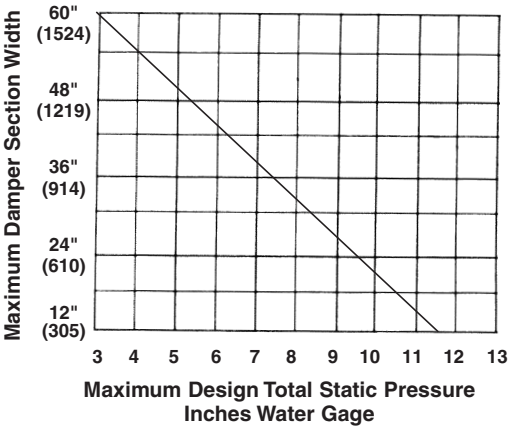
NOTE: Dimensions shown in parenthesis ( ) indicate millimeters.

*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.

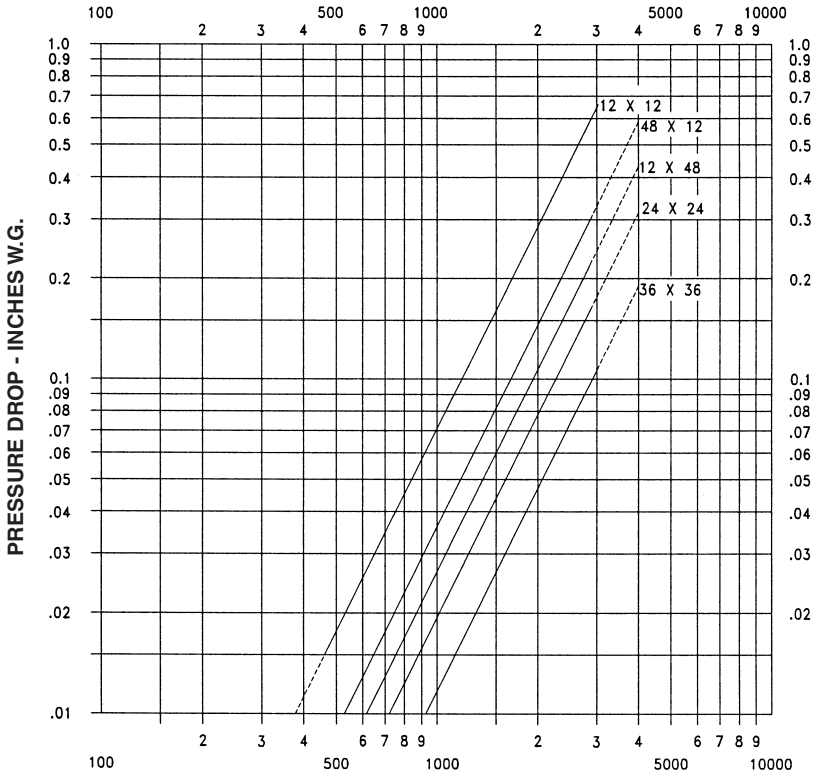
Ruskin Company certifies that the CD50 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA International Certified Ratings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

Pressure/ Class	Leakage, L/s/m² (ft³/min/ft²)			
	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



FACE VELOCITY - FEET/MINUTE
AMCA FIG. 5.3

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.

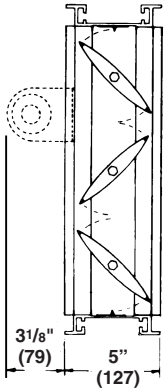
SOUND RATINGS

CD50 SOUND RATINGS

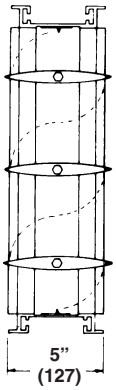
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12 (305 x 305)	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18 (457 x 457)	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125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

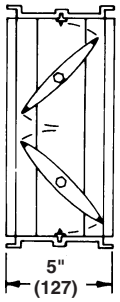
DIMENSIONAL INFORMATION



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.

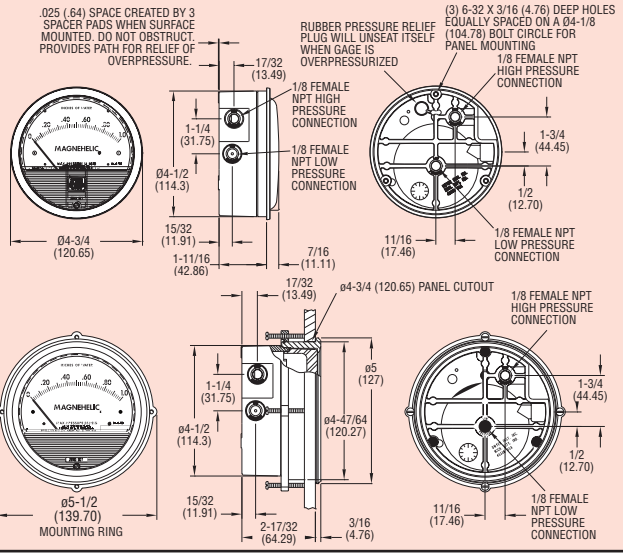
Blade edge seals shall be extruded double edge design with inflatable pocket which enables air pressure from either direction to assist in blade to blade seal off. Blades seals shall be mechanically locked in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade 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.

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%

RoHS



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.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of 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, standhang bracket and terminal tube with holder.

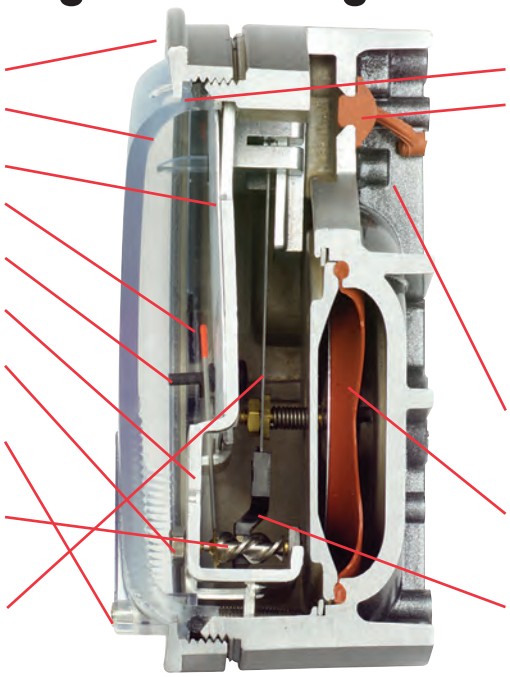
Model A-605 Air Filter Gage Accessory Kit
Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4″ aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings 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

Series 2000

Magnehelic® Gage Models & Ranges



Bezel provides flange for flush mounting in panel.

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

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

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

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

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

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

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

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

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

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

OVERPRESSURE PROTECTION
Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads. The blowout plug is not used on models above 180″ of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm. The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

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

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

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

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10

Model	Range, Pa
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-1000
Zero Center Ranges	
Model	Range, Pa
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, in w.c.	Range, Pa or kPa
2000-00D†••	0-.25	0-62 Pa
2000-0D†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

VELOCITY AND VOLUMETRIC FLOW UNITS
Scales are available on the Magnehelic® that read in velocity units (FPM, m/s) or volumetric flow units (SCFM, m^3/s, m^3/h). Stocked velocity units with dual range scales in inches w.c. and feet per minute are shown above. For other ranges contact the factory.
When ordering volumetric flow scales please specify the maximum flow rate and its corresponding pressure. Example: 0.5 in w.c. = 16,000 CFM.

ACCESSORIES
A-321, Safety Relief Valve
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-135, Rubber gasket for panel mounting

A-310A 3-Way Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A

ADVANCED DIRECT DRIVE PLENUM FANS

ENERGY STAR PARTNER

ISO9001 CERTIFIED

NO APPLICATION IS TO 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.

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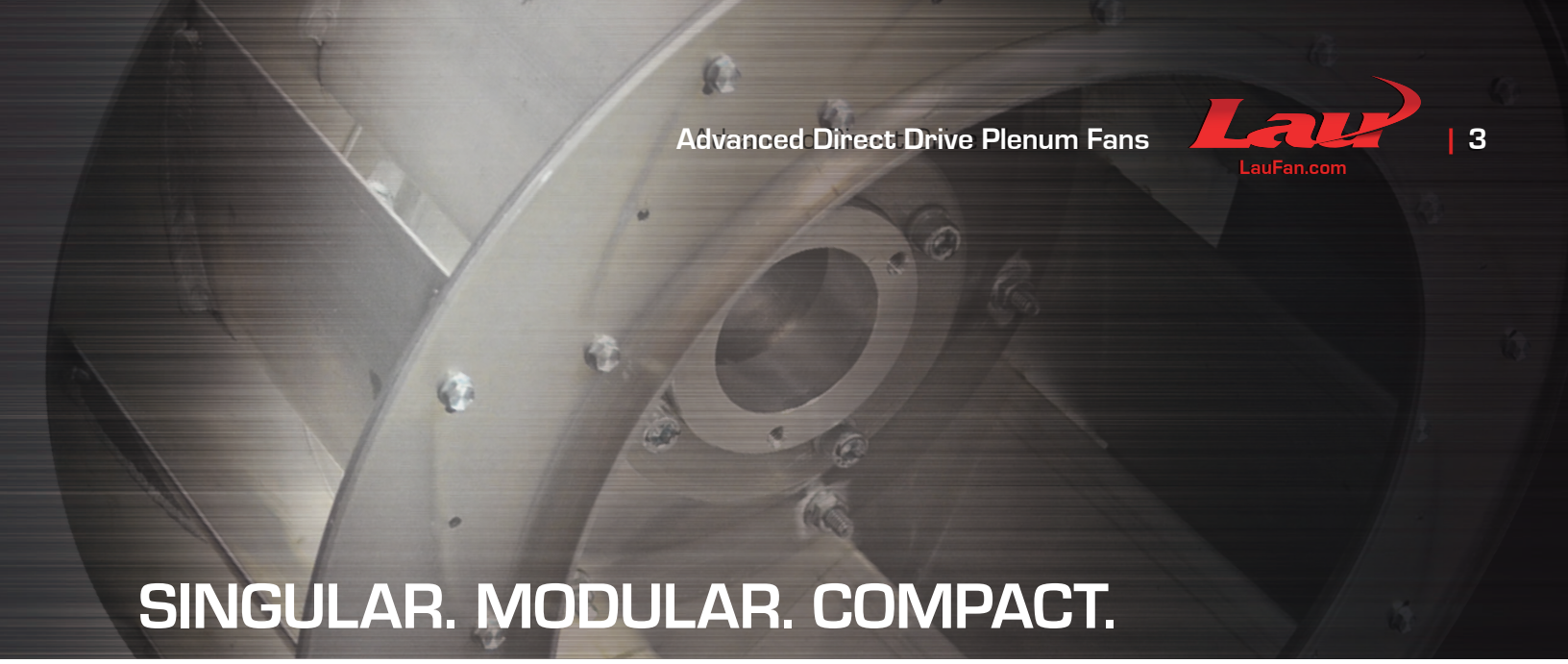
937 476 6500

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.

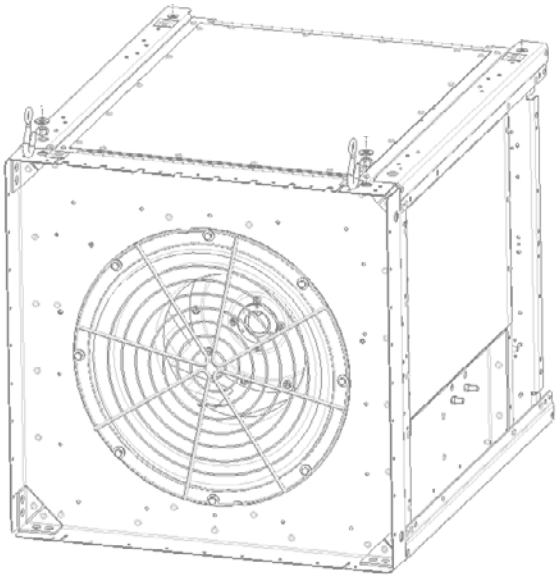
Eliminates all resonance conditions.

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.

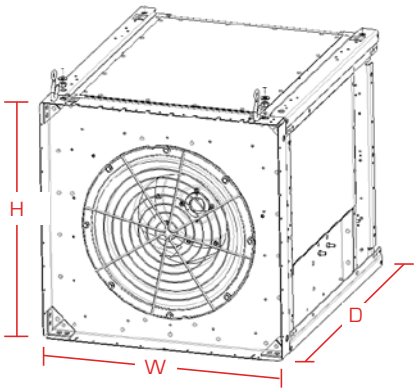
SIMPLE, STACKABLE APPLICATION

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

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

WARRANTY

STANDARD LIMITED WARRANTY
ENGINEERED SYSTEMS EQUIPMENT

SERVICE POLICY Supersedes: 50.05-NM2 (812) Form 50.05-NM2 (1212)

POLICY STATEMENT

Johnson Controls (JCI) warrants all equipment and associated factory supplied materials or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of eighteen (18) months from date of shipment, or twelve (12) months from date of start up, whichever occurs first. Subject to the exclusions listed below, Johnson Controls, at its option, will repair or replace, FOB point of shipment, such products or components as it finds defective.

Except for reciprocating replacement compressors, which Johnson Controls warrants for a period of twelve (12) months from date of shipment, Johnson Controls warrants Johnson Controls reconditioned or replacement materials, or installation or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of (90) days from date of shipment.

The above represents the minimum warranty policy Johnson Controls will extend to customers. Additional product specific coverage is provided as outlined in related warranty policies. No warranty repairs or replacements will be made until payment for all equipment, materials, or components has been received by Johnson Controls.

EXCLUSIONS:

Unless specifically agreed to in the contract documents, this warranty does not include the following costs and expenses:

1. Labor to remove or reinstall any equipment, materials or components.

2. Shipping, handling or transportation charges, including cranes, safety walks or other safety requirements specific to jobsites.

3. Cost of refrigerant.

4. Freight damage.

5. Field applied coatings added to any surface or heat exchanger.

6. Rental Chillers.

ALL WARRANTIES ARE VOID IF:

1. Equipment is used with refrigerants, oil, additives, or antifreeze agents other than those authorized by supplying factory.

2. Equipment is used with any material or any equipment such as evaporators, tubing, other low side equipment or refrigerant controls not approved by supplying factory.

3. Equipment has been damaged by freezing because it was not properly protected during cold weather or damaged by fire or any other conditions not ordinarily encountered.

4. Equipment is not installed, operated, maintained and serviced in accordance with instructions issued by Johnson Controls.

5. Equipment is damaged due to dirt, air, moisture, or other foreign matter entering the refrigerant system.

6. Equipment is not properly stored, protected, or inspected by the customer during the period from date of shipment to date of initial start-up.

7. Field coating of coil has occurred.

8. Equipment is damaged due to acts of god, abuse, including shipping damage, neglect, sabotage, or acts of terrorists.

9. Equipment has modifications carried out that have an effect on the original design of the product without such work being authorized by the factory. Any on site design changes or unit modification/replacement shall be authorized in advance by the factory.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIAL OR EQUIPMENT INVOLVED, NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT, (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS SUPPLIERS AND SUBCONTRACTORS.

Reference: BOS 03-23.105.BEGTM

P.O. Box 423, Milwaukee, WI 53203
www.johnsoncontrols.com

Printed in USA 50.05-NM2 (1212)
Replaces: 50.05-NM2 (812)

STANDARD LIMITED LABOR WARRANTY
SOLUTION XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: SOLUTION XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for eighteen (18) months from the date of shipment from Seller's facility or twelve (12) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

Notification of defect and any warranty claim must be made in writing, postage paid, with a brief written description of the problem to Buyer's local Johnson Controls' sales/service office. Nothing herein us intended to provide warranty coverage to lessees or anyone other than Buyer and no third-parties are intended to be beneficiaries of this warranty.

BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

(Product Code Ref: 8513

5 YEAR PARTS & LABOR LIMITED WARRANTY YORK®
SOLUTION™ XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: YORK® SOLUTION™ XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for sixty-six (66) months from the date of shipment from Seller's facility or sixty (60) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

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APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

RECEIVING/RIGGING

RECEIVING / RIGGING INSTRUCTIONS

The installing contractor is responsible to provide Johnson Controls / YORK with a contact to coordinate the delivery of the equipment in this submittal. Please fill out the information requested in the Submittal Approval Form section in the back of this submittal.

It is the installing contractor's responsibility to verify the following prior to signing the bill of lading presented by the transportation company:

- Ensure everything on the bill of lading was delivered.
- Visually perform a thorough inspection of all equipment for any signs of shipping damage

Any short-shipments or shipping damage must be noted on the bill of lading prior to signing.

The transportation company will provide you withinstructions for filing a claim. It is the installing contractor's responsibility to work directly with the transportation company to resolve any shipping claims.

1.0 PRE-INSTALLATION

RECEIVING

All units leaving the plant have been inspected to ensure the shipment of quality products. All reasonable means are utilized to properly package the air handling units.

CAUTION

Johnson Controls will NOT be responsible for any damage or loss of parts in shipments or at the job site. Receiver is solely responsible for noting Bill of Lading and filing freight claims IMMEDIATLY. Refer to Shipping Damage Claims Form 50.15-NM available from Johnson Controls Sales representative.

RIGGING OF INDOOR AND OUTDOOR UNITS

WARNING

All lifting points must be used to avoid personal injury or death and to avoid damage to the equipment.

NOTE

SHIPPED LOOSE DAMPERS. When large units are ordered with MZ segments in rear discharge location (on the end of the unit), the units will ship with the top section (hot deck) separated. In these cases, the complete multizone damper assembly (hot deck and cold deck together) will ship loose.

FIG. 1-1 – RECOMMENDED LIFTING WITH FOUR LIFTING POINTS

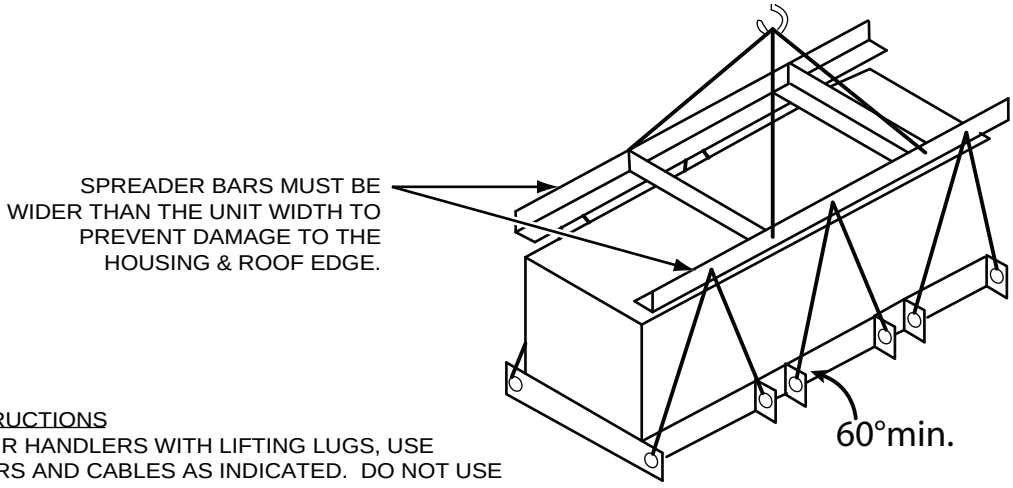


FIG. 1-2 – RECOMMENDED LIFTING WITH MULTIPLE POINTS

OFF-LOADING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the air and watertight seams in the unit casing. Prevent unnecessary jarring or rough handling.

For lifting air handling units with lifting lugs or corner connectors; proper spreader bars and hoisting line must be used when rigging to prevent damage to the unit casing *(see Fig. 1-1)*. When lifting long units a special system must be used to insure a minimum 60° angle between lifting lug and spreader bar/frame *(see Fig. 1-2 & Table 1-1)*. It is also mandatory that an experienced and reliable rigger be selected to handle unloading and final placement of the equipment. The rigger must be advised that the unit contains internal components and that it be handled in an upright position. Care must be exercised to avoid twisting the equipment structure.

NOTE

Refer to the submittal for the section weights.

TABLE 1-1 - SPACING REQUIREMENTS FOR OFFLOADING LONG UNITS		
UNIT HT.	MAX. LIFTING LUG SPACING	MIN. LIFTING STRAP LENGTH
≤ 72"	120"	120"
> 72"	192"	192"

NOTE

All lifting lugs must be used to avoid damage to unit. If unit does not have lifting lugs, use bottom corner connectors and intermediate raceway lifting lugs. Do not use top corner connectors.

Unit section weights are furnished on the job submittal. Due to the variance in weight of each unit design, it is not possible to list unit weights in this instruction. The submittal must be referred to when selecting a crane for rigging and figuring roof weight loads. Contact your Johnson Controls Sales representative if you have any questions regarding unit weights.

CRANE AND SPREADER BARS

See Fig's 1-1 and 1-2.

FORK LIFT

Forklifts should not be used to off-load air handlers except in special circumstances. If moving air handling equipment with a fork lift or similar means becomes necessary, always make sure the lifting forks are long enough to reach from the fork truck to the opposite side and slightly beyond. It is helpful to leave the shipping blocks attached to the bottom of the equipment until in its final location. There is no structural support under the equipment except what is visible from the perimeter.

COME-A-LONGS OR POWER PULL

See Fig1-3.

LD09613

FIG. 1-3 – TYPICAL COME-A-LONG TYPES

SHACKLES

Refer to Fig. 1-4 for proper lifting with hook and shackle at corners. Refer to Fig. 1-5 for proper lifting with hook and shackle at lifting lugs.

NOTE

Fig's 1-4 and 1-5 show YORK Solution unit without baserails. When baserails are present, always use all lifting lugs pre-mounted on baserails. Do not lift by corners.

LD13767

FIG. 1-4 – PROPER LIFTING WITH SHACKLE AT CORNER

LD13768

FIG. 1-5 – PROPER LIFTING WITH SHACKLE AT LIFTING LUG

LD13766

FIG. 1-6 – RECOMMENDED LIFTING WITH BASERAIL

INSPECTION

CHECK FOR DAMAGE

RECEIVER RESPONSIBILITY

Receiver is solely responsible for noting freight bill and filling freight claims IMMEDIATLY *(see "Receiving" in this section).*

Visible damage should be noted on the signed and dated bill of lading with a request that the carrier inspect the damage within 72 HRS. of notification. The shipping wrapper must be removed and replaced with a tarp or similar protective covering. Any concealed damaged reported after 15 days will compromise a claim settlement. Inspection requests may be done by telephone or in person, but should be confirmed in writing. If assistance is needed with the claim process, contact your Johnson Controls Sales representative.

INDOOR UNITS

It is Johnson Controls intention that a shipping wrapper be applied to unpainted indoor units for protection from weather, road dirt, etc. during inland transit and that the wrapper be removed at the time of delivery to allow for a thorough inspection, both inside and out.

OUTDOOR UNITS

Outdoor units are not fully wrapped. Exposed openings are covered for protection from weather, road dirt, etc. during inland transit. A thorough inspection, both inside and out, should be done at the time of delivery.

CHECKING FOR NON MOUNTED PARTS

- Check the packing list for non-mounted ship loose parts. (Check inside all segments.)
- Packing list will note how many and type of parts.
- Shortages must be reported within 10 days after receipt of order.

See Ship Loose Parts, Fig 2-8 thru 2-14

STORAGE

SHORT-TERM STORAGE

Indoor Units:

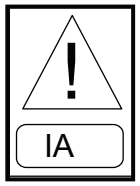
Under no circumstances should outdoor storage be used

Outdoor Units:

Be sure all shipping covers are reapplied after inspection, or tarps are used during storage.

Short-term storage is considered six (6) months or less from date of shipment. Storage maintenance during this time is usually limited to the following.

- Rotate fans every four (4) weeks beginning upon arrival to prevent moisture from damaging bearing.
- If the units are to be stored out-of-doors, prior to installation, special care must be taken to cover and protect the units from dust, rain, snow and rodents. The units must be protected from constant exposure to rain and snow.
- Store on a firm, flat surface to prevent distortion. Block the unit off the ground to protect components from water.



Protect all parts and porous materials from rain and other sources of moisture. Decontaminate or replace as needed to ensure microbial growth is not introduced to the air handler.

- The unit must also be protected from damage to the exterior of the cabinet or coil connections by construction vehicles and personnel.

Equipment ReSubmittal
For Approval Rev 2

Project:

VEGA AMERICAS

York Solution XTI Indoor Air Handling Unit (AHU-3)

SUBMITTED TO:
FELDKAMP ENTERPRISES

ATTENTION: HEATHER WYATT

DATE:
April 1, 2021

SUBMITTED BY:

CHARLES E. LEWIS
SYSTEMS APPLICATION ENGINEER
Johnson Controls
Equipment Sales – Cincinnati, OH

TABLE OF CONTENTS

Submittal Comments

- **Coordinate Increased Weight With Structural**
  JCI Will Coordinate

- **Verify Filter Access From Front Is Available**
  Verified Filter Access Will Be From The Front.

- **Verify Single Point Power Connection, Required For Unit.**
  AHU Can Not Be Single Point Power. JCI Is Not Providing Motor Control For Either The Supply Fan Or Return Fan. Please Coordinate With Electrical Contractor.

- **Unit Shall Have 65K SCCR For Supply Fans**
  The Supply Fan Will Be Supplied With 65kA SCCR MMP.

- **Heating Coil: Max APD is 0.1". Revise Selection Accordingly And Max Velocity is 300 FPM**
  JCI has ReSelected Coil

- **Cooling Coil: Provide Minimum 402.5 Total MBH And 252.5 Sensible MBH Per Schedule**
  JCI Has ReSelected Coil To Meet Capacity Requirements On Schedule

- **Coordinate Transitions From Unit Opening To Relief Air Duct**
  JCI Will Coordinate With Install Contractor

- **Verify Updated Unit Dimensions Do Not Conflict With Anything In Model**
  JCI Will Coordinate With Install Contractor

- **Coordinate Both Relief Air and Return Air Connections**
  JCI Will Coordinate With Install Contractor

Submittal Notes

- JCI has officially announced a 2.5% price increase for the AHUs provided in this submittal. In order to avoid the price increase JCI will need to receive approved submittals and a release of the AHUs by 4-23-21 in order to process and meet the required factory release date of 4-30-21. If JCI receives this AHU submittal approved after 4-23-21, JCI will required a 2.5% price increase to meet costs driven by macro-economic factors.
- All air intake and relief dampers are provided with Tampco 9000 SC as specified.
- AHU-1 and AHU-2 are provided with 65kA SCCR supply fan circuit ratings.
- Lead Time is approximately 13 weeks from time of approved submittal.
- Before release, Feldkamp is to verify that all split sections are as required for AHUs to be maneuvered on site.
- Field installed VFD's will be furnished and installed by FEI per spec section 237300, 2.10 A.
- All controls to be field mounted on the AHU by JCI controls division.
- Outside airflow measuring station provided and field installed by JCI controls division.
- AHU is provided with base rail height per detail drawing M200. Feldkamp to provide any changes before release on returned submittal.
- Field leakage testing is not included or available per ASHRAE 111 standards. Any field leakage testing is to be provided by Feldkamp. AHU will conform to ASHRAE Standard 111 Class 6 low-leak casing design.
- AHUs will include a 5 year parts and labor warranty from time of substantial completion of startup.
- Due to the short filter section scaled on detail drawing M200, some filters will be provided as front loading with no side access door. The front access provides better access to all of the filters due to the deep width of these units. Providing side access will increase the overall length to the AHUs that are currently exceeding the maximum length specified.
- All AHUs and their current sizes with connected ductwork have been plotted using Feldkamp's shop drawings. Currently there does not seem to be anything that could cause an issue due to some of the AHU units being longer or wider.
- All fan segments are sized for fan/motor removal.
- Three sets of filters will be provided for each AHU.
- **Feldkamp to verify unit handing configuration before release**
- **Feldkamp to verify overall unit dimensions for space before release.**

- **Feldkamp to verify required shipping splits before release. Every additional shipping split will increase the length by 3”**
- **Feldkamp to verify all duct connections before release.**
- Disconnects are furnished on all supply fans via MMP panel.

PERFORMANCE

YORK® Solution™ Air Handling Unit Performance Report

Job Summary

Project Name:	VEGA Americas - Bid Day		
Unit Tag(s):	AHU-3		
Quantity:	1	**Environment:**	Indoor

Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
XTI-54x75	6,000	1,004	4,231

Segment Sequence

(FS)(CC-2)(CC-1)(RF MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Bulkhead Material
MB , RF , CC-1 , CC-2 , FS	2	None	STD Ga. G-90 Galvanized	STD Ga. G-90 Galvanized	2" Foam	Galvanized

Base Details

Segment(s)	Base		Floor				
	Material	Paint	Gauge and Material	Paint	Insulation	Attachment	Tread Plate
MB , RF , CC-1 , CC-2 , FS	Standard Formed Steel	None	STD Ga. G-90 Galvanized	None	N/A	-	None

Unit Electrical

Circuit Details

Circuit #	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	Manual Motor Protection	460/3/60	12.0	13.5	17.5
2	Lights and Outlets	120/1/60	-	-	15.0

Electrical Details

Minimum Unit SCCR	5 kA rms Symmetrical	**ETL Label (UL1995/NEC-2002)**	Yes
Unit Light Type		**Unit Light Switch**	
Vaporproof LED		External	

Supply Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	DDPG2	II	150-9	100	100	2	6,000	1,004	4.77	2.00	2,829	3.35

Drive Type	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Isolation Type	Total Eficiency (%)	Outlet Velocity (ft/s)	Max Speed (RPM)
Direct Drive	SWSI	Airfoil	Aluminum	Galvanized Steel	None	Yes (K=1181.00)	1" Spring	67.14	444	3,650

Motor Details

Type	Manufacturer	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	Motor Speed (RPM)	Frame Size	Full Load Amps (Amps)	Efficiency	Location
ODP	Baldor	5.0	460/3/60	2	H	3,600	182	6.00	Premium	Direct Drive

At Motor Synchronous Details

TSP (in w.g.)	Total Air Flow (CMF)	Fan Speed (RPM)	Motor Correction Factor(%)	Fan Power (BHP)	Total Eficiency (%)
4.77	3,000	2,829	86.5	3.35	67.14

Water Coil(s)

Performance[1] Details

Coil	Fluid Type	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
							DB	WB	DB	WB									
CC-1	Water	2	8	4	425	425	20.0	-	81.7	-	6,000	308	0.09	42.3	150.0	129.5	3.2	6.9	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size (in)	
CC-1	0	Right	0	Steel	0	MPT	1	1-1/2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-1	1	Full	45.25	62	19.5	AL	.008	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-1	-	155	46	.8	Copper	Galvanized	304 Stainless Steel	-

Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-1[1][0]: This coil is 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.

Glycol Coil(s)

Performance[1] Details

Coil	Glycol Type	Glycol %	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
								DB	WB	DB	WB									
CC-2	Propylene	30%	12	14	12	402	252	92.0	74.0	52.7	52.7	6,000	308	1.09	62.0	45.0	58.6	2.4	8.9	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size	
CC-2	0	Right	0	Steel	0	MPT	1	2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-2	1	Full	45.25	62	19.5	AL	.010	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-2	-	1016	260	4.0	Copper	Galvanized	304 Stainless Steel	-

Coil Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-2[1][0]: This coil is 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.

Drain(s)

Details

Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
CC-1	Galvanized	Right	None
CC-2	Stainless Steel	Right	None

Filter(s)

Details

Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material
RF	Pre-Filter	2"	Side	Pleated 30% (MERV 8)	2	Pleated 30% (MERV 8)	Aluminum
RF	Primary Filter	4" Mini-Pleat	Side	80-85% Eff, (MERV 13)	2	80-85% Eff, (MERV 13)	Aluminum

Sizes						Filter Gauge Details		
Segment	Filter	1st Filter Size H x W (in)	1st Qty	2nd Filter Size H x W (in)	2nd Qty	Location	Type	Range (in w.g)
RF	Pre-Filter	24x20	3	20x20	3	Door	Magnehelic	0 - 2
RF	Primary Filter	24x20	3	20x20	3	Door	Magnehelic	0 - 2

Damper(s)

Details														
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area	CFM	Minimum Allowable OA CFM	Damper Type	Damper Config	Model	Material	Blade Orientation	Actuator Type	Fail Position
MB	Outside Air	9.50 x 56.00		1,624		6,000		Insulated	100%	CDTI50	Aluminum	Parallel	-	-
MB	Return Air	21.00 x 26.00		1,582		6,000	-	Control	100%	CD50	Aluminum	Parallel	-	-

Door(s)

Details										
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	Test Port	Spare Gasket	Thermal Break	Safety Latch	Noncontact Safety Interlock
MB, CC-1	Right	Outward	Upstream Side	48 x 18 x 2	STD Double Pane	Yes	-	-	-	-
RF	Right	Outward	Upstream Side	48 x 10 x 2	None	-	-	-	-	-
CC-2	Right	Outward	Downstream Side	48 x 18 x 2	STD Double Pane	Yes	-	-	-	-
FS	Left	Outward	Upstream Side	48 x 18 x 2	STD Double Pane	Yes	-	-	Yes	-
FS	Right	Outward	Upstream Side	48 x 18 x 2	STD Double Pane	Yes	-	-	Yes	-

Motor Control(s)

Details										
Segment	Type	MMP	V/Ph/Hz	Input/Output Amps*	Efficiency	Heat Loss (at 100% load)	Enclosure	Bypass	Disconnect Type	RFI/EMI EMC Filter
FS	Manual Motor Protection	Yes	460/3/60	9.6/9.6	87 %	160	NEMA 3R	-	None	No

Notes
*Drives are rated for use below 3,000 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.42-EGI (212) for use above these limits.
Storage Temperature: -40°F to 158°F
Humidity: MAX 95% RH non-condensing
Altitude: 3,300 ft. without derate (1% derate for each additional 330 ft.)
Overload Current Rating: 100% for 1 minute every 10 minutes.
The Class 10 trip rating of the MMP device will not withstand an across-the-line start of a fan and should not be used with VFDs with bypass circuits.
The customer must provide a platform or catwalk for accessing the power-disconnect.
Copper Conductors Only.

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (sq. ft)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	Opening	0.0	6,000	0.00	0.00	0.00
MB	Insulated Aluminum (CDTI50)	0.0	6,000	0.00	0.25	0.00
MB	Special Quote: SQ21-004907-001	0.0		0.00	0.48	0.00
RF	2" Pleated 30% (MERV 8)	18.3	6,000	327.00	0.15	0.00
RF	Dirty Filter Allowance - Prefilter	0.0	6,000	0.00	0.20	0.00
RF	4" Mini-Pleat 80-85% Eff, (MERV 13)	18.3	6,000	327.00	0.31	0.00
RF	Dirty Filter Allowance	0.0	6,000	0.00	0.20	0.00
CC-1	Heating 2 rows 8 fins	19.5	6,000	308.00	0.09	0.00
CC-2	Cooling 12 rows 14 fins	19.5	6,000	308.00	1.09	0.00
FS	Opening	6.8	6,000	888.00	0.08	0.00
FS	External Static - User Entered	0.0	6,000	0.00	2.00	0.00
				Total	**4.85**	**0.00**

Dimensions and Weight

Details					
Segment	Description	Length[1] (in)	Width[2] (in)	Height (in)	Weight (lbs)
MB	Mixing Box	24	75	54	413
RF	High Efficiency Filter	13	75	54	239
CC-1	Variable Length Cooling Coil	33	75	54	749
CC-2	Variable Length Cooling Coil	43	75	54	1,707
FS	Supply Fan - SWSI	47	75	54	1,123
Overall[3]		**160**			**4,231**

Notes

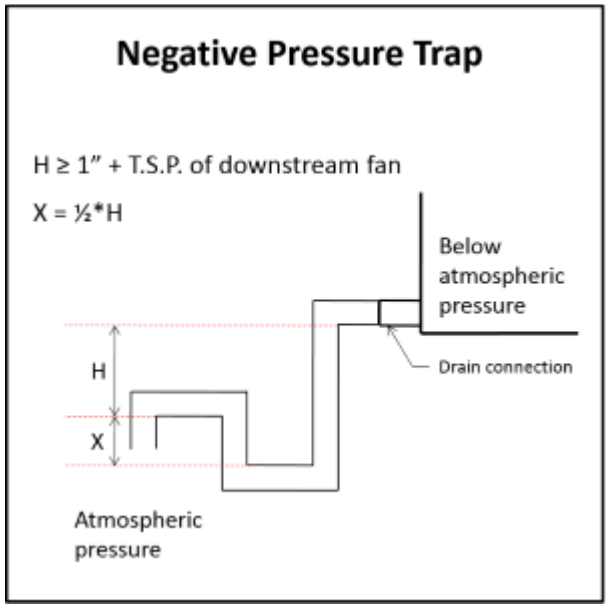
[1]The length includes bottom tier segments only

[2]The 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.

[3]Unit level and other loose components may be excluded from segment weights and overall segment weights. For total unit weight reference Unit Overview.

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-1	Supply Fan	4.77	Negative	5.77	2.89	8.66	6.00	9.00	3"
CC-2	Supply Fan	4.77	Negative	5.77	2.89	8.66	6.00	9.00	3"



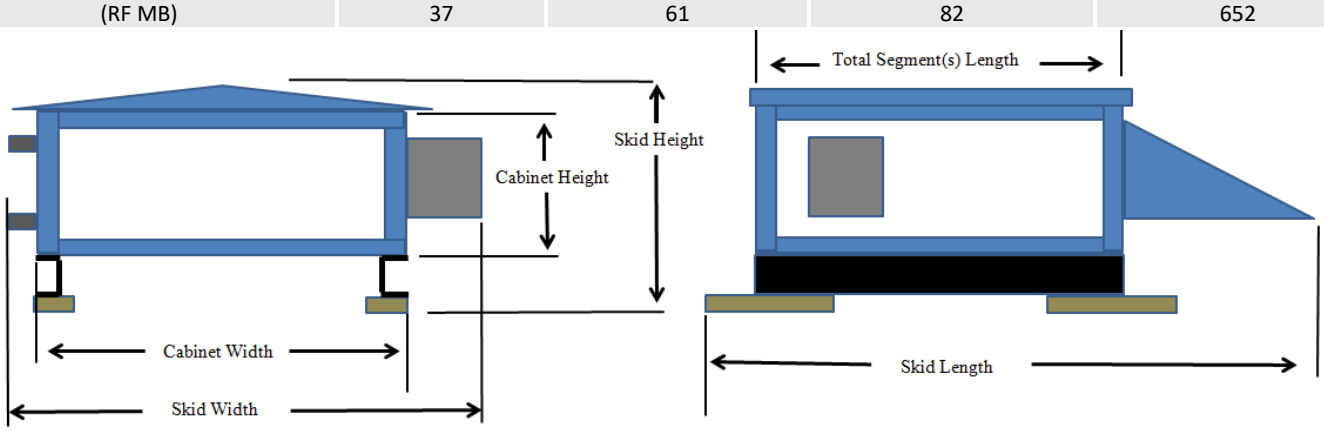
Notes
Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.
Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details
YORK® Solution XT AHU's meet IBC seismic requirements for non-critical equipment (Ip = 1.0) for locations with design spectral response Sds <= 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 SubmittalDrawing 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)**	**Skid Weight (lbs)**
(FS)	47	61	82	1,123
(CC-2)	43	61	84	1,707
(CC-1)	33	61	83	749
(RF MB)	37	61	82	652



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).

Special Quote(s)

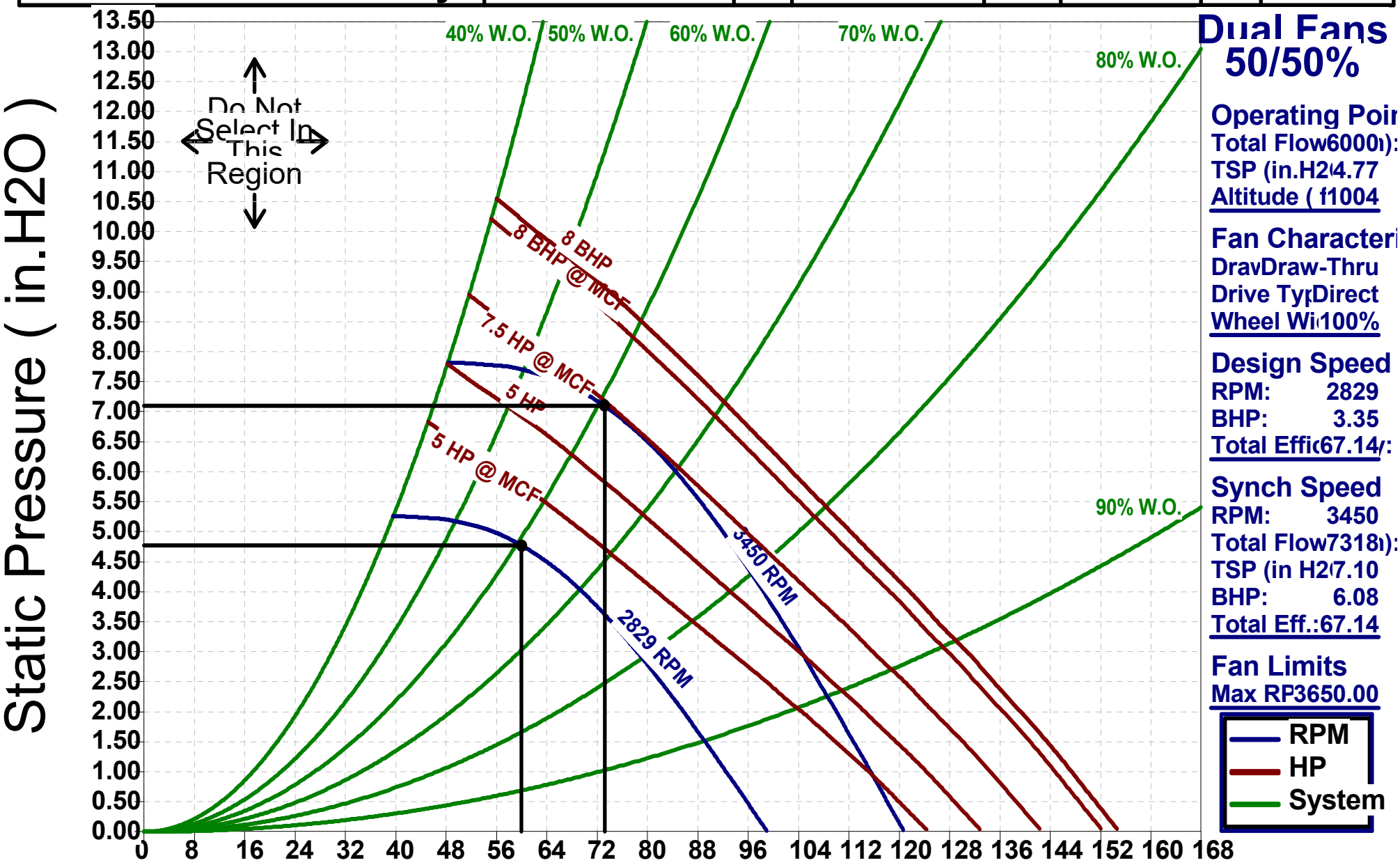
Details		
Segment	**SQ Number**	**Resolution**
MB	SQ21-004907-001	***LONG LEAD TIME ITEM*** Tamco dampers have a 5 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install 55"Wx9.5"H Tamco 9000 damper in lieu of YW selected. Locate damper 10" from front end and centered in unit width. Damper includes: Extruded Aluminum Frame Extruded Aluminum Blades Extruded EPDM Blade seals (SC option) Extruded silicon frame seals (SC option) Celcon bearings Leakage Class 1A at 1â W.G. static pressure differential Jackshafts
FS	SQ21-004907-002	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
Unit	SQ21-004907-003	***Information ONLY*** See attached CAD drawing.

FAN CURVE

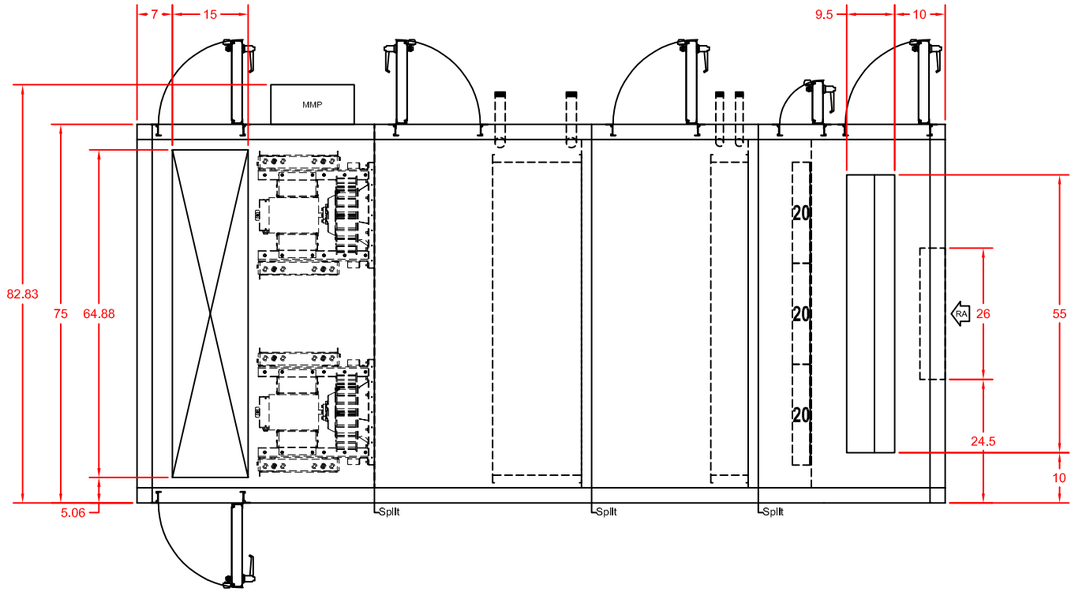
Johnson Controls

Solution XT Fan Rating Curve

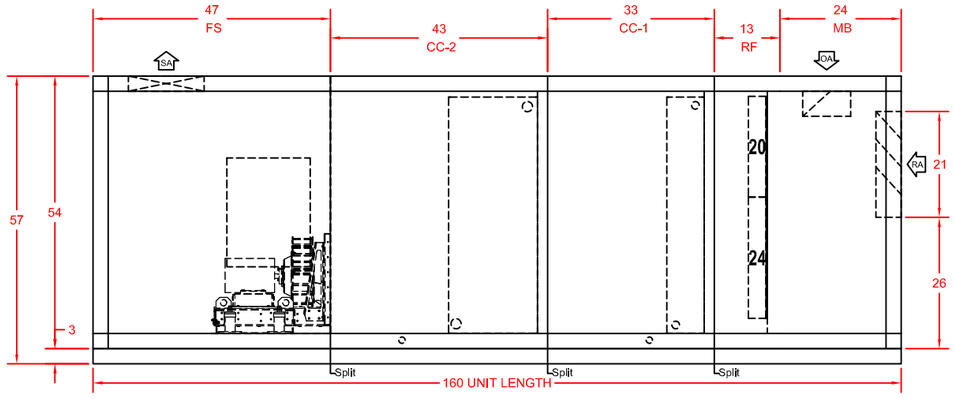
Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-3	1	XTI-54x75	FSP	L-DDPG	II	150-9-10



UNIT AND WIRING DRAWINGS



PLAN VIEW



* NOTE: MAX HEIGHT

ELEVATION VIEW

UNIT CONSTRUCTION

Model: Solution-XTI-54x75 **Construction:** Indoor
Motor Location:
Unit Weight: 4,231 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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

(S) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	2"	2"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 150 - DDPG2

DWG #	S21-2398
Version:	3
Ver. Date:	3/29/21
SQ:	21-004907
DRN BY:	KR
CKD BY:	1
SHEET:	1

PRODUCT DRAWING

SOLUTION XT AIR HANDLING UNIT DETAIL
MODEL: Solution-XTI-54x75
NOT FOR CONSTRUCTION

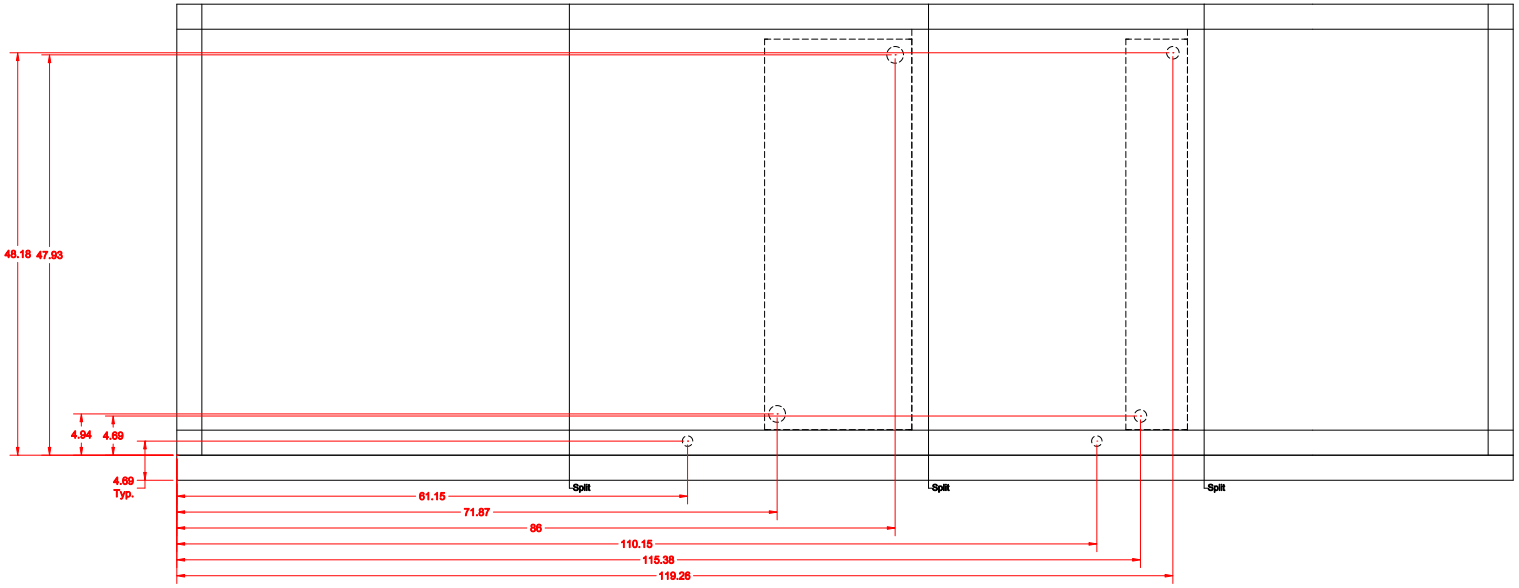
Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-3 - Sheet 1

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

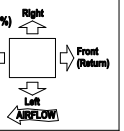
Johnson Controls



Coil Connections

UNIT CONSTRUCTION

Model: Solution-XTI-54x75 Construction: Indoor
Motor Location:
Unit Weight: 4,231 lbs. (+/- 10%)



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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

(●) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	2"	2"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 150 - DDPG2

PRODUCT DRAWING
SOLUTION XT COIL CONNECTION DETAIL
MODEL: Solution-XTI-54x75
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

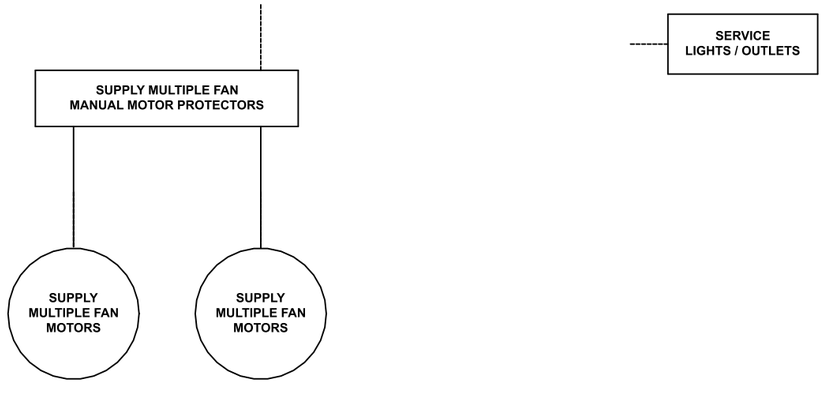
Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-3 - Sheet 2

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194



PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-3 - Sheet 1	Date: 3/30/2021 8:12:13 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:	Johnson Controls

SCHEMATIC LEGEND SYMBOLS

TERMINAL IN PANEL

FUSE BLOCK

1 POLE
CIRCUIT BREAKER

2 POLE
CIRCUIT BREAKER

3 POLE
CIRCUIT BREAKER

R — CONTROL RELAY COIL

TDR — CONTROL TIMER COIL

24 HR — 24 HOUR PIN TIMER

HM — MOTOR HOUR METER

CC — MOTOR CYCLE COUNTER

FLOAT SWITCH CLOSES
ON RISING LEVEL

FLOAT SWITCH OPENS
ON RISING LEVEL

PRESSURE SWITCH CLOSES
ON RISING PRESSURE

PRESSURE SWITCH OPENS
ON RISING PRESSURE

TEMPERATURE SWITCH OPENS
ON RISING TEMPERATURE

TEMPERATURE SWITCH CLOSES
ON RISING TEMPERATURE

FLOW SWITCH CLOSES
ON INCREASING FLOW

NORMALLY OPEN RELAY CONTACT

NORMALLY CLOSED RELAY CONTACT

NORMALLY OPEN TIMER CONTACT

NORMALLY CLOSED TIMER CONTACT

FIELD WIRING

NORMALLY OPEN PUSHBUTTON
MOMENTARY

NORMALLY CLOSED PUSHBUTTON
MOMENTARY

NORMALLY CLOSED EMERGENCY
STOP PUSHBUTTON

THREE POSITION H.O.A.
SELECTOR SWITCH
(ILLUMINATED ON NON-ILLUMINATED)

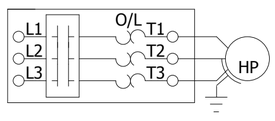
SELECTOR SWITCH
(ADDITIONAL CONTACTS MAY BE ADDED)

DISTRIBUTION BLOCK

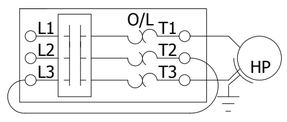
SOLENOID VALVE

WIRE CONTINUATION

DISCONNECT



3 %%C MOTOR STARTER
WITH OVERLOAD



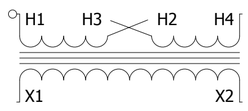
1 %%C MOTOR STARTER
WITH OVERLOAD

M — MOTOR STARTER/CONTACTOR
COIL

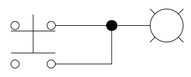
CONTACTOR

GROUND

DUPLEX RECEPTACLE



TRANSFORMER



PUSH-TO-TEST
PILOT LIGHT

PILOT LIGHT

CONTROL PANEL WIRE COLOR CODING

BLACK	ALL UNGROUNDED CONTROL CIRCUIT CONDUCTORS OPERATING AT THE SUPPLY VOLTAGE
RED	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE
BLUE	UNGROUNDED DC CONTROL CIRCUITS
YELLOW	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE (CLASS 2)
WHITE OR NATURAL GRAY	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH BLUE STRIPE	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH YELLOW STRIPE	GROUNDED AC CONTROL CIRCUIT CURRENT-CARRYING CONDUCTOR THAT REMAINS ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION
LIGHT BLUE	INTRINSICALLY SAFE WIRING CONTROL CIRCUIT CONDUCTOR

Previous page:

Next page: 1

Johnson Controls

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Legend

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Engineer: Electrical Engineer

Checked By:

DRC Ref Number: JOHNCO-004743

Date: 2021.02.23

Designed by: orders

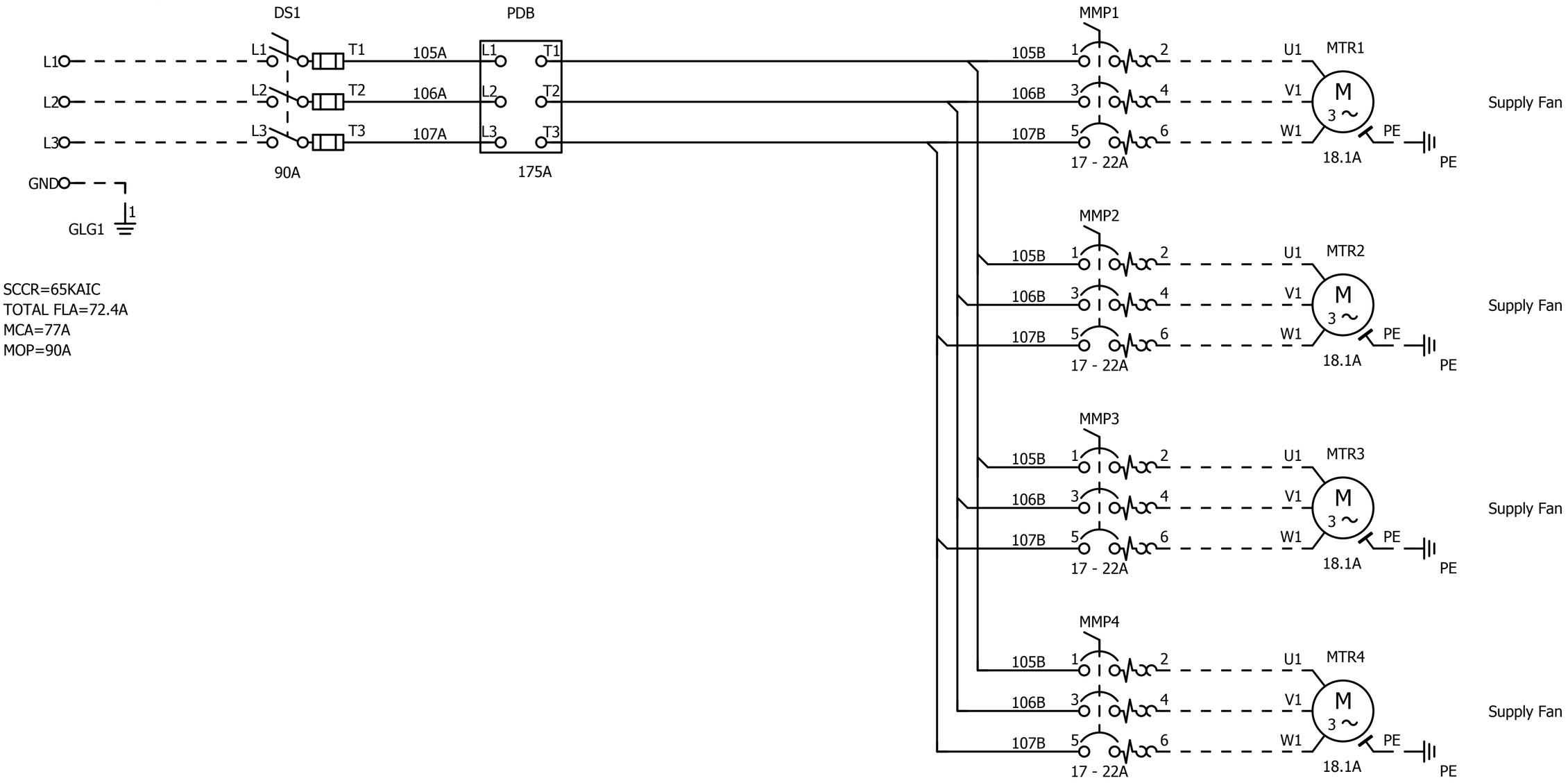
Revision B

Job Name: VEGA Americas - Bid Day

Sheet: 0

Page: 0

480Y/277V, 3 Phase, 60Hz



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TOTAL FLA=72.4A
MCA=77A
MOP=90A

Previous page: 0

Next page: 100

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Electrical Schematics

Project Description: AHU-1

Order No.: SQ21-000373

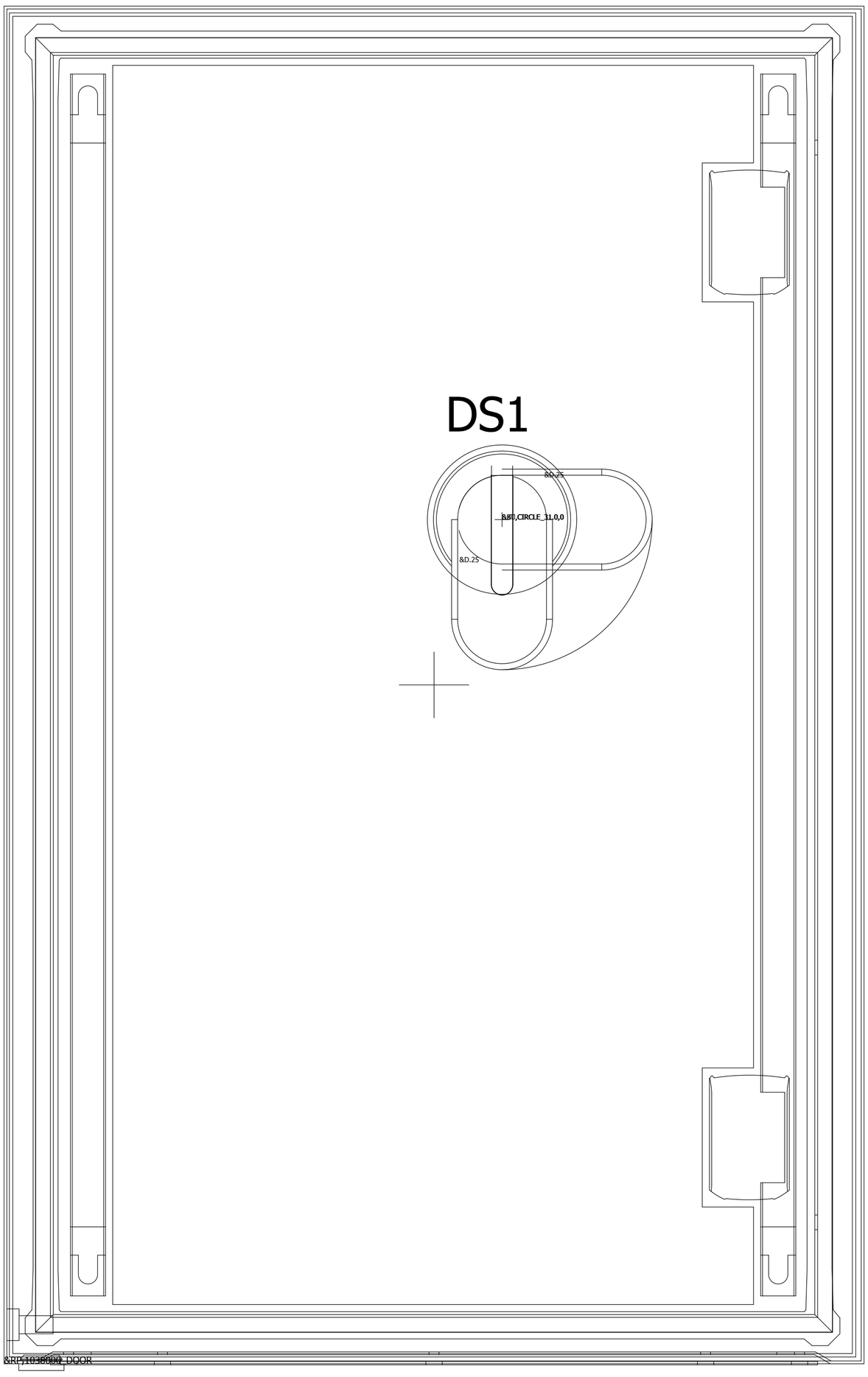
Total Sheets: 4

Job Name: VEGA Americas - Bid Day

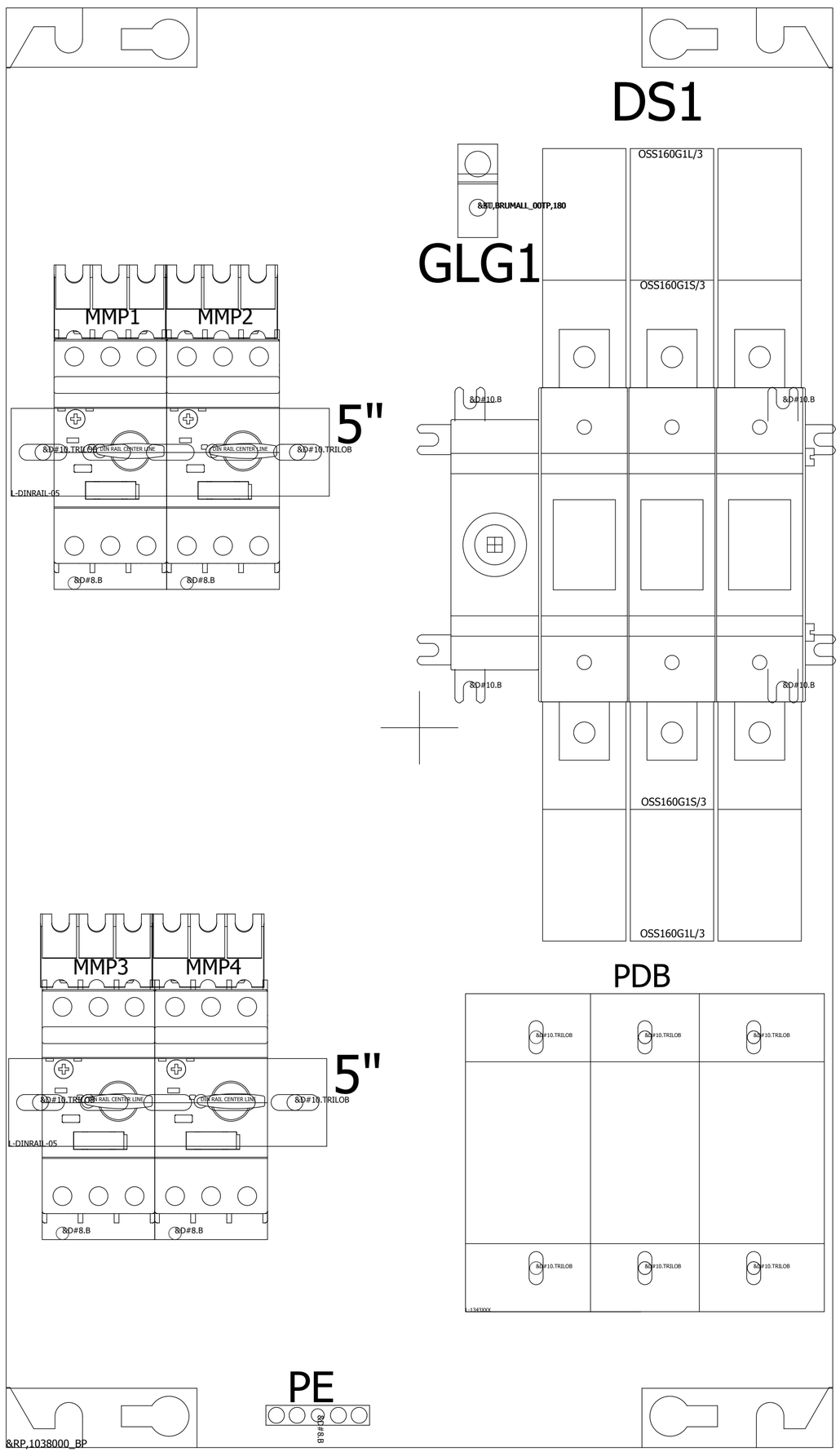
Sheet: 1

Page: 1

DOOR



24"H X 15"W X 8"D Type 1



Previous page: 1 Next page: 101

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Panel Layout | Project Description: AHU-1 | Order No.: SQ21-000373 | Total Sheets: 4

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

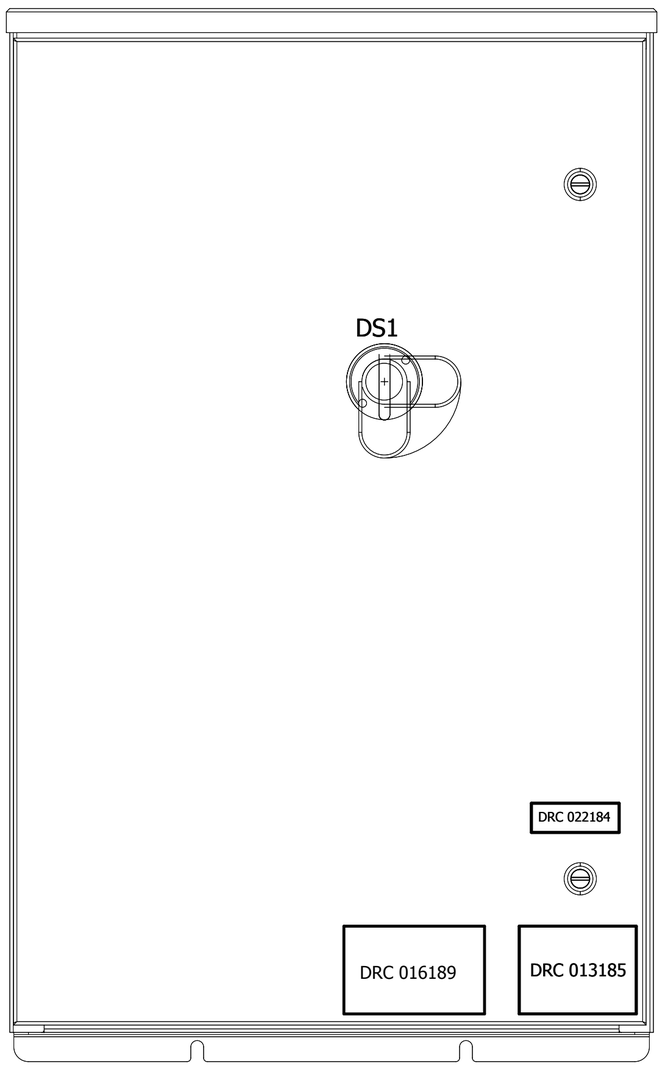
Revision B

Job Name: VEGA Americas - Bid Day

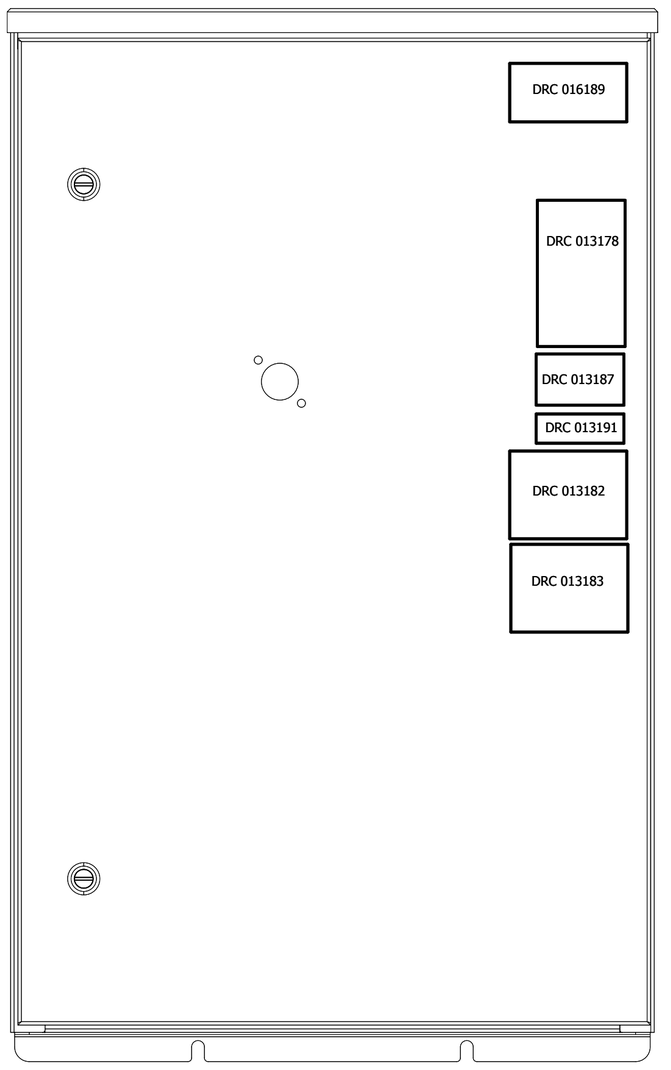
Sheet: 100 Page: 100

GENERIC LABELS LAYOUT

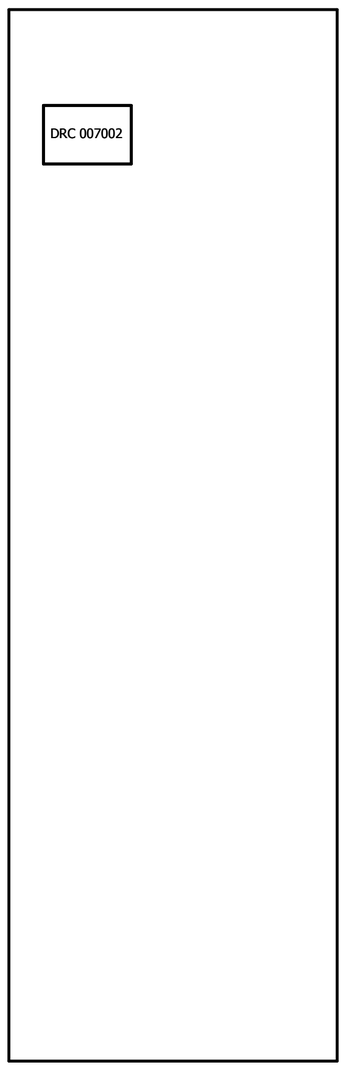
Outside Door



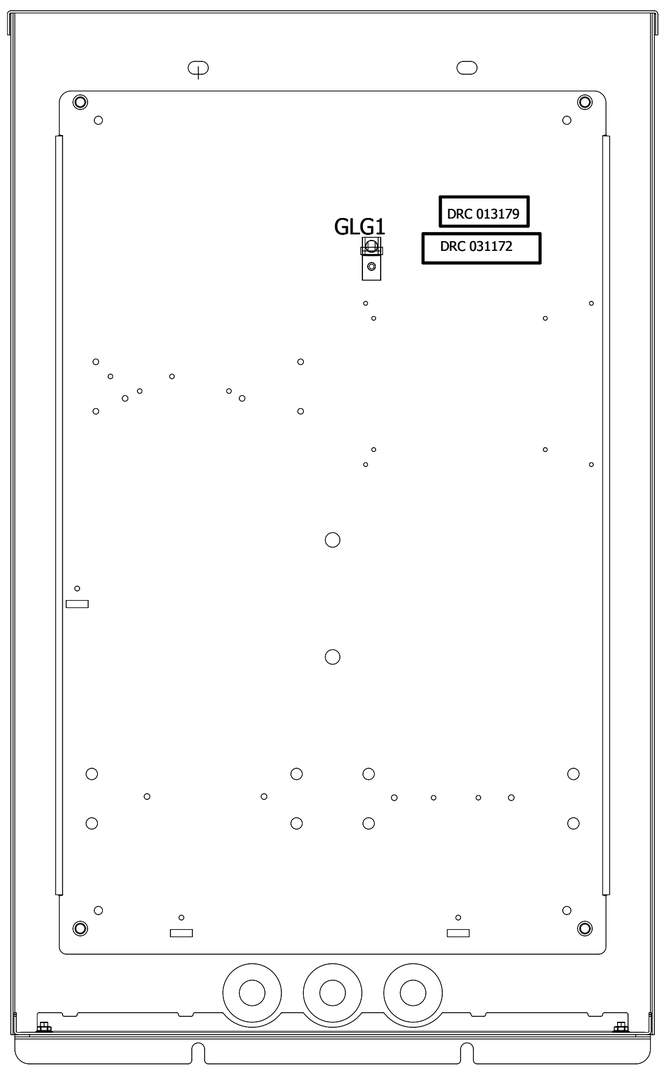
Inside Door



INSIDE LEFT SIDE



BACK PANEL



CONTROL BOX DIMENSION (INCHES) AND WEIGHT (POUNDS):

Wall Mount: 24"Hx15"Wx8.3"D, Estimated Weight: 100 Pounds

Previous page: 100

Next page:

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Label Layout

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Job Name: VEGA Americas - Bid Day

Sheet: 101

GENERAL PRODUCT DETAILS

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite™

Self-Supporting Extended Surface Pleated Filter

High performance MERV 8 mechanical air filter media is self-supporting and requires no metal support grid downstream. No metal components means the filter is completely incinerable after use.

Exclusive vForm™ Pleating Technology maintains uniform pleat spacing in every filter. In addition, vForm™ Pleating Technology insures the same pleat configuration used for decades in our original Multi-Pleat products. Same aerodynamic v-shaped pleat design, same superior performance.

Sturdy, moisture-resistant, beverage board perimeter frame and cross-braces provide structural integrity even in difficult operating conditions.

The media used in the Multi-Pleat Elite is extraordinarily resilient and is engineered to endure the rigors of shipping, handling, installation and operation.

Multi-Pleat Elite earns the Koch Green Icon for one or more following categories: Earns LEED Points, Reduces Energy Costs, Extends Filter Lifecycles, Conserves Resources, and Improves Indoor Environmental Quality.

Features:

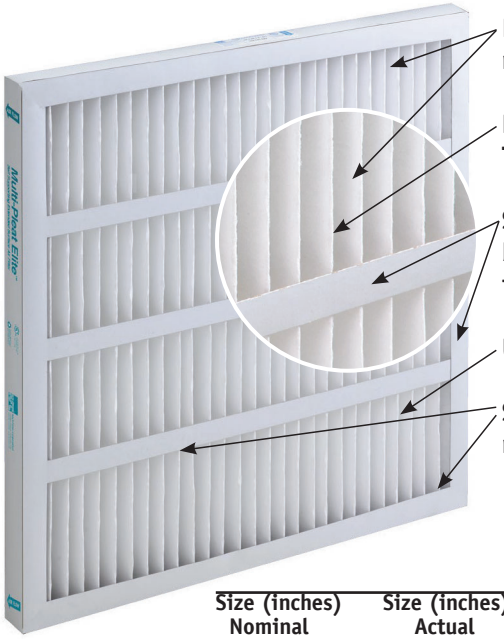
- Exclusive vForm™ Pleating Technology
- MERV 8 performance rating
- Self-supporting pleats requires no metal reinforcement
- Low resistance to airflow reduces energy costs
- Moisture-resistant beverage board frame
- Completely incinerable

Koch Filter Corporation…Durable. Reliable. Versatile.

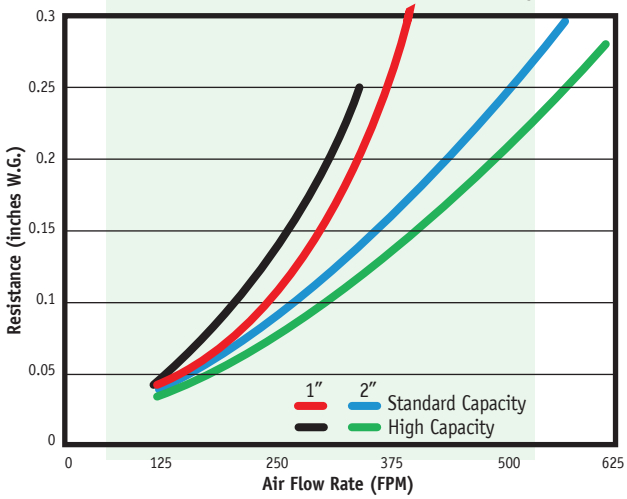
Bulletin No. K-MPE10

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite Technical Data



Initial Resistance vs. Filter Face Velocity



Additional Multi-Pleat Elite Product Information
ASHRAE Test Standard 52.2-2007.
Recommended maximum continuous operational temperature is 150° F (93°C).
Multi-Pleat Elite filters are classified as Underwriter's Laboratories Class 2 according to U.L. Standard 900.

Size (inches) Nominal W x H x D	Size (inches) Actual W x H x D	Capacity (CFM)	Standard Capacity Elite Initial Resistance (in. W.G.)	Standard Capacity Elite Media Area (Sq. Ft.)	High Capacity Elite Initial Resistance (in. W.G.)	High Capacity Elite Media Area (Sq. Ft.)
12 x 24 x 1	$11^{3/8}$ x $23^{3/8}$ x $^{3/4}$	600	0.29	3.3	0.20	3.8
14 x 20 x 1	$13^{1/2}$ x $19^{1/2}$ x $^{3/4}$	590	0.29	3.4	0.20	3.8
14 x 25 x 1	$13^{1/2}$ x $24^{1/2}$ x $^{3/4}$	730	0.29	4.3	0.20	4.8
15 x 20 x 1	$14^{1/2}$ x $19^{1/2}$ x $^{3/4}$	630	0.29	3.6	0.20	4.1
16 x 20 x 1	$15^{1/2}$ x $19^{1/2}$ x $^{3/4}$	670	0.29	3.8	0.20	4.3
16 x 24 x 1	$15^{1/2}$ x $23^{3/8}$ x $^{3/4}$	800	0.29	4.6	0.20	5.2
16 x 25 x 1	$15^{1/2}$ x $24^{1/2}$ x $^{3/4}$	840	0.29	4.8	0.20	5.4
20 x 20 x 1	$19^{1/2}$ x $19^{1/2}$ x $^{3/4}$	840	0.29	4.7	0.20	5.4
20 x 24 x 1	$19^{1/2}$ x $23^{3/8}$ x $^{3/4}$	1000	0.29	5.7	0.20	6.5
20 x 25 x 1	$19^{1/2}$ x $24^{1/2}$ x $^{3/4}$	1050	0.29	6.0	0.20	6.8
24 x 24 x 1	$23^{3/8}$ x $23^{3/8}$ x $^{3/4}$	1200	0.29	7.1	0.20	8.1
12 x 24 x 2	$11^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	1000	0.26	5.4	0.20	7.8
14 x 20 x 2	$13^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	980	0.26	5.5	0.20	7.9
14 x 25 x 2	$13^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1215	0.26	6.9	0.20	9.9
15 x 20 x 2	$14^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1050	0.26	6.0	0.20	8.4
16 x 20 x 2	$15^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1115	0.26	6.5	0.20	8.8
16 x 24 x 2	$15^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1340	0.26	7.8	0.20	10.6
16 x 25 x 2	$15^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1400	0.26	8.1	0.20	11.0
18 x 24 x 2	$17^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1500	0.26	8.4	0.20	12.3
20 x 20 x 2	$19^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1400	0.26	8.0	0.20	11.1
20 x 24 x 2	$19^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1675	0.26	9.6	0.20	13.4
20 x 25 x 2	$19^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1740	0.26	10.0	0.20	14.0
24 x 24 x 2	$23^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	2000	0.26	11.4	0.20	16.2
25 x 25 x 2	$24^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	2170	0.26	12.5	0.20	17.4

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Koch Filter Corporation
Filtration Products Crafted with Pride

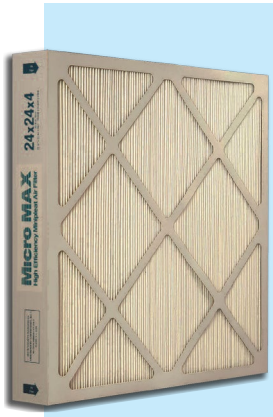
MicroMax™

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

Bulletin No. K-195-B

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 thress-per-carton. This multiple packaging means substantial reductions in shipping costs.

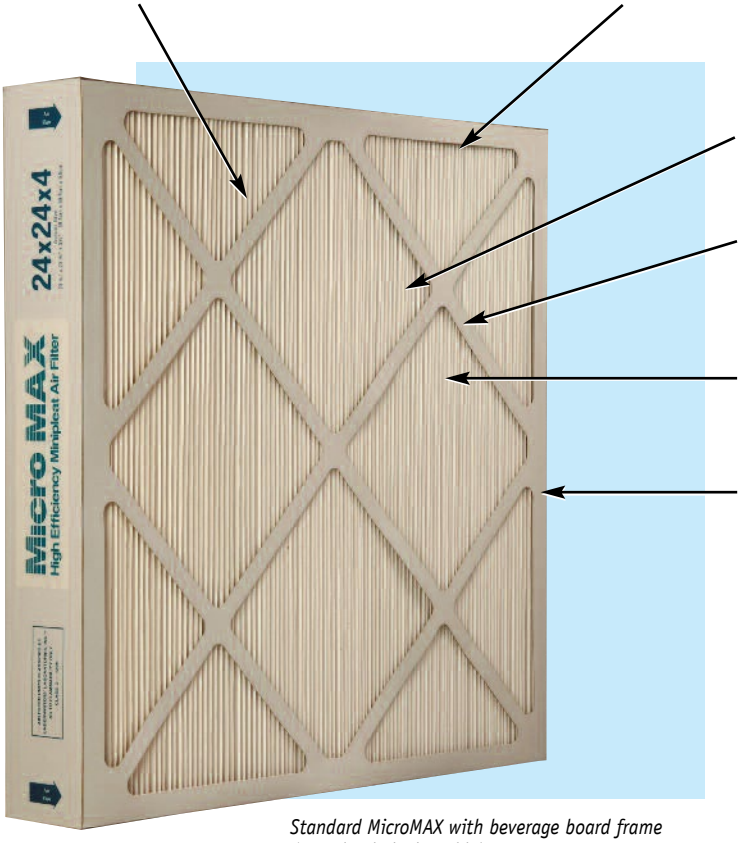
...Saves Space

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.

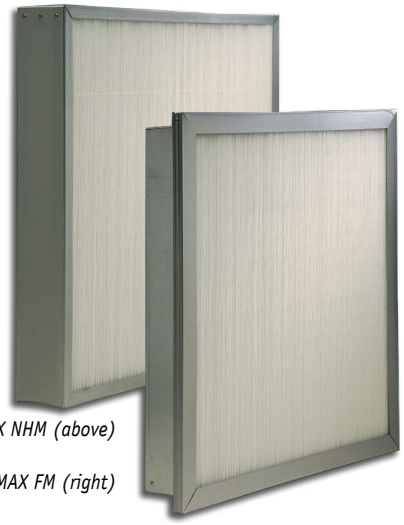
Specially-formulated adhesive bead insures even airflow and filter strength.

Available with double-walled, moisture resistant, beverage board frame (completely incinerable) or galvanized stell 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

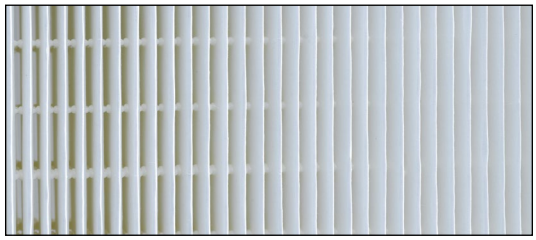
The media used in MicroMAX minipleat filters is composed of microfiberglass paper, treated with a specially-formulated, water-repllent binder. Millions of fibers are constructed into a Graded Density mat, with coarse fibers upstream and finer fibers on the air-exiting side. This dual-density insures 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 seprators uniformly secure the pleats to allow maximum air flow with minimal pressure drop.



Koch Filter Corporation
Filtration Products Crafted with Pride

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	23-3/8x23-3/8x3-3/4	2000	0.68	1.5	120	20
MX-9-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.68	1.5	111	18
MX-9-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.68	1.5	106	16
MX-9-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.68	1.5	95	11
MX-9-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.68	1.5	70	9
MX-9-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.68	1.5	63	19
MicroMAX 80 - 85% (MERV 13)								
MX-8-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.59	1.5	120	20
MX-8-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.59	1.5	111	18
MX-8-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.59	1.5	106	16
MX-8-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.59	1.5	95	11
MX-8-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.59	1.5	70	9
MX-8-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.59	1.5	63	19
MicroMAX 60 - 65% (MERV 11)								
MX-6-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.40	1.5	120	20
MX-6-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.40	1.5	111	18
MX-6-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.40	1.5	106	16
MX-6-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.40	1.5	95	11
MX-6-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.40	1.5	70	9
MX-6-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.40	1.5	63	19

1 . Shipping weights listed above apply to MicroMAX with beverage board frames. Add 10 lbs. per carton for metal framed models.

2. Data based on ASHRAE 52.1 and 52.2.

3. MicroMAX filters are classified as U.L. Class 2. Testing conducted according to U.L. Standard 900.

4. Width and height dimensions are interchargeable. MicroMAX filters may be installed with pleats in either direction.

5. Filters may be operated at up to 125% of rated face velocity.

6. MicroMAX filters should be used with a perfilters for maximum performance.

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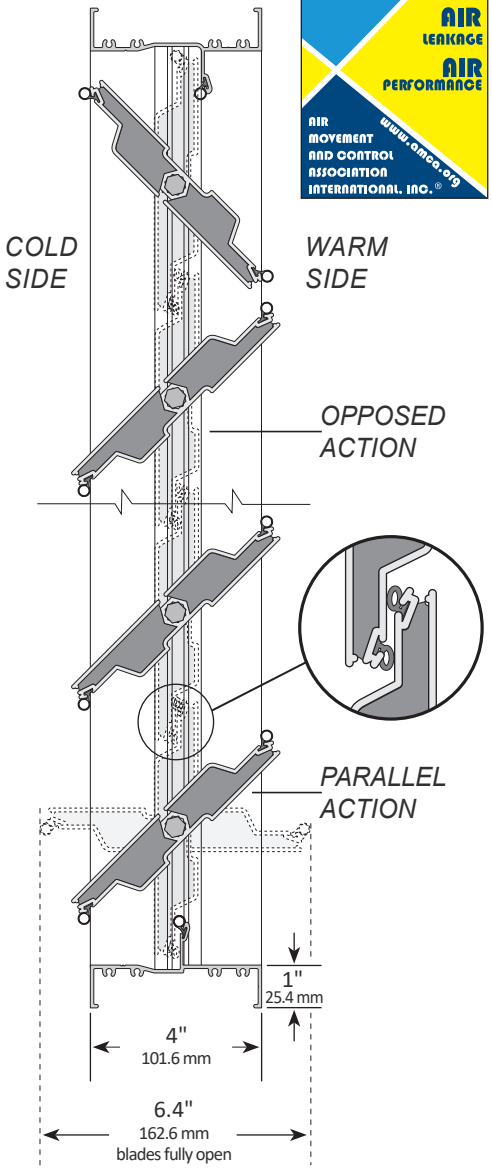
*Denotes manufacturing site.

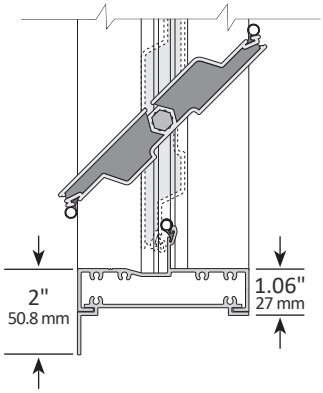
SUBMITTAL DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

Tampco 9000 SC dampers are provided on all AHU outside air intake and relief dampers as specified.

In Duct or Flanged to Duct Install Types



Extended Rear Flange Install Type



1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted.
3. Blade seals are extruded EPDM. Frame seals are extruded silicone. Seals are secured in an integral slot within the aluminum extrusions. Blade and frame seals are mechanically fastened to prevent shrinkage and movement over the life of the damper.
4. Bearings are composed of a Celcon inner bearing - fixed around a 7/16" *(11.11 mm)* aluminum hexagon blade pivot pin - rotating within a polycarbonate outer bearing inserted in the frame. This eliminates action between metal-to-metal or metal-to-plastic riding surfaces.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are zinc-plated steel. These provide a positive connection to blades and linkage.
6. Aluminum and corrosion-resistant zinc-plated steel linkage hardware is installed in the frame side, complete with cup-point trunnion screws for a slip-proof grip.
7. Dampers are designed for operation in temperatures ranging from -40°F *(-40°C)* to 212°F *(100°C)*.
8. Leakage Class 1A at 1 in. w.g. *(0.25 kPa)* static pressure differential. Standard air leakage data is certified under the AMCA Certified Ratings Program.
9. Dampers are custom made to required size, without blanking off free area. The blade stop is set at a fixed height and is a continuous and integral part of the top and bottom frames.
10. Dampers are available with either opposed blade action or parallel blade action.
11. Dampers are available in four install types: Installed In Duct, Flanged to Duct, Extended Rear Flange, and Square to Round Transition. *(See Install Type pages for details.)*
12. Installation of dampers must be in accordance with TAMCO's current on-line installation guidelines. *(Printed installation guidelines are provided with each damper shipment, however all technical information available on TAMCO's web site at www.tamcodampers.com supersedes information contained within printed versions.)*
13. Intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. *(See TAMCO Aluminum Damper Installation Guidelines.)*

OPTIONS FOR SP – STANDARD PROFILE:
For each option listed, replace the lines above with their corresponding lines below.

SC - SEVERE COLD TEMPERATURE OPTION:

3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.

MR - MOISTURE RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Frame is assembled using stainless steel screws.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

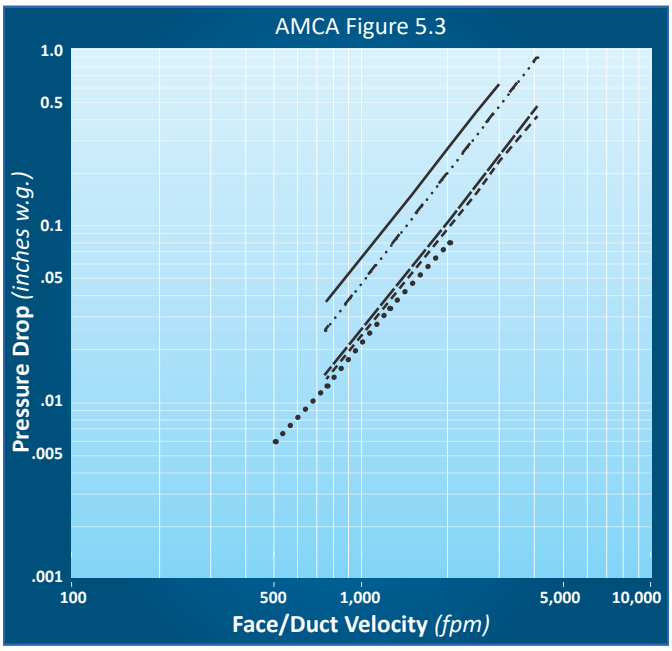
SW - SALT WATER RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Aluminum frame is clear anodized to a minimum depth of 0.7 mil *(18 microns)*. Frame is assembled using stainless steel screws.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted. Extruded aluminum blades are clear anodized to a minimum depth of 0.7 mil *(18 microns)*.
3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Clear anodized aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With no Option or with MR Option

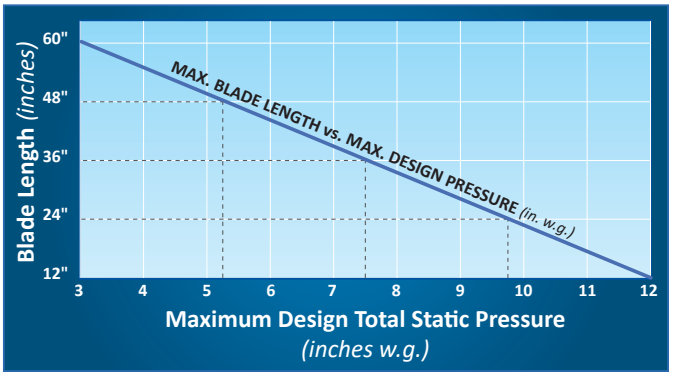
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" – – – *(610 mm x 610 mm))*
48" x 12" –·–·– *(1220 mm x 305 mm)*
12" x 48" — — *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, no Option or MR Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1
12.1 to 36.0 *(306 to 915)*	1A	1
36.1 to 48.0 *(916 to 1220)*	1A	1
48.1 to 60.0 *(1221 to 1524)*	1A	1

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* and a minimum of 70 in-lb *(7.9 N-m)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with no Option or MR Option, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

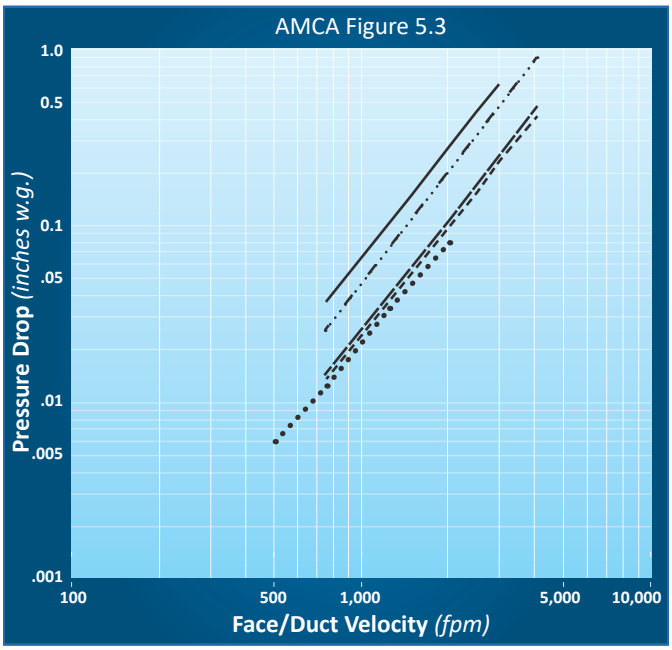
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)*	
	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
1A	3 *(15.2)*	n/a
1	4 *(20.3)*	8 *(40.6)*
2	10 *(50.8)*	20 *(102)*
3	40 *(203)*	80 *(406)*

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With SC or SW Options

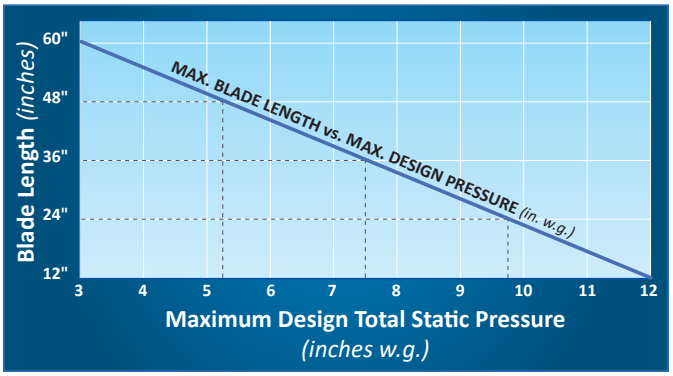
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" - - - *(610 mm x 610 mm))*
48" x 12" -·-·- *(1220 mm x 305 mm)*
12" x 48" —— *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

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FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1	1	1
12.1 to 36.0 *(306 to 915)*	1A	1	1	1
36.1 to 48.0 *(916 to 1220)*	1A	1	1	1
48.1 to 60.0 *(1221 to 1524)*	1A	1	n/a	n/a

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with SC or SW Options, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

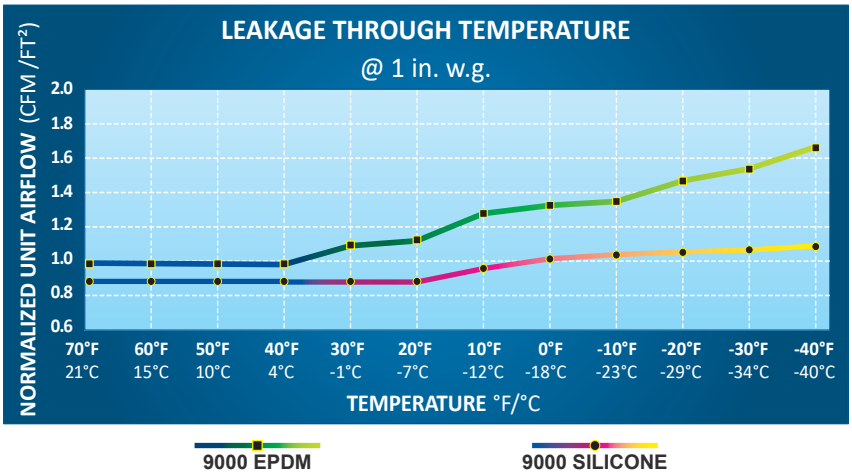
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)*			
	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
1A	3 *(15.2)*	n/a	n/a	n/a
1	4 *(20.3)*	8 *(40.6)*	9.8 *(49.8)*	11.3 *(57.4)*
2	10 *(50.8)*	20 *(102)*	24.5 *(125)*	28.3 *(144)*
3	40 *(203)*	80 *(406)*	98 *(498)*	113 *(574)*

***NOTE:** TAMCO Leakage Class Rating is not provided for dampers measuring more than 48" *(1220 mm)* wide at 6 in. w.g. *(1.5 kPa)* and at 8 in. w.g. *(2.0 kPa)*, as the recommended blade length is exceeded at these static pressures. *(Refer to the Blade Design Pressure Limitations Chart.)*

EPDM VS. SILICONE UPGRADE OPTION BLADE SEALS

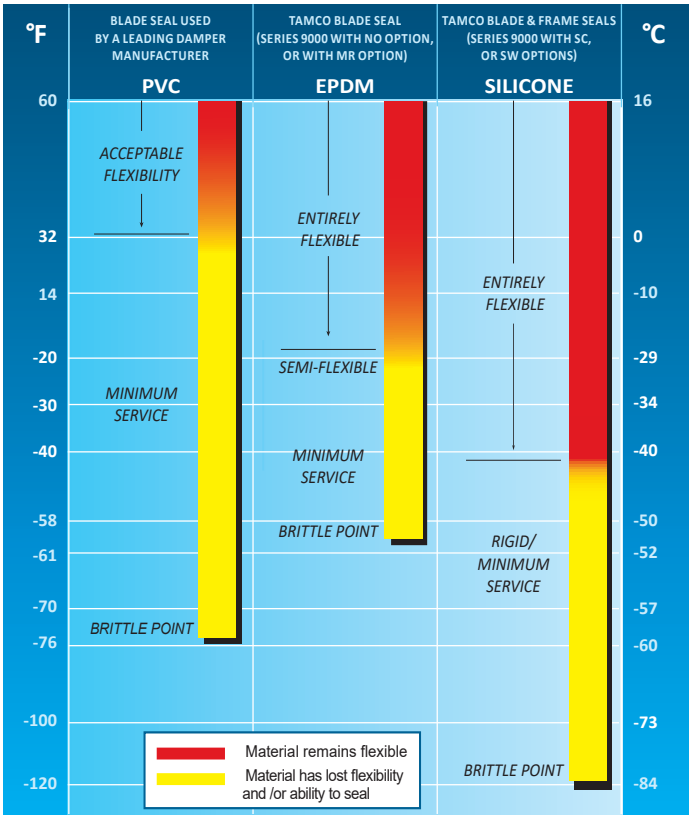
LEAKAGE COMPARISON GRAPH



Damper tests were conducted in a laboratory cold room to determine the effects of colder and severe cold temperatures *(down to -40°F (-40°C))* on sealing gaskets and leakage rates.

NOTE: Leakage rates shown in this graph are not licensed to bear the AMCA Seal. There is no AMCA standard dealing with the testing of leakage in temperatures below 32°F (0°C).

SEAL PERFORMANCE COMPARISON GRAPH



Minimum service temperatures and brittle points are as stated by material manufacturers. Flexibility, rigidity, and suitability status of various materials were determined by observation and operation of dampers in both cold room and cold box environments.

Provided on Mixed air dampers.

RUSKIN®

AMCA LICENSED
See Page 2

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

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 stystems. 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

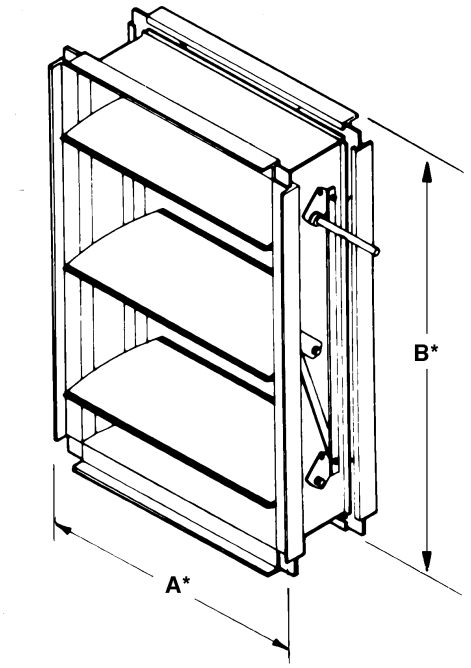
- Airfoil blade design for low pressure drop and less noise generation.
- Positive lock axles, noncorrosive bearings and shake proof linkage for low maintenance operation.
- Blade edge seals mechanically lock into the blade for superior sealing.

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.

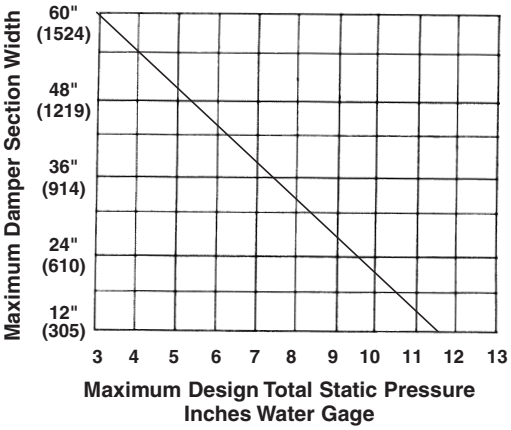
NOTE: Dimensions shown in parenthesis ( ) indicate millimeters.

*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.

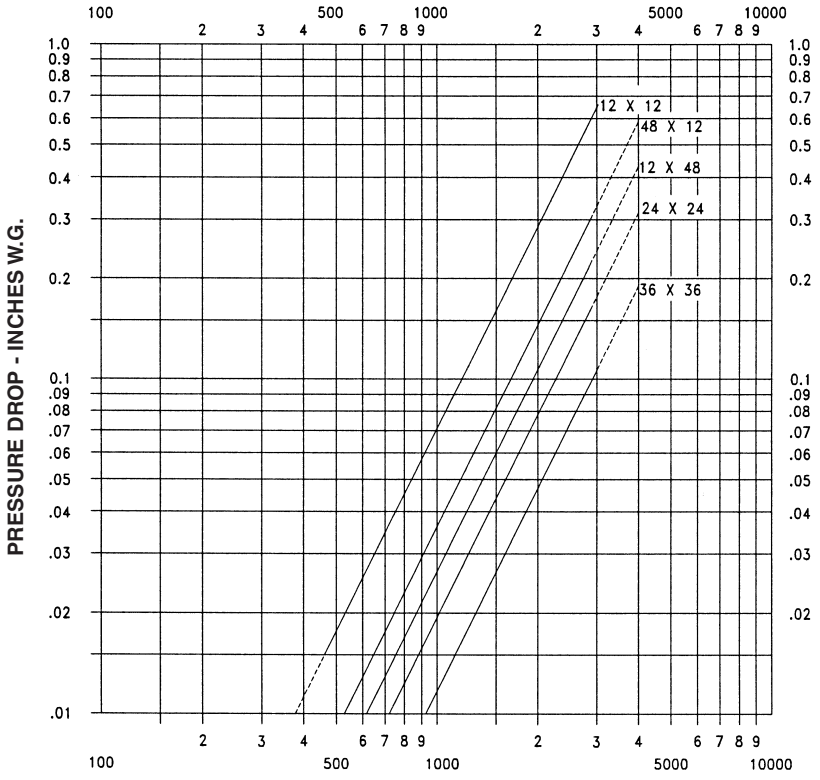
Ruskin Company certifies that the CD50 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA International Certified Ratings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

Pressure/ Class	Leakage, L/s/m² (ft³/min/ft²)			
	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



FACE VELOCITY - FEET/MINUTE
AMCA FIG. 5.3

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.

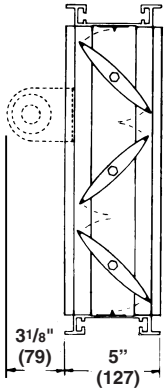
SOUND RATINGS

CD50 SOUND RATINGS

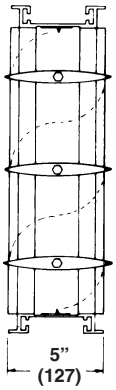
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12 (305 x 305)	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18 (457 x 457)	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125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

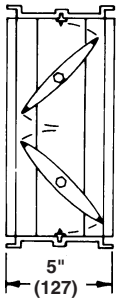
DIMENSIONAL INFORMATION



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.

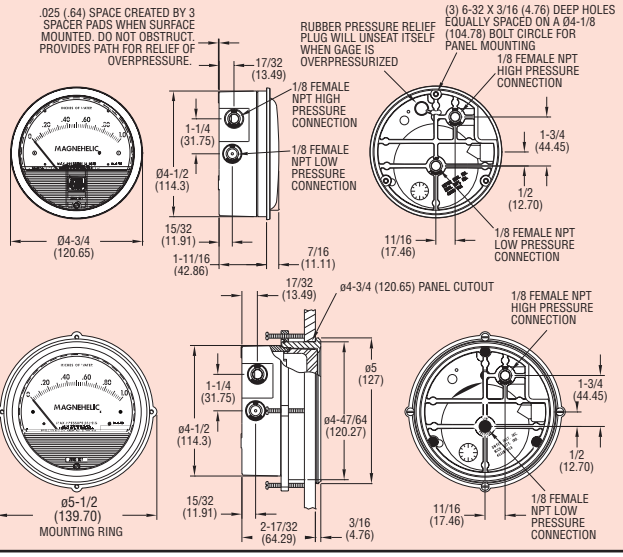
Blade edge seals shall be extruded double edge design with inflatable pocket which enables air pressure from either direction to assist in blade to blade seal off. Blades seals shall be mechanically locked in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade 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.

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%

RoHS



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.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of 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, standhang bracket and terminal tube with holder.

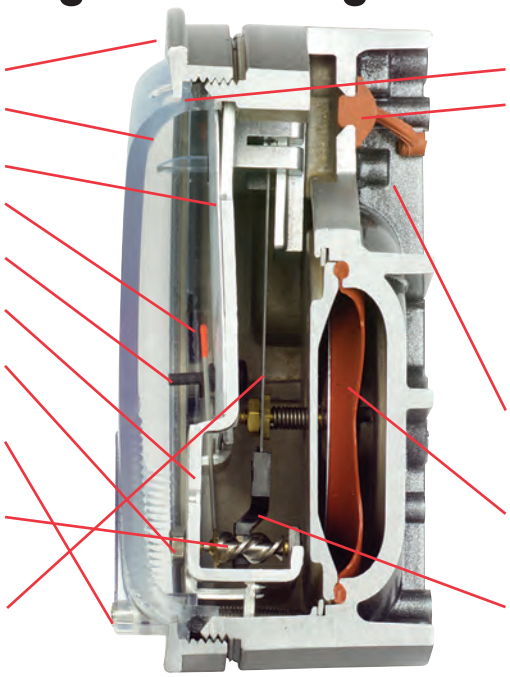
Model A-605 Air Filter Gage Accessory Kit
Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4″ aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings 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

Series 2000

Magnehelic® Gage Models & Ranges



Bezel provides flange for flush mounting in panel.

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

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

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

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

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

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

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

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

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

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

OVERPRESSURE PROTECTION
Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads. The blowout plug is not used on models above 180″ of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm. The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

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

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

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

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10

Model	Range, Pa
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-1000
Zero Center Ranges	
Model	Range, Pa
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, in w.c.	Range, Pa or kPa
2000-00D†••	0-.25	0-62 Pa
2000-0D†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

VELOCITY AND VOLUMETRIC FLOW UNITS
Scales are available on the Magnehelic® that read in velocity units (FPM, m/s) or volumetric flow units (SCFM, m^3/s, m^3/h). Stocked velocity units with dual range scales in inches w.c. and feet per minute are shown above. For other ranges contact the factory.
When ordering volumetric flow scales please specify the maximum flow rate and its corresponding pressure. Example: 0.5 in w.c. = 16,000 CFM.

ACCESSORIES
A-321, Safety Relief Valve
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-135, Rubber gasket for panel mounting

A-310A 3-Way Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A

ADVANCED DIRECT DRIVE PLENUM FANS

ENERGY STAR PARTNER

ISO9001 CERTIFIED

NO APPLICATION IS TO 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.

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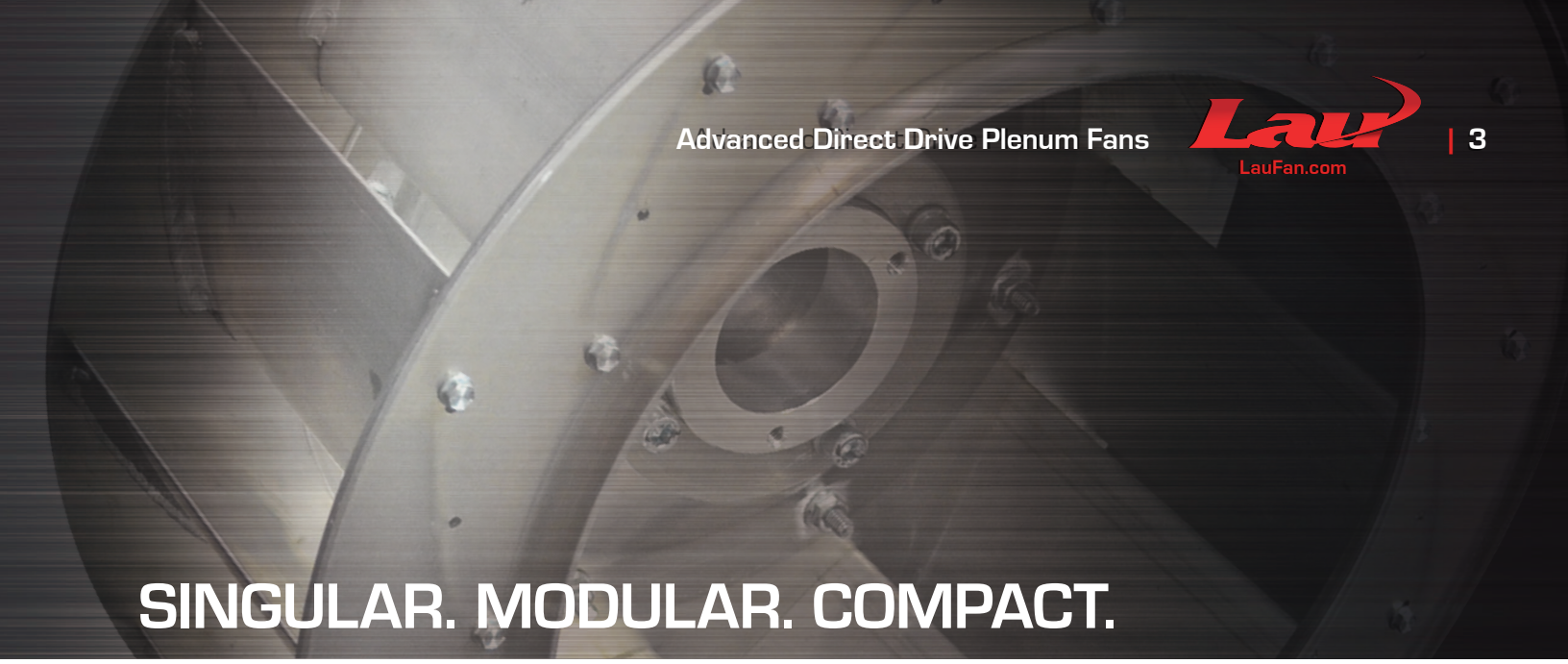


SINGULAR. MODULAR. COMPACT.

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.

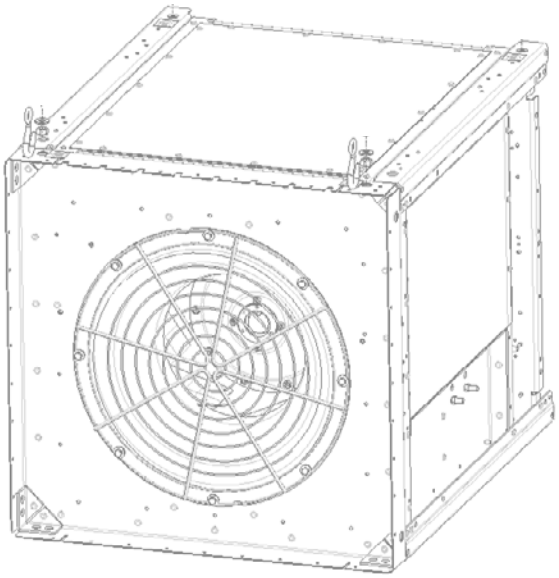
Eliminates all resonance conditions.

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.

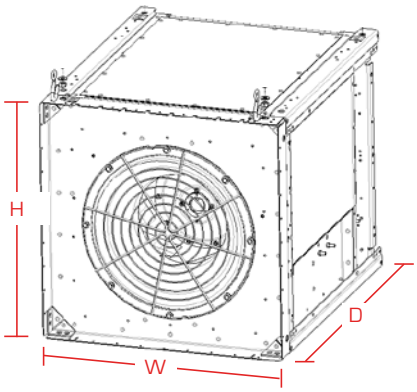
SIMPLE, STACKABLE APPLICATION

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

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

WARRANTY

STANDARD LIMITED WARRANTY
ENGINEERED SYSTEMS EQUIPMENT

SERVICE POLICY Supersedes: 50.05-NM2 (812) Form 50.05-NM2 (1212)

POLICY STATEMENT

Johnson Controls (JCI) warrants all equipment and associated factory supplied materials or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of eighteen (18) months from date of shipment, or twelve (12) months from date of start up, whichever occurs first. Subject to the exclusions listed below, Johnson Controls, at its option, will repair or replace, FOB point of shipment, such products or components as it finds defective.

Except for reciprocating replacement compressors, which Johnson Controls warrants for a period of twelve (12) months from date of shipment, Johnson Controls warrants Johnson Controls reconditioned or replacement materials, or installation or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of (90) days from date of shipment.

The above represents the minimum warranty policy Johnson Controls will extend to customers. Additional product specific coverage is provided as outlined in related warranty policies. No warranty repairs or replacements will be made until payment for all equipment, materials, or components has been received by Johnson Controls.

EXCLUSIONS:

Unless specifically agreed to in the contract documents, this warranty does not include the following costs and expenses:

1. Labor to remove or reinstall any equipment, materials or components.

2. Shipping, handling or transportation charges, including cranes, safety walks or other safety requirements specific to jobsites.

3. Cost of refrigerant.

4. Freight damage.

5. Field applied coatings added to any surface or heat exchanger.

6. Rental Chillers.

ALL WARRANTIES ARE VOID IF:

1. Equipment is used with refrigerants, oil, additives, or antifreeze agents other than those authorized by supplying factory.

2. Equipment is used with any material or any equipment such as evaporators, tubing, other low side equipment or refrigerant controls not approved by supplying factory.

3. Equipment has been damaged by freezing because it was not properly protected during cold weather or damaged by fire or any other conditions not ordinarily encountered.

4. Equipment is not installed, operated, maintained and serviced in accordance with instructions issued by Johnson Controls.

5. Equipment is damaged due to dirt, air, moisture, or other foreign matter entering the refrigerant system.

6. Equipment is not properly stored, protected, or inspected by the customer during the period from date of shipment to date of initial start-up.

7. Field coating of coil has occurred.

8. Equipment is damaged due to acts of god, abuse, including shipping damage, neglect, sabotage, or acts of terrorists.

9. Equipment has modifications carried out that have an effect on the original design of the product without such work being authorized by the factory. Any on site design changes or unit modification/replacement shall be authorized in advance by the factory.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIAL OR EQUIPMENT INVOLVED, NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT, (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS SUPPLIERS AND SUBCONTRACTORS.

Reference: BOS 03-23.105.BEGTM

P.O. Box 423, Milwaukee, WI 53203
www.johnsoncontrols.com

Printed in USA 50.05-NM2 (1212)
Replaces: 50.05-NM2 (812)

STANDARD LIMITED LABOR WARRANTY
SOLUTION XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: SOLUTION XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for eighteen (18) months from the date of shipment from Seller's facility or twelve (12) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

Notification of defect and any warranty claim must be made in writing, postage paid, with a brief written description of the problem to Buyer's local Johnson Controls' sales/service office. Nothing herein us intended to provide warranty coverage to lessees or anyone other than Buyer and no third-parties are intended to be beneficiaries of this warranty.

BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

(Product Code Ref: 8513

5 YEAR PARTS & LABOR LIMITED WARRANTY YORK®
SOLUTION™ XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: YORK® SOLUTION™ XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for sixty-six (66) months from the date of shipment from Seller's facility or sixty (60) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

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BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

RECEIVING/RIGGING

RECEIVING / RIGGING INSTRUCTIONS

The installing contractor is responsible to provide Johnson Controls / YORK with a contact to coordinate the delivery of the equipment in this submittal. Please fill out the information requested in the Submittal Approval Form section in the back of this submittal.

It is the installing contractor's responsibility to verify the following prior to signing the bill of lading presented by the transportation company:

- Ensure everything on the bill of lading was delivered.
- Visually perform a thorough inspection of all equipment for any signs of shipping damage

Any short-shipments or shipping damage must be noted on the bill of lading prior to signing.

The transportation company will provide you withinstructions for filing a claim. It is the installing contractor's responsibility to work directly with the transportation company to resolve any shipping claims.

1.0 PRE-INSTALLATION

RECEIVING

All units leaving the plant have been inspected to ensure the shipment of quality products. All reasonable means are utilized to properly package the air handling units.

CAUTION

Johnson Controls will NOT be responsible for any damage or loss of parts in shipments or at the job site. Receiver is solely responsible for noting Bill of Lading and filing freight claims IMMEDIATLY. Refer to Shipping Damage Claims Form 50.15-NM available from Johnson Controls Sales representative.

RIGGING OF INDOOR AND OUTDOOR UNITS

WARNING

All lifting points must be used to avoid personal injury or death and to avoid damage to the equipment.

NOTE

SHIPPED LOOSE DAMPERS. When large units are ordered with MZ segments in rear discharge location (on the end of the unit), the units will ship with the top section (hot deck) separated. In these cases, the complete multizone damper assembly (hot deck and cold deck together) will ship loose.

FIG. 1-1 – RECOMMENDED LIFTING WITH FOUR LIFTING POINTS

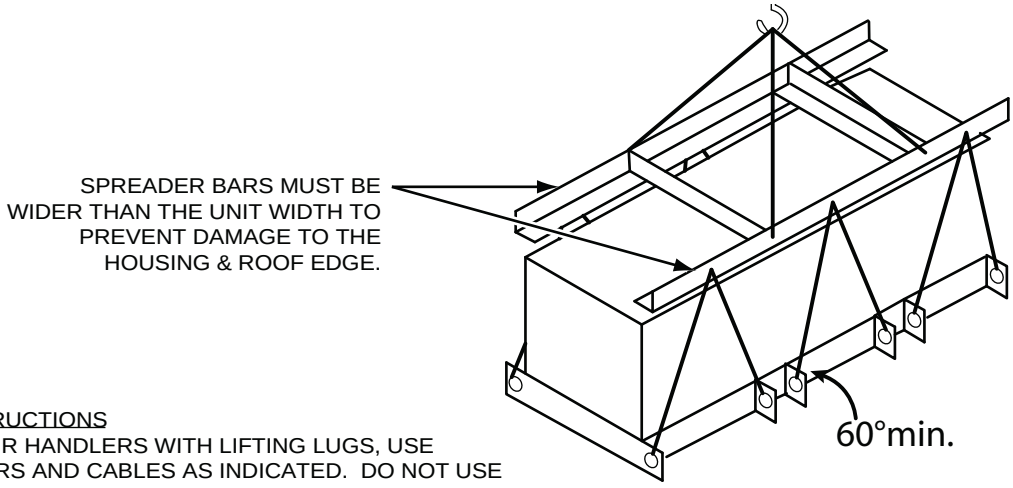


FIG. 1-2 – RECOMMENDED LIFTING WITH MULTIPLE POINTS

OFF-LOADING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the air and watertight seams in the unit casing. Prevent unnecessary jarring or rough handling.

For lifting air handling units with lifting lugs or corner connectors; proper spreader bars and hoisting line must be used when rigging to prevent damage to the unit casing *(see Fig. 1-1)*. When lifting long units a special system must be used to insure a minimum 60° angle between lifting lug and spreader bar/frame *(see Fig. 1-2 & Table 1-1)*. It is also mandatory that an experienced and reliable rigger be selected to handle unloading and final placement of the equipment. The rigger must be advised that the unit contains internal components and that it be handled in an upright position. Care must be exercised to avoid twisting the equipment structure.

NOTE

Refer to the submittal for the section weights.

TABLE 1-1 - SPACING REQUIREMENTS FOR OFFLOADING LONG UNITS		
UNIT HT.	MAX. LIFTING LUG SPACING	MIN. LIFTING STRAP LENGTH
≤ 72"	120"	120"
> 72"	192"	192"

NOTE

All lifting lugs must be used to avoid damage to unit. If unit does not have lifting lugs, use bottom corner connectors and intermediate raceway lifting lugs. Do not use top corner connectors.

Unit section weights are furnished on the job submittal. Due to the variance in weight of each unit design, it is not possible to list unit weights in this instruction. The submittal must be referred to when selecting a crane for rigging and figuring roof weight loads. Contact your Johnson Controls Sales representative if you have any questions regarding unit weights.

CRANE AND SPREADER BARS

See Fig's 1-1 and 1-2.

FORK LIFT

Forklifts should not be used to off-load air handlers except in special circumstances. If moving air handling equipment with a fork lift or similar means becomes necessary, always make sure the lifting forks are long enough to reach from the fork truck to the opposite side and slightly beyond. It is helpful to leave the shipping blocks attached to the bottom of the equipment until in its final location. There is no structural support under the equipment except what is visible from the perimeter.

COME-A-LONGS OR POWER PULL

See Fig1-3.

LD09613

FIG. 1-3 – TYPICAL COME-A-LONG TYPES

SHACKLES

Refer to Fig. 1-4 for proper lifting with hook and shackle at corners. Refer to Fig. 1-5 for proper lifting with hook and shackle at lifting lugs.

NOTE

Fig's 1-4 and 1-5 show YORK Solution unit without baserails. When baserails are present, always use all lifting lugs pre-mounted on baserails. Do not lift by corners.

LD13767

FIG. 1-4 – PROPER LIFTING WITH SHACKLE AT CORNER

LD13768

FIG. 1-5 – PROPER LIFTING WITH SHACKLE AT LIFTING LUG

LD13766

FIG. 1-6 – RECOMMENDED LIFTING WITH BASERAIL

INSPECTION

CHECK FOR DAMAGE

RECEIVER RESPONSIBILITY

Receiver is solely responsible for noting freight bill and filling freight claims IMMEDIATLY *(see "Receiving" in this section).*

Visible damage should be noted on the signed and dated bill of lading with a request that the carrier inspect the damage within 72 HRS. of notification. The shipping wrapper must be removed and replaced with a tarp or similar protective covering. Any concealed damaged reported after 15 days will compromise a claim settlement. Inspection requests may be done by telephone or in person, but should be confirmed in writing. If assistance is needed with the claim process, contact your Johnson Controls Sales representative.

INDOOR UNITS

It is Johnson Controls intention that a shipping wrapper be applied to unpainted indoor units for protection from weather, road dirt, etc. during inland transit and that the wrapper be removed at the time of delivery to allow for a thorough inspection, both inside and out.

OUTDOOR UNITS

Outdoor units are not fully wrapped. Exposed openings are covered for protection from weather, road dirt, etc. during inland transit. A thorough inspection, both inside and out, should be done at the time of delivery.

CHECKING FOR NON MOUNTED PARTS

- Check the packing list for non-mounted ship loose parts. (Check inside all segments.)
- Packing list will note how many and type of parts.
- Shortages must be reported within 10 days after receipt of order.

See Ship Loose Parts, Fig 2-8 thru 2-14

STORAGE

SHORT-TERM STORAGE

Indoor Units:

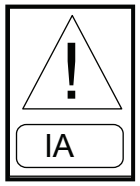
Under no circumstances should outdoor storage be used

Outdoor Units:

Be sure all shipping covers are reapplied after inspection, or tarps are used during storage.

Short-term storage is considered six (6) months or less from date of shipment. Storage maintenance during this time is usually limited to the following.

- Rotate fans every four (4) weeks beginning upon arrival to prevent moisture from damaging bearing.
- If the units are to be stored out-of-doors, prior to installation, special care must be taken to cover and protect the units from dust, rain, snow and rodents. The units must be protected from constant exposure to rain and snow.
- Store on a firm, flat surface to prevent distortion. Block the unit off the ground to protect components from water.



Protect all parts and porous materials from rain and other sources of moisture. Decontaminate or replace as needed to ensure microbial growth is not introduced to the air handler.

- The unit must also be protected from damage to the exterior of the cabinet or coil connections by construction vehicles and personnel.

Equipment ReSubmittal For Approval Rev 2

Project:

VEGA AMERICAS

York Solution XTI Indoor Air Handling Unit (AHU-4)

SUBMITTED TO:
FELDKAMP ENTERPRISES

ATTENTION: HEATHER WYATT

DATE:
April 1, 2021

SUBMITTED BY:

CHARLES E. LEWIS
SYSTEMS APPLICATION ENGINEER
Johnson Controls
Equipment Sales – Cincinnati, OH

TABLE OF CONTENTS

Submittal Comments

- **Verify Single Point Power Connection, Required For Unit.**
  AHU Can Not Be Single Point Power. JCI Is Not Providing Motor Control For Either The Supply Fan Or Return Fan. Please Coordinate With Electrical Contractor.

- **Verify APD Was For Unit At Full 4,300 CFM Of Unit, Not Reduced Heating Airflow**
  APD Are Calculated With The Design CFM

- **Cooling Coil: Provide Minimum 210.8 Total MBH And 144.7 Sensible MBH Per Schedule**
  JCI Has ReSelected Coil To Meet Capacity Requirements On Schedule

- **Coordinate Transitions From Unit Opening To Relief Air Duct**
  JCI Will Coordinate With Install Contractor

- **Verify Updated Unit Dimensions Do Not Conflict With Anything In Model**
  JCI Will Coordinate With Install Contractor

- **Coordinate Both Relief Air and Return Air Connections**
  JCI Will Coordinate With Install Contractor

Submittal Notes

- JCI has officially announced a 2.5% price increase for the AHUs provided in this submittal. In order to avoid the price increase JCI will need to receive approved submittals and a release of the AHUs by 4-23-21 in order to process and meet the required factory release date of 4-30-21. If JCI receives this AHU submittal approved after 4-23-21, JCI will required a 2.5% price increase to meet costs driven by macro-economic factors.
- All air intake and relief dampers are provided with Tampco 9000 SC as specified.
- AHU-1 and AHU-2 are provided with 65kA SCCR supply fan circuit ratings.
- Lead Time is approximately 13 weeks from time of approved submittal.
- Before release, Feldkamp is to verify that all split sections are as required for AHUs to be maneuvered on site.
- Field installed VFD's will be furnished and installed by FEI per spec section 237300, 2.10 A.
- All controls to be field mounted on the AHU by JCI controls division.
- Outside airflow measuring station provided and field installed by JCI controls division.
- AHU is provided with base rail height per detail drawing M200. Feldkamp to provide any changes before release on returned submittal.
- Field leakage testing is not included or available per ASHRAE 111 standards. Any field leakage testing is to be provided by Feldkamp. AHU will conform to ASHRAE Standard 111 Class 6 low-leak casing design.
- AHUs will include a 5 year parts and labor warranty from time of substantial completion of startup.
- Due to the short filter section scaled on detail drawing M200, some filters will be provided as front loading with no side access door. The front access provides better access to all of the filters due to the deep width of these units. Providing side access will increase the overall length to the AHUs that are currently exceeding the maximum length specified.
- All AHUs and their current sizes with connected ductwork have been plotted using Feldkamp's shop drawings. Currently there does not seem to be anything that could cause an issue due to some of the AHU units being longer or wider.
- All fan segments are sized for fan/motor removal.
- Three sets of filters will be provided for each AHU.
- **Feldkamp to verify unit handing configuration before release**
- **Feldkamp to verify overall unit dimensions for space before release.**

- **Feldkamp to verify required shipping splits before release. Every additional shipping split will increase the length by 3”**
- **Feldkamp to verify all duct connections before release.**
- Disconnects are furnished on all supply fans via MMP panel.

PERFORMANCE

YORK® Solution™ Air Handling Unit Performance Report

Job Summary

Project Name:	VEGA Americas - Bid Day		
Unit Tag(s):	AHU-4		
Quantity:	1	**Environment:**	Indoor

Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
XTI-42x69	4,300	1,004	3,917

Segment Sequence

(DP FS CC-2 CC-1)(RF EE EE FR MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Bulkhead Material
MB , FR , EE , RF , CC-1 , CC-2 , FS , DP	2	None	STD Ga. G-90 Galvanized	STD Ga. G-90 Galvanized	2" Foam	Galvanized

Base Details

Segment(s)	Base		Floor				
	Material	Paint	Gauge and Material	Paint	Insulation	Attachment	Tread Plate
MB , FR , EE , RF , CC-1 , CC-2 , FS , DP	Standard Formed Steel	None	STD Ga. G-90 Galvanized	None	N/A	-	None

Unit Electrical

Circuit Details

Circuit #	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	Supply Fan Motor Control	460/3/60	8.6	10.8	17.5
2	Return Fan Motor Control	460/3/60	8.6	10.8	17.5
3	Lights and Outlets	120/1/60	-	-	15.0

Electrical Details

Minimum Unit SCCR	5 kA rms Symmetrical	**ETL Label (UL1995/NEC-2002)**	Yes

Unit Light Type	Unit Light Switch
Vaporproof LED	External

Supply Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	DDPG2	II	150-9	80	100	1	4,300	1,004	3.55	1.50	3,575	4.71

Drive Type	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Isolation Type	Total Eficiency (%)	Outlet Velocity (ft/s)	Max Speed (RPM)
Direct Drive	SWSI	Airfoil	Aluminum	Galvanized Steel	None	Yes (K=1181.00)	1" Spring	50.96	956	3,650

Motor Details

Type	Manufacturer	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	Motor Speed (RPM)	Frame Size	Full Load Amps (Amps)	Efficiency	Location
ODP	Baldor	7.5	460/3/60	1	H	3,600	184	8.60	Premium	Direct Drive

At Motor Synchronous Details

TSP (in w.g.)	Total Air Flow (CMF)	Fan Speed (RPM)	Motor Correction Factor(%)	Fan Power (BHP)	Total Eficiency (%)
3.55	4,300	3,575	88.5	4.71	50.96

Return Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	DDPG2	II	150-12	80	100	1	4,300	1,004	1.89	1.25	3,263	3.4

Max RPM	Fan Power with Drive Loss (HP)	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints
3,650	-	SWSI	Airfoil	Aluminum	Galvanized Steel	None	Yes (K=1181.00)	-	1" Spring	-

Drive Type	Drive SF	Spare Belts	Spare Sheave	Inlet Screen	Fan Cage	Belt Guard	Lube Lines	Bearings	Fan Stand	Motor Removal Rail	Seismic Snubber
Direct Drive	-	-	-	Yes	-	-	None	-	-	-	-

Motor Details

Type/MFG	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	RPM	Frame Size	FLA (Amps)	Efficiency	Location	SGR
ODP/Baldor	7.5	460/3/60	1	H	3,600	184	8.60	Premium	Direct Drive	Yes

Water Coil(s)

Performance[1] Details

Coil	Fluid Type	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
							DB	WB	DB	WB									
CC-1	Water	2	8	6	303	303	7.7	-	68.2	-	4,300	333	0.12	15.0	150.0	108.7	2.5	2.3	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size (in)	
CC-1	0	Right	0	Steel	0	MPT	1	1-1/2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-1	1	Full	33.25	56	12.9	AL	.010	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-1	-	116	30	.5	Copper	Galvanized	304 Stainless Steel	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)

Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-1[1][0]: This coil is 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.

Glycol Coil(s)

Performance[1] Details

Coil	Glycol Type	Glycol %	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
								DB	WB	DB	WB									
CC-2	Propylene	30%	10	14	16	210	142	84.0	69.0	52.0	52.0	4,300	333	1.04	32.5	45.0	58.5	2.9	10.2	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size	
CC-2	0	Right	0	Steel	0	MPT	1	2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-2	1	Full	33.25	56	12.9	AL	.010	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-2	-	574	140	2.2	Copper	Galvanized	304 Stainless Steel	-

Coil Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-2[1][0]: This coil is 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.

Drain(s)

Details			
Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
CC-1	Galvanized	Right	None
CC-2	Stainless Steel	Right	None

Filter(s)

Details							
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material
RF	Pre-Filter	2"	Side	Pleated 30% (MERV 8)	2	Pleated 30% (MERV 8)	Aluminum
RF	Primary Filter	4" Mini-Pleat	Side	80-85% Eff, (MERV 13)	2	80-85% Eff, (MERV 13)	Aluminum

Sizes				Filter Gauge Details		
Segment	Filter	1st Filter Size H x W (in)	1st Qty	Location	Type	Range (in w.g)
RF	Pre-Filter	16x20	6	Door	Magnehelic	0 - 2
RF	Primary Filter	16x20	6	Door	Magnehelic	0 - 2

Damper(s)

Details													
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area	CFM	Minimum Allowable OA CFM	Damper Type	Damper Config	Model	Material	Blade Orientation	Actuator Type	Fail Position
EE	Exhaust Air	15.25 x 55.00		738		4,300	-	Control	100%	CD60	Galvanized	Parallel	-	-
EE	Outside Air	15.25 x 55.00		738		4,300		Insulated	100%	CDTI50	Aluminum	Parallel	-	-
EE	Mixed Air	15.25 x 55.00		738		4,300	-	Control	100%	CD60	Galvanized	Parallel	-	-

Door(s)

Details										
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	Test Port	Spare Gasket	Thermal Break	Safety Latch	Noncontact Safety Interlock
MB	Left	Outward	Upstream Side	36 x 18 x 2	STD Double Pane	-	-	-	-	-
FR, FS, DP	Right	Outward	Upstream Side	36 x 18 x 2	STD Double Pane	Yes	-	-	Yes	-
EE	Right	Outward	Upstream Side	36 x 24 x 2	STD Double Pane	Yes	-	-	Yes	-
EE	Right	Outward	Upstream Side	36 x 15 x 2	None	Yes	-	-	-	-
RF	Right	Outward	Upstream Side	36 x 10 x 2	None	-	-	-	-	-
CC-1	Right	Outward	Upstream Side	36 x 18 x 2	STD Double Pane	Yes	-	-	-	-
CC-2	Right	Outward	Downstream Side	36 x 18 x 2	STD Double Pane	Yes	-	-	-	-

Motor Control(s)

Details										
Segment	Type	MMP	V/Ph/Hz	Input/Output Amps*	Efficiency	Heat Loss (at 100% load)	Enclosure	Bypass	Disconnect Type	RFI/EMI EMC Filter
FR	External Wired Disconnect	-	460/3/60	9.6/9.6	89 %	160	NEMA 1	-	Fused	No
FS	External Wired Disconnect	-	460/3/60	12.0/12.0	89 %	210	NEMA 1	-	Fused	No

Notes
*Drives are rated for use below 3,000 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.42-EGI (212) for use above these limits.
Storage Temperature: -40°F to 158°F
Humidity: MAX 95% RH non-condensing
Altitude: 3,300 ft. without derate (1% derate for each additional 330 ft.)
Overload Current Rating: 100% for 1 minute every 10 minutes.
The Class 10 trip rating of the MMP device will not withstand an across-the-line start of a fan and should not be used with VFDs with bypass circuits.
The customer must provide a platform or catwalk for accessing the power-disconnect.
Copper Conductors Only.

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (sq. ft)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	Opening	2.4	4,300	1,769.00	0.00	0.53
FR	External Static - User Entered	0.0	4,300	0.00	0.00	1.25
EE	Opening	5.8	4,300	738.00	0.00	0.09
EE	Control Galvanized (CD60)	0.0	4,300	0.00	0.00	0.02
EE	Opening	0.0	4,300	0.00	0.00	0.00
EE	Insulated Aluminum (CDTI50)	0.0	4,300	0.00	0.04	0.00
RF	2" Pleated 30% (MERV 8)	13.3	4,300	323.00	0.14	0.00
RF	Dirty Filter Allowance - Prefilter	0.0	4,300	0.00	0.20	0.00
RF	4" Mini-Pleat 80-85% Eff, (MERV 13)	13.3	4,300	323.00	0.31	0.00
RF	Dirty Filter Allowance	0.0	4,300	0.00	0.20	0.00
CC-1	Heating 2 rows 8 fins	12.9	4,300	333.00	0.12	0.00
CC-2	Cooling 10 rows 14 fins	12.9	4,300	333.00	1.04	0.00
FS	External Static - User Entered	0.0	4,300	0.00	1.50	0.00
DP	Opening	0.0	4,300	0.00	0.00	0.00
				Total	3.55	1.89

Dimensions and Weight

Details					
Segment	Description	Length[1] (in)	Width[2] (in)	Height (in)	Weight (lbs)
MB	Mixing Box	24	69	42	345
FR	Return Fan - SWSI	30	69	42	572
EE	Economizer	54	69	42	470
RF	High Efficiency Filter	13	69	42	202
CC-1	Variable Length Cooling Coil	30	69	42	628
CC-2	Variable Length Cooling Coil	38	69	42	1,139
FS	Supply Fan - SWSI	33	69	42	598
DP	Discharge Plenum	24	69	42	345
Overall[3]		246			4,299

Notes

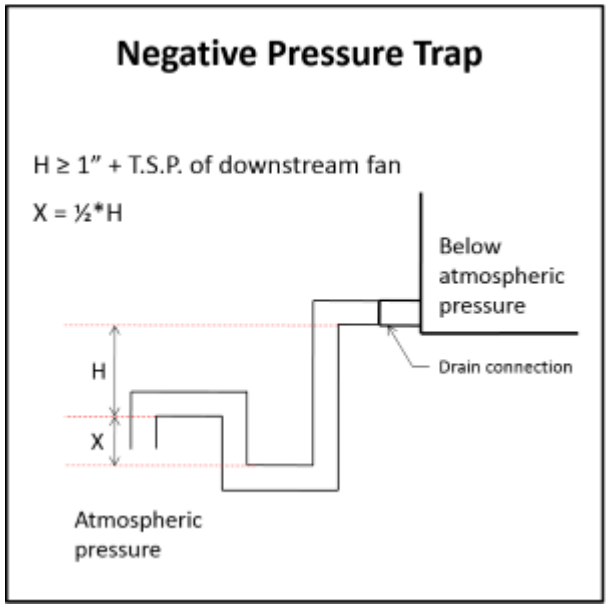
[1]The length includes bottom tier segments only

[2]The 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.

[3]Unit level and other loose components may be excluded from segment weights and overall segment weights. For total unit weight reference Unit Overview.

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-1	Supply Fan	3.55	Negative	4.55	2.28	6.82	4.75	7.25	3"
CC-2	Supply Fan	3.55	Negative	4.55	2.28	6.82	4.75	7.25	3"



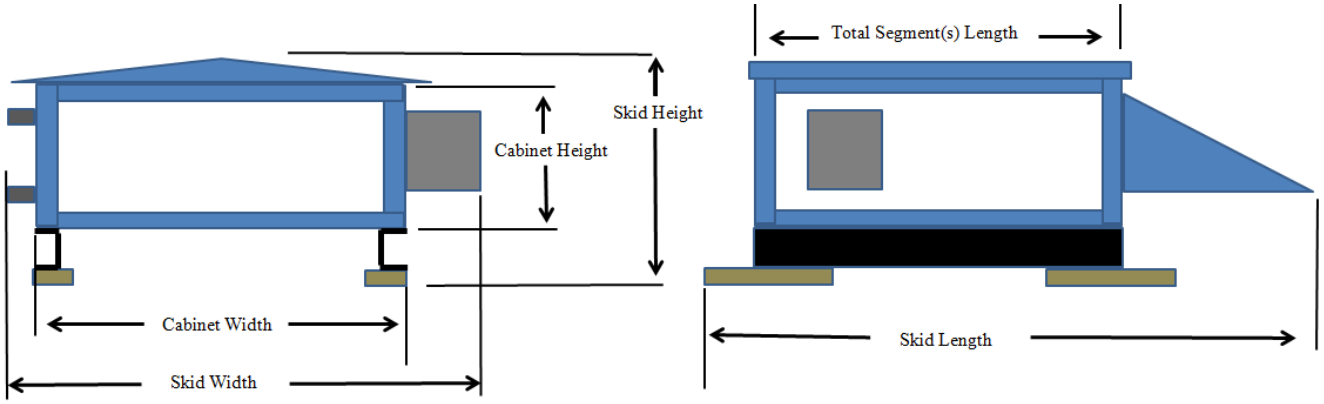
Notes
Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.
Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details
YORK® Solution XT AHU's meet IBC seismic requirements for non-critical equipment (Ip = 1.0) for locations with design spectral response Sds <= 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 SubmittalDrawing 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)**	**Skid Weight (lbs)**
(DP FS CC-2 CC-1)	125	49	80	2,709
(RF EE EE FR MB)	121	49	80	1,589



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).

Special Quote(s)

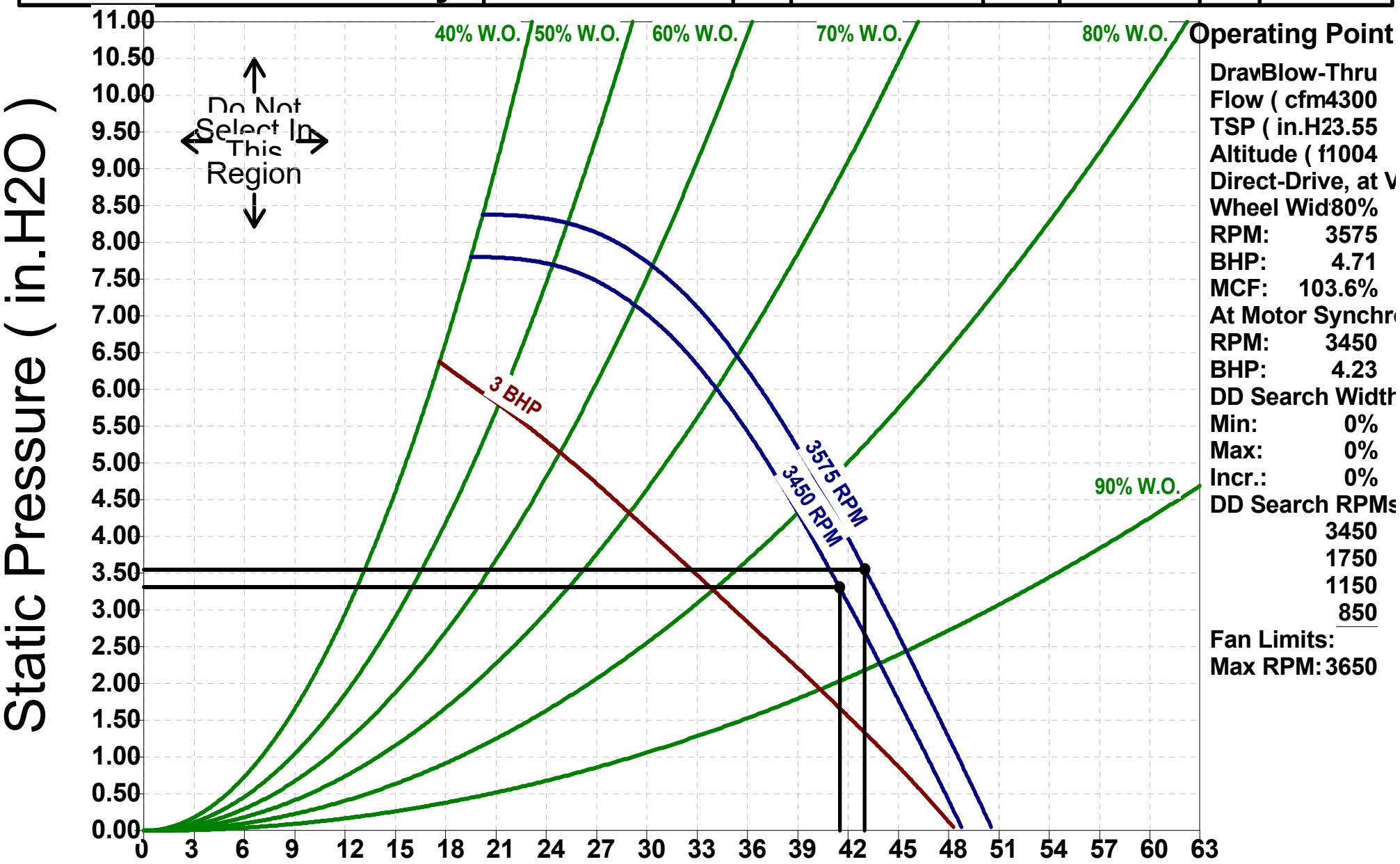
Details		
Segment	**SQ Number**	**Resolution**
Unit	SQ21-000440-003	AE-KR, ENG-SV MLP deduct to provide the following modifications: Shorten MB segment by 3", making it 21"L. Resize door to 15"W. Shorten EA portion of EE (EE1) by 15", making it 18"L. Ref. SQ-004 for Tamco dampers in EE segments. Crosscheck locations of EE parts. Delete EE-1 door. ADD 3" to EE-2, making it 24"L. Shorten DP segment by 18", making it 6"L. Delete DP door. Resultant overall unit length to be 213"L. Ref. submittal drawing for layout.
EE	SQ21-000440-004	***LONG LEAD TIME ITEM*** Tamco dampers have a 5 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install 15.25"Hx49"W Tamco PB 9000 OA damper in lieu of YW selected. Locate damper 6" downstream of MA wall and centered in unit width. Provide and install 15.25"Hx49"W Tamco PB 9000 EA damper in lieu of YW selected. Locate damper 6" upstream of MA wall and centered in unit width. Dampers include: Extruded Aluminum Frame Extruded Aluminum Blades Extruded EPDM Blade seals (SC option) Extruded silicon frame seals (SC option) Celcon bearings Leakage Class 1A at 1â W.G. static pressure differential Jackshafts
FS	SQ21-000440-006	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
FR	SQ21-000440-007	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
MB	SQ21-000440-009	AE-KR, ENG-SV Shorten MB segment by 3", making it 21"L. Resize door to 15"W. Ref. SQ-003 for details.
EE	SQ21-000440-010	AE-KR, ENG-SV Shorten EA portion of EE (EE1) by 15", making it 18"L. Ref. SQ-004 for Tamco dampers in EE segments. Crosscheck locations of EE parts. Delete EE-1 door. Ref. SQ-003 for details.
EE	SQ21-000440-011	AE-KR, ENG-SV ADD 3" to EE-2, making it 24"L. Ref. SQ-003 for details.
DP	SQ21-000440-012	AE-KR, ENG-SV Shorten DP segment by 18", making it 6"L. Delete DP door. Ref. SQ-003 for details.
Unit	SQ21-000440-014	***Information ONLY*** See attached CAD drawing.

FAN CURVE

Johnson Controls

Solution XT Fan Rating Curve

Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-4	1	XTI-42x69	FSP	L-DDPG	III	150-9-8(



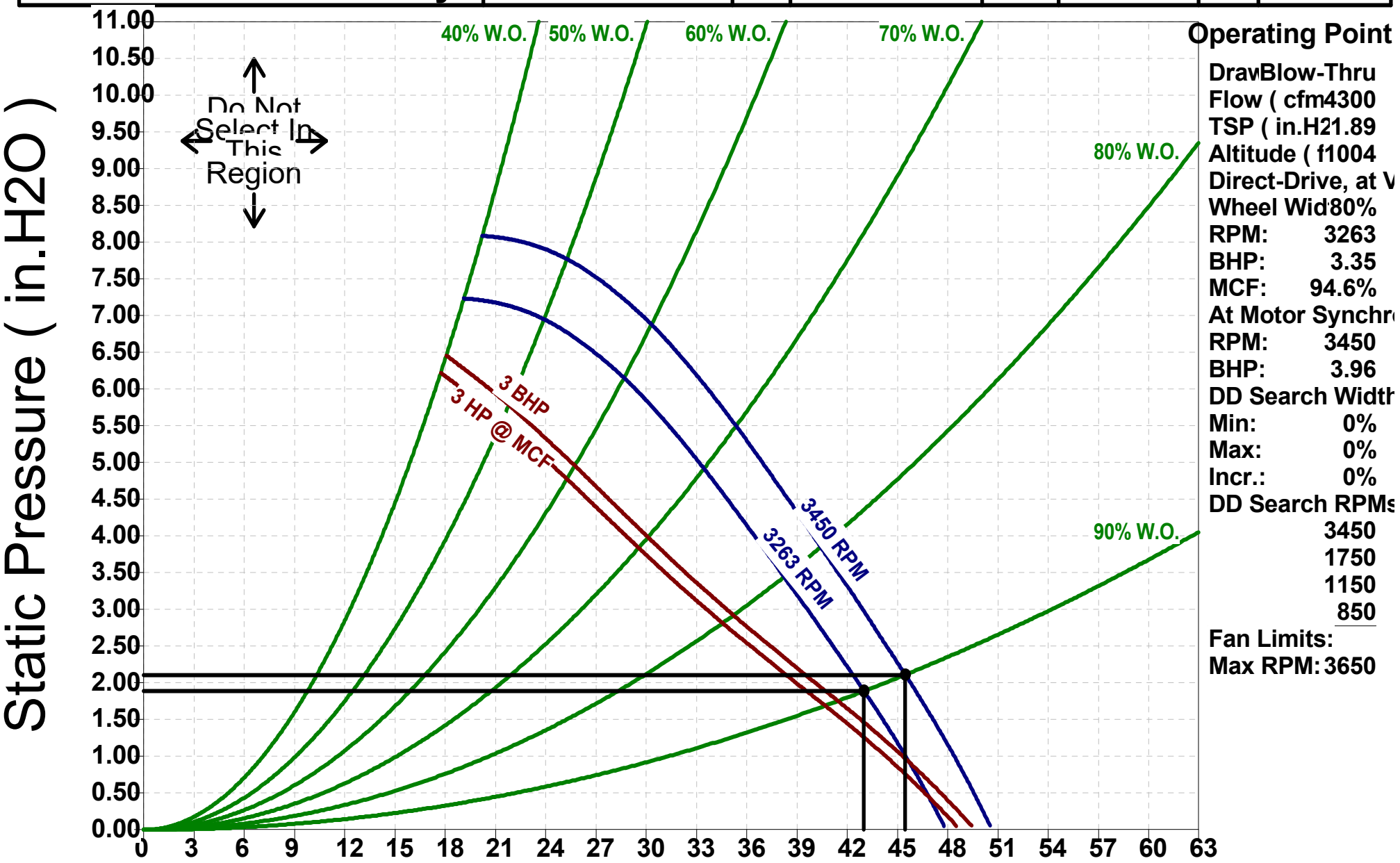
Operating Point

Draw	Blow-Thru
Flow (cfm	4300
TSP (in.H2	3.55
Altitude (f	1004
Direct-Drive, at V	
Wheel Wid	80%
RPM:	3575
BHP:	4.71
MCF:	103.6%
At Motor Synchr	
RPM:	3450
BHP:	4.23
DD Search Width	
Min:	0%
Max:	0%
Incr.:	0%
DD Search RPMs	
	3450
	1750
	1150
	850
Fan Limits:	
Max RPM:	3650

Johnson Controls

Solution XT Fan Rating Curve

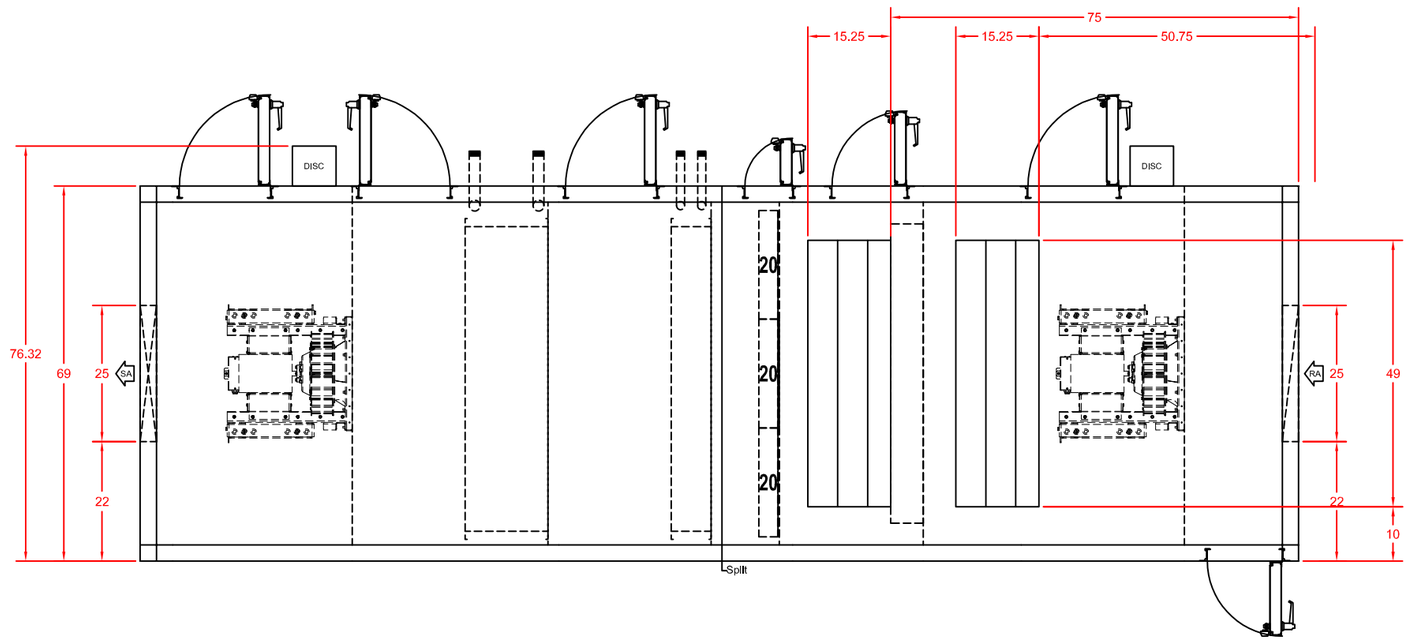
Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-4	1	XTI-42x69	FFP	L-DDPG	II	150-12-8



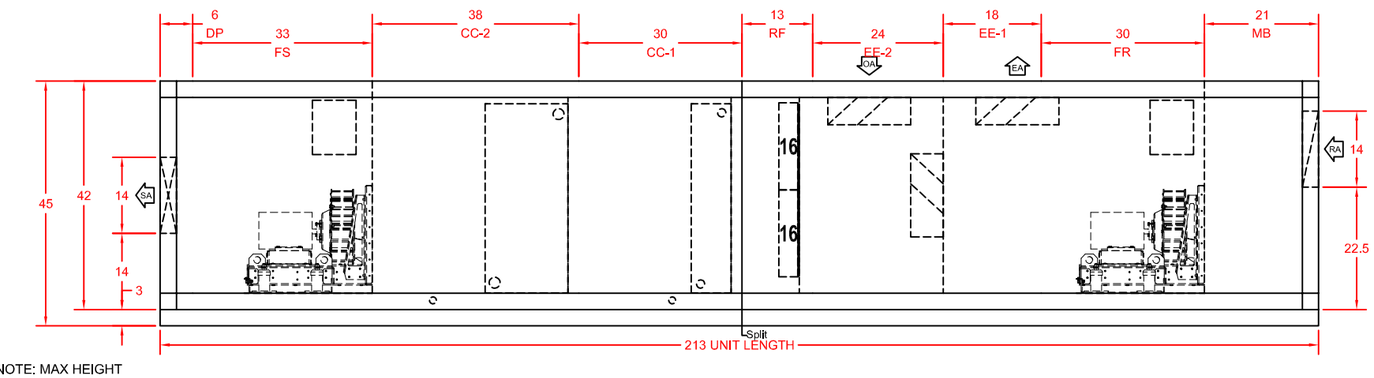
Operating Point

Draw	Blow-Thru
Flow (cfm	4300
TSP (in.H2	1.89
Altitude (f	1004
Direct-Drive, at V	
Wheel Wid	80%
RPM:	3263
BHP:	3.35
MCF:	94.6%
At Motor Synchr	
RPM:	3450
BHP:	3.96
DD Search Width	
Min:	0%
Max:	0%
Incr.:	0%
DD Search RPMs	
	3450
	1750
	1150
	850
Fan Limits:	
Max RPM:	3650

UNIT AND WIRING DRAWINGS



PLAN VIEW



* NOTE: MAX HEIGHT

ELEVATION VIEW

UNIT CONSTRUCTION

Model: Solution-XTI-42x69 **Construction: Indoor**

Motor Location:

Unit Weight: 3,916 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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

(S) - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	2"	2"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
FR	Return Fan - 150 - DDPG2
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 150 - DDPG2
DP	Discharge Plenum

DWG #	S21-2406
Version:	2
Ver. Date:	3/29/21
SQ:	21-000440
DRN BY:	KR
CKD BY:	1
SHEET:	1

PRODUCT DRAWING

SOLUTION XT AIR HANDLING UNIT DETAIL
MODEL: Solution-XTI-42x69
NOT FOR CONSTRUCTION

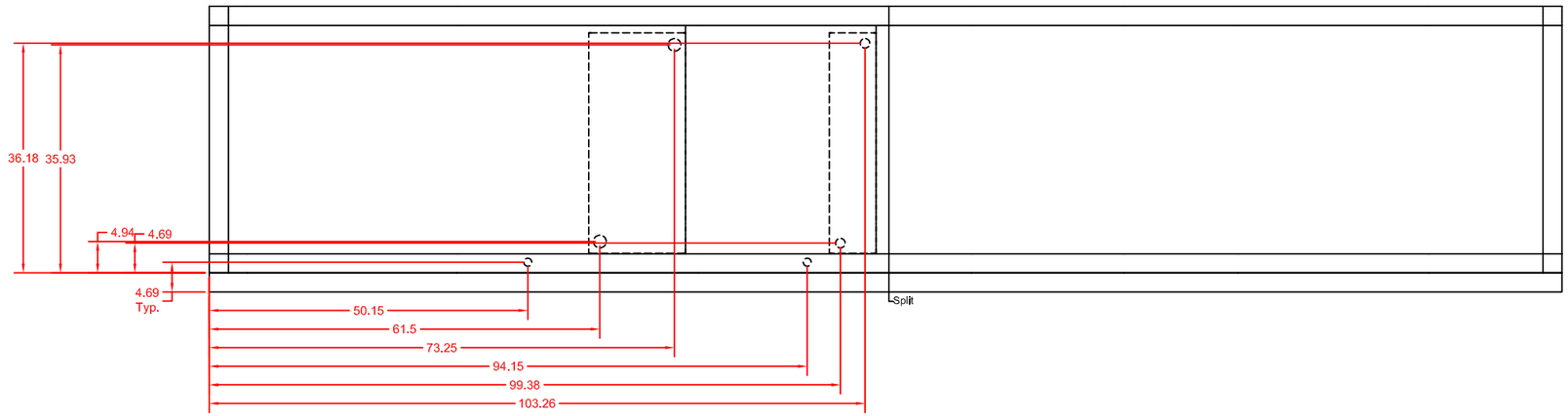
Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-4 - Sheet 1

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls



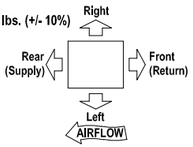
UNIT CONSTRUCTION

Model: Solution-XTI-42x69 **Construction:** Indoor

Motor Location:

Unit Weight: 3,916 lbs. (+/- 10%)

PLAN VIEW



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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

Ⓢ - Designates Shipped Loose Item(s)

PIPING CONNECTIONS (In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	2"	2"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
FR	Return Fan - 150 - DDPG2
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 150 - DDPG2
DP	Discharge Plenum

DWG #	S21-2406
Version:	COIL_v2
Ver. Date:	3/29/21
SQ:	21-000440
DRN BY:	KR
CKD BY:	1
SHEET:	1

Coil Connections

PRODUCT DRAWING

SOLUTION XT COIL CONNECTION DETAIL
MODEL: Solution-XTI-42x69
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-4 - Sheet 2

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls

RETURN
FAN
MOTOR #1

SUPPLY
FAN
MOTOR #1

SERVICE
LIGHTS / OUTLETS

PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-4 - Sheet 1	Date: 3/30/2021 8:14:3 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:	Johnson Controls

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

GENERAL PRODUCT DETAILS

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite™

Self-Supporting Extended Surface Pleated Filter

High performance MERV 8 mechanical air filter media is self-supporting and requires no metal support grid downstream. No metal components means the filter is completely incinerable after use.

Exclusive vForm™ Pleating Technology maintains uniform pleat spacing in every filter. In addition, vForm™ Pleating Technology insures the same pleat configuration used for decades in our original Multi-Pleat products. Same aerodynamic v-shaped pleat design, same superior performance.

Sturdy, moisture-resistant, beverage board perimeter frame and cross-braces provide structural integrity even in difficult operating conditions.

The media used in the Multi-Pleat Elite is extraordinarily resilient and is engineered to endure the rigors of shipping, handling, installation and operation.

Multi-Pleat Elite earns the Koch Green Icon for one or more following categories: Earns LEED Points, Reduces Energy Costs, Extends Filter Lifecycles, Conserves Resources, and Improves Indoor Environmental Quality.

Features:

- Exclusive vForm™ Pleating Technology
- MERV 8 performance rating
- Self-supporting pleats requires no metal reinforcement
- Low resistance to airflow reduces energy costs
- Moisture-resistant beverage board frame
- Completely incinerable

Koch Filter Corporation…Durable. Reliable. Versatile.

Bulletin No. K-MPE10

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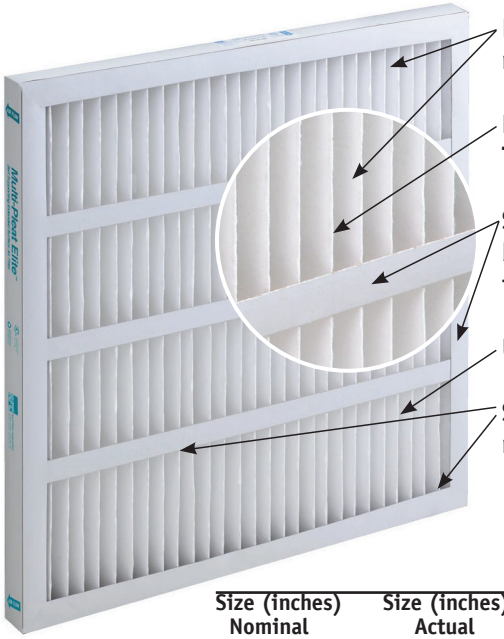
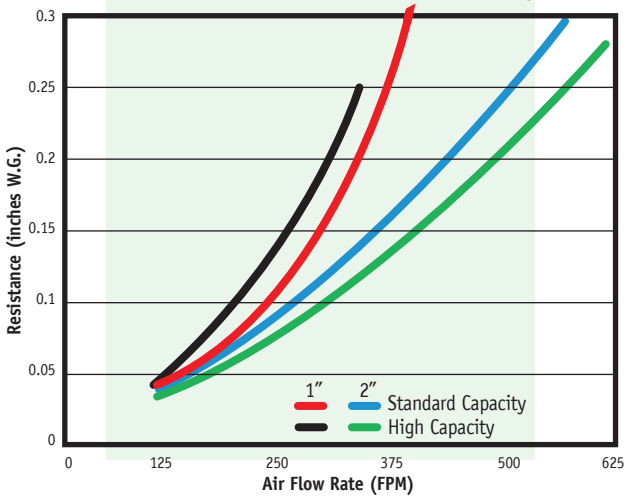
Filtration Products Crafted with Pride

Multi-Pleat Elite Technical Data



Initial Resistance vs. Filter Face Velocity



Additional Multi-Pleat Elite Product Information
ASHRAE Test Standard 52.2-2007.
Recommended maximum continuous operational temperature is 150° F (93°C).
Multi-Pleat Elite filters are classified as Underwriter's Laboratories Class 2 according to U.L. Standard 900.

Size (inches) Nominal W x H x D	Size (inches) Actual W x H x D	Capacity (CFM)	Standard Capacity Elite Initial Resistance (in. W.G.)	Standard Capacity Elite Media Area (Sq. Ft.)	High Capacity Elite Initial Resistance (in. W.G.)	High Capacity Elite Media Area (Sq. Ft.)
12 x 24 x 1	$11^{3/8}$ x $23^{3/8}$ x $^{3/4}$	600	0.29	3.3	0.20	3.8
14 x 20 x 1	$13^{1/2}$ x $19^{1/2}$ x $^{3/4}$	590	0.29	3.4	0.20	3.8
14 x 25 x 1	$13^{1/2}$ x $24^{1/2}$ x $^{3/4}$	730	0.29	4.3	0.20	4.8
15 x 20 x 1	$14^{1/2}$ x $19^{1/2}$ x $^{3/4}$	630	0.29	3.6	0.20	4.1
16 x 20 x 1	$15^{1/2}$ x $19^{1/2}$ x $^{3/4}$	670	0.29	3.8	0.20	4.3
16 x 24 x 1	$15^{1/2}$ x $23^{3/8}$ x $^{3/4}$	800	0.29	4.6	0.20	5.2
16 x 25 x 1	$15^{1/2}$ x $24^{1/2}$ x $^{3/4}$	840	0.29	4.8	0.20	5.4
20 x 20 x 1	$19^{1/2}$ x $19^{1/2}$ x $^{3/4}$	840	0.29	4.7	0.20	5.4
20 x 24 x 1	$19^{1/2}$ x $23^{3/8}$ x $^{3/4}$	1000	0.29	5.7	0.20	6.5
20 x 25 x 1	$19^{1/2}$ x $24^{1/2}$ x $^{3/4}$	1050	0.29	6.0	0.20	6.8
24 x 24 x 1	$23^{3/8}$ x $23^{3/8}$ x $^{3/4}$	1200	0.29	7.1	0.20	8.1
12 x 24 x 2	$11^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	1000	0.26	5.4	0.20	7.8
14 x 20 x 2	$13^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	980	0.26	5.5	0.20	7.9
14 x 25 x 2	$13^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1215	0.26	6.9	0.20	9.9
15 x 20 x 2	$14^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1050	0.26	6.0	0.20	8.4
16 x 20 x 2	$15^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1115	0.26	6.5	0.20	8.8
16 x 24 x 2	$15^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1340	0.26	7.8	0.20	10.6
16 x 25 x 2	$15^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1400	0.26	8.1	0.20	11.0
18 x 24 x 2	$17^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1500	0.26	8.4	0.20	12.3
20 x 20 x 2	$19^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1400	0.26	8.0	0.20	11.1
20 x 24 x 2	$19^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1675	0.26	9.6	0.20	13.4
20 x 25 x 2	$19^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1740	0.26	10.0	0.20	14.0
24 x 24 x 2	$23^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	2000	0.26	11.4	0.20	16.2
25 x 25 x 2	$24^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	2170	0.26	12.5	0.20	17.4

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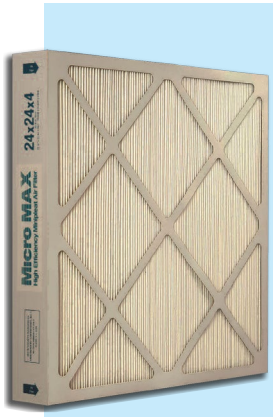
MicroMax™

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

Bulletin No. K-195-B

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 thress-per-carton. This multiple packaging means substantial reductions in shipping costs.

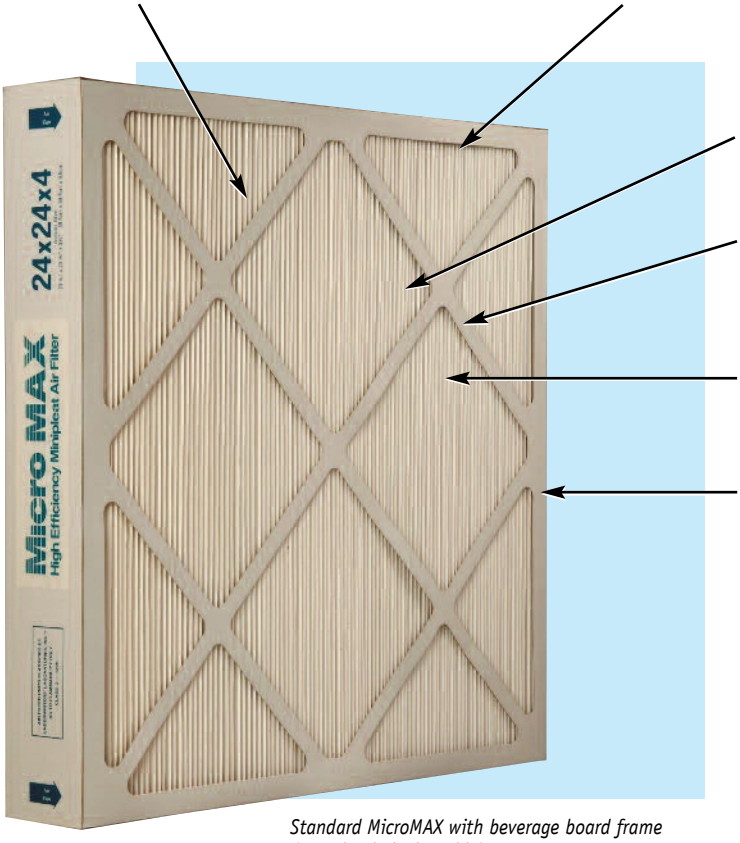
...Saves Space

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.

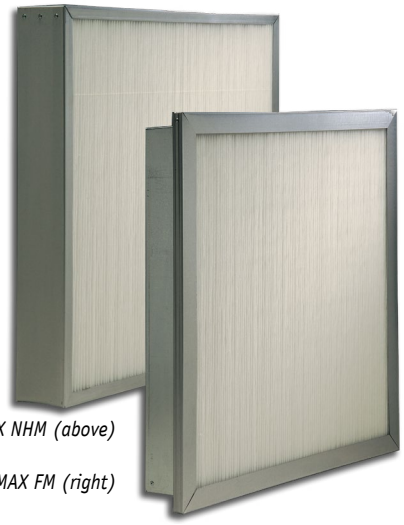
Specially-formulated adhesive bead insures even airflow and filter strength.

Available with double-walled, moisture resistant, beverage board frame (completely incinerable) or galvanized stell 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

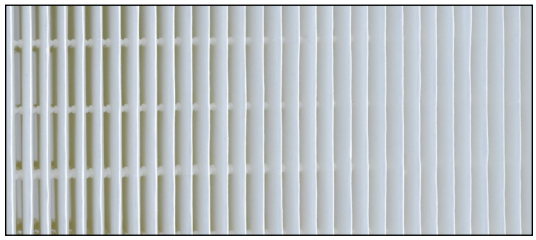
The media used in MicroMAX minipleat filters is composed of microfiberglass paper, treated with a specially-formulated, water-repllent binder. Millions of fibers are constructed into a Graded Density mat, with coarse fibers upstream and finer fibers on the air-exiting side. This dual-density insures 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 seprators uniformly secure the pleats to allow maximum air flow with minimal pressure drop.



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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	23-3/8x23-3/8x3-3/4	2000	0.68	1.5	120	20
MX-9-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.68	1.5	111	18
MX-9-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.68	1.5	106	16
MX-9-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.68	1.5	95	11
MX-9-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.68	1.5	70	9
MX-9-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.68	1.5	63	19
MicroMAX 80 - 85% (MERV 13)								
MX-8-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.59	1.5	120	20
MX-8-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.59	1.5	111	18
MX-8-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.59	1.5	106	16
MX-8-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.59	1.5	95	11
MX-8-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.59	1.5	70	9
MX-8-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.59	1.5	63	19
MicroMAX 60 - 65% (MERV 11)								
MX-6-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.40	1.5	120	20
MX-6-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.40	1.5	111	18
MX-6-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.40	1.5	106	16
MX-6-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.40	1.5	95	11
MX-6-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.40	1.5	70	9
MX-6-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.40	1.5	63	19

1 . Shipping weights listed above apply to MicroMAX with beverage board frames. Add 10 lbs. per carton for metal framed models.

2. Data based on ASHRAE 52.1 and 52.2.

3. MicroMAX filters are classified as U.L. Class 2. Testing conducted according to U.L. Standard 900.

4. Width and height dimensions are interchargeable. MicroMAX filters may be installed with pleats in either direction.

5. Filters may be operated at up to 125% of rated face velocity.

6. MicroMAX filters should be used with a perfilters for maximum performance.

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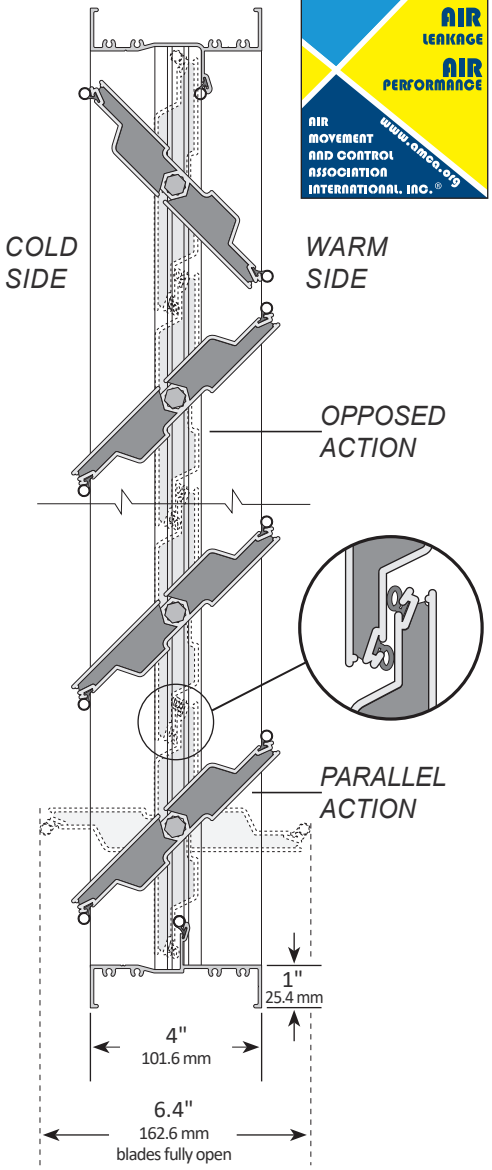
*Denotes manufacturing site.

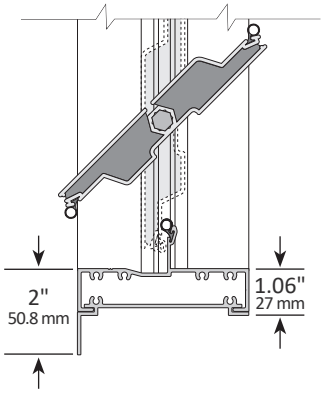
SUBMITTAL DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

Tampco 9000 SC dampers are provided on all AHU outside air intake and relief dampers as specified.

In Duct or Flanged to Duct Install Types



Extended Rear Flange Install Type



1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted.
3. Blade seals are extruded EPDM. Frame seals are extruded silicone. Seals are secured in an integral slot within the aluminum extrusions. Blade and frame seals are mechanically fastened to prevent shrinkage and movement over the life of the damper.
4. Bearings are composed of a Celcon inner bearing - fixed around a 7/16" *(11.11 mm)* aluminum hexagon blade pivot pin - rotating within a polycarbonate outer bearing inserted in the frame. This eliminates action between metal-to-metal or metal-to-plastic riding surfaces.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are zinc-plated steel. These provide a positive connection to blades and linkage.
6. Aluminum and corrosion-resistant zinc-plated steel linkage hardware is installed in the frame side, complete with cup-point trunnion screws for a slip-proof grip.
7. Dampers are designed for operation in temperatures ranging from -40°F *(-40°C)* to 212°F *(100°C)*.
8. Leakage Class 1A at 1 in. w.g. *(0.25 kPa)* static pressure differential. Standard air leakage data is certified under the AMCA Certified Ratings Program.
9. Dampers are custom made to required size, without blanking off free area. The blade stop is set at a fixed height and is a continuous and integral part of the top and bottom frames.
10. Dampers are available with either opposed blade action or parallel blade action.
11. Dampers are available in four install types: Installed In Duct, Flanged to Duct, Extended Rear Flange, and Square to Round Transition. *(See Install Type pages for details.)*
12. Installation of dampers must be in accordance with TAMCO's current on-line installation guidelines. *(Printed installation guidelines are provided with each damper shipment, however all technical information available on TAMCO's web site at www.tamcodampers.com supersedes information contained within printed versions.)*
13. Intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. *(See TAMCO Aluminum Damper Installation Guidelines.)*

OPTIONS FOR SP – STANDARD PROFILE:
For each option listed, replace the lines above with their corresponding lines below.

SC - SEVERE COLD TEMPERATURE OPTION:

3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.

MR - MOISTURE RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Frame is assembled using stainless steel screws.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

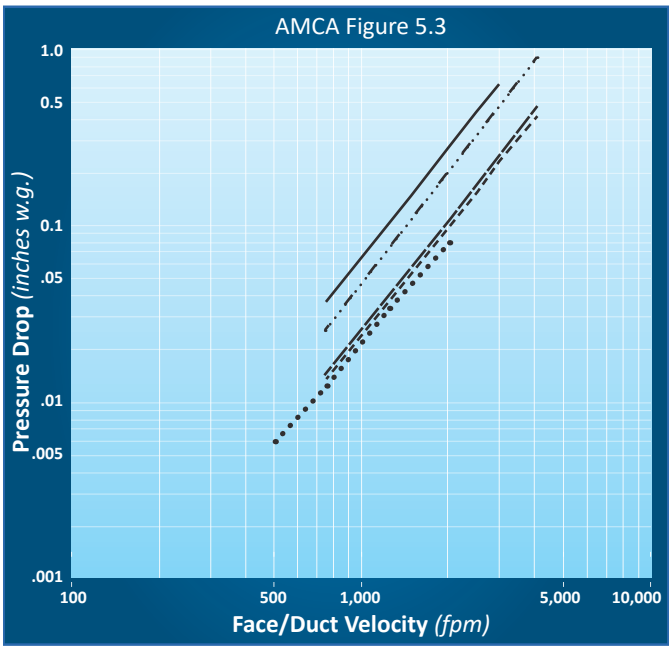
SW - SALT WATER RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Aluminum frame is clear anodized to a minimum depth of 0.7 mil *(18 microns)*. Frame is assembled using stainless steel screws.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted. Extruded aluminum blades are clear anodized to a minimum depth of 0.7 mil *(18 microns)*.
3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Clear anodized aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With no Option or with MR Option

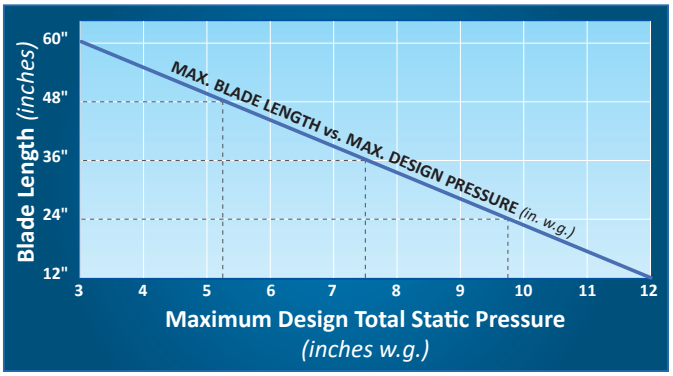
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" – – – *(610 mm x 610 mm))*
48" x 12" –·–·– *(1220 mm x 305 mm)*
12" x 48" — — *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, no Option or MR Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1
12.1 to 36.0 *(306 to 915)*	1A	1
36.1 to 48.0 *(916 to 1220)*	1A	1
48.1 to 60.0 *(1221 to 1524)*	1A	1

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* and a minimum of 70 in-lb *(7.9 N-m)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with no Option or MR Option, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

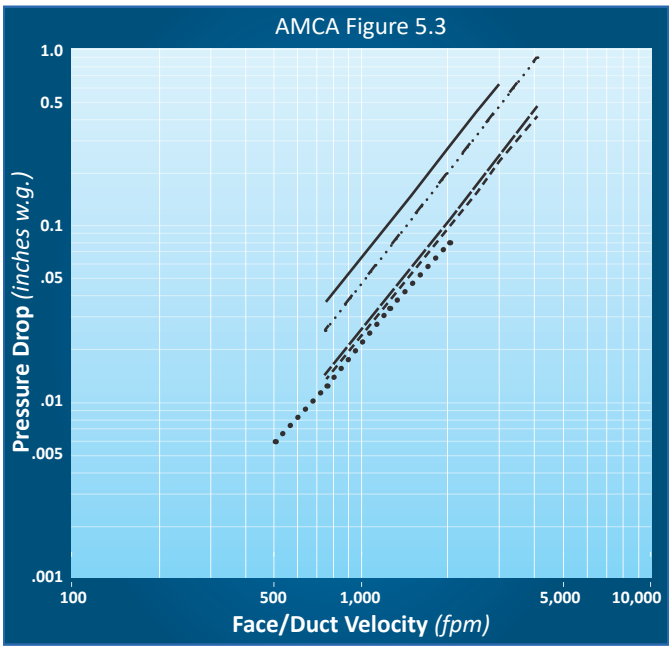
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)*	
	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
1A	3 *(15.2)*	n/a
1	4 *(20.3)*	8 *(40.6)*
2	10 *(50.8)*	20 *(102)*
3	40 *(203)*	80 *(406)*

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With SC or SW Options

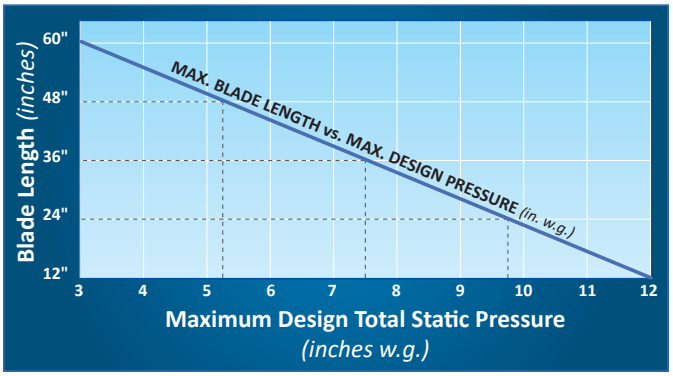
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" - - - *(610 mm x 610 mm))*
48" x 12" -·-·- *(1220 mm x 305 mm)*
12" x 48" —— *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, SC or SW Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1	1	1
12.1 to 36.0 *(306 to 915)*	1A	1	1	1
36.1 to 48.0 *(916 to 1220)*	1A	1	1	1
48.1 to 60.0 *(1221 to 1524)*	1A	1	n/a	n/a

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with SC or SW Options, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

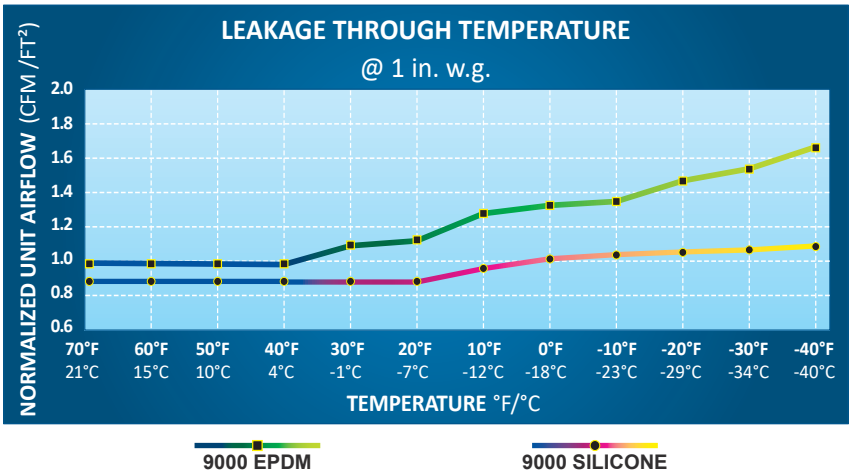
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)* 1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
1A	3 *(15.2)*	n/a	n/a	n/a
1	4 *(20.3)*	8 *(40.6)*	9.8 *(49.8)*	11.3 *(57.4)*
2	10 *(50.8)*	20 *(102)*	24.5 *(125)*	28.3 *(144)*
3	40 *(203)*	80 *(406)*	98 *(498)*	113 *(574)*

***NOTE:** TAMCO Leakage Class Rating is not provided for dampers measuring more than 48" *(1220 mm)* wide at 6 in. w.g. *(1.5 kPa)* and at 8 in. w.g. *(2.0 kPa)*, as the recommended blade length is exceeded at these static pressures. *(Refer to the Blade Design Pressure Limitations Chart.)*

EPDM VS. SILICONE UPGRADE OPTION BLADE SEALS

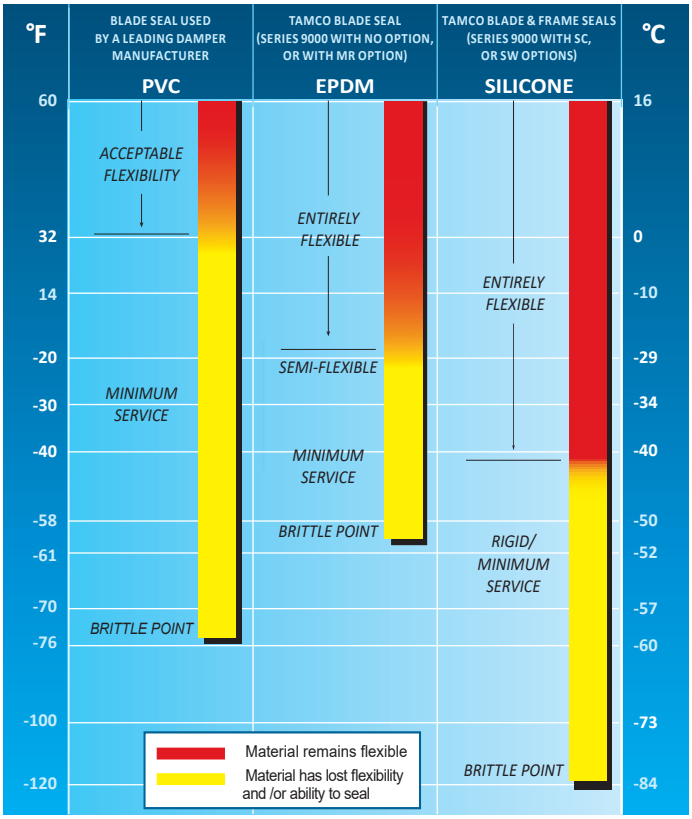
LEAKAGE COMPARISON GRAPH



Damper tests were conducted in a laboratory cold room to determine the effects of colder and severe cold temperatures *(down to -40°F (-40°C))* on sealing gaskets and leakage rates.

NOTE: Leakage rates shown in this graph are not licensed to bear the AMCA Seal. There is no AMCA standard dealing with the testing of leakage in temperatures below 32°F (0°C).

SEAL PERFORMANCE COMPARISON GRAPH



Minimum service temperatures and brittle points are as stated by material manufacturers. Flexibility, rigidity, and suitability status of various materials were determined by observation and operation of dampers in both cold room and cold box environments.

Provided on Mixed air dampers.

RUSKIN®

AMCA LICENSED
See Page 2

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

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 stystems. 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

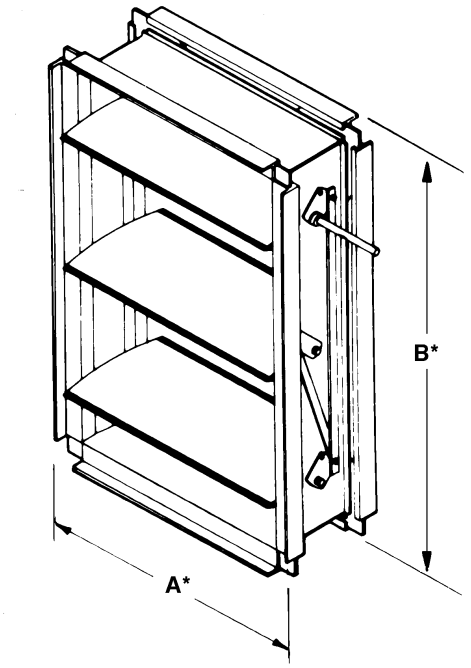
- Airfoil blade design for low pressure drop and less noise generation.
- Positive lock axles, noncorrosive bearings and shake proof linkage for low maintenance operation.
- Blade edge seals mechanically lock into the blade for superior sealing.

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.

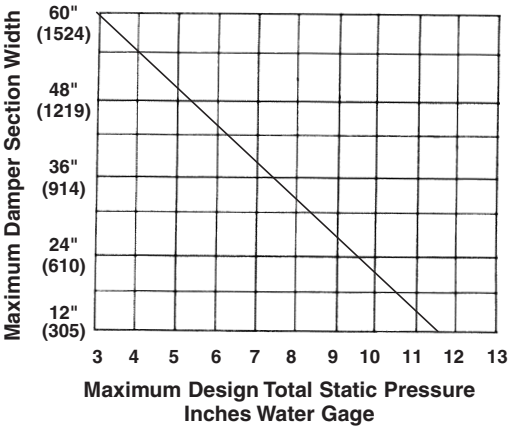
NOTE: Dimensions shown in parenthesis ( ) indicate millimeters.

*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.

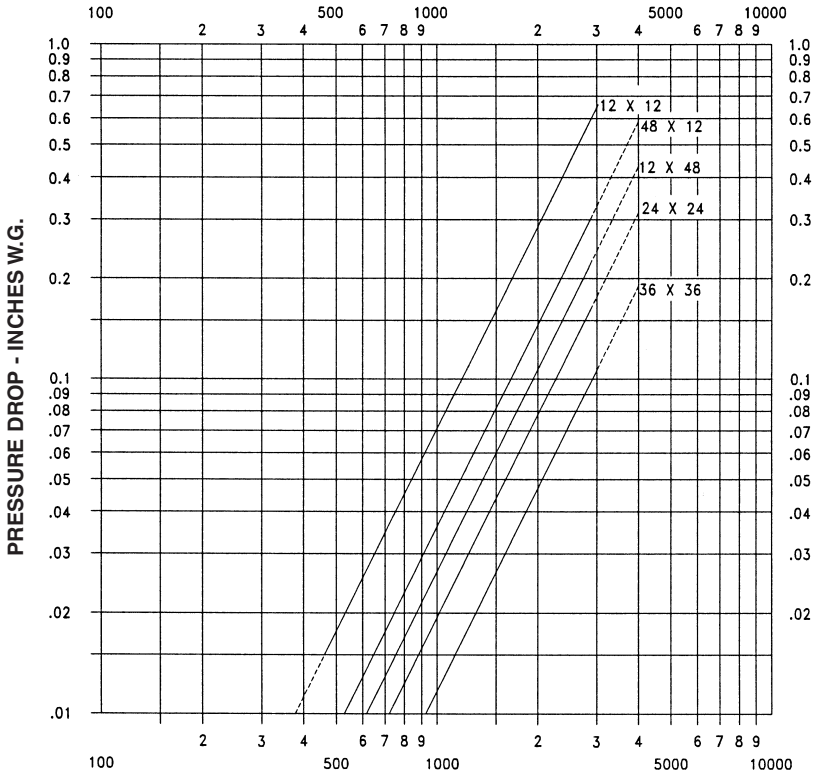
Ruskin Company certifies that the CD50 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA International Certified Ratings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

Pressure/ Class	Leakage, L/s/m² (ft³/min/ft²)			
	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



FACE VELOCITY - FEET/MINUTE
AMCA FIG. 5.3

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.

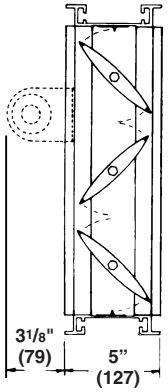
SOUND RATINGS

CD50 SOUND RATINGS

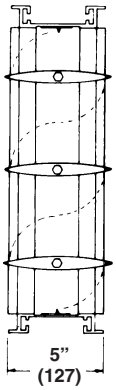
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12 (305 x 305)	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18 (457 x 457)	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125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

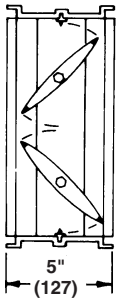
DIMENSIONAL INFORMATION



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.

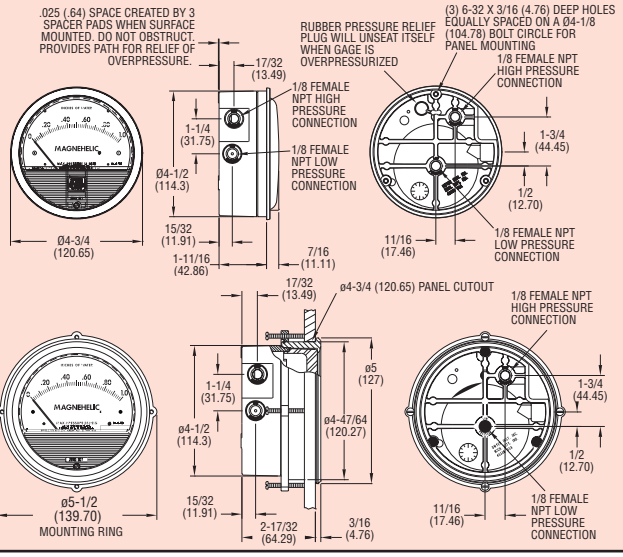
Blade edge seals shall be extruded double edge design with inflatable pocket which enables air pressure from either direction to assist in blade to blade seal off. Blades seals shall be mechanically locked in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade 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.

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%

RoHS



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.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of 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, standhang bracket and terminal tube with holder.

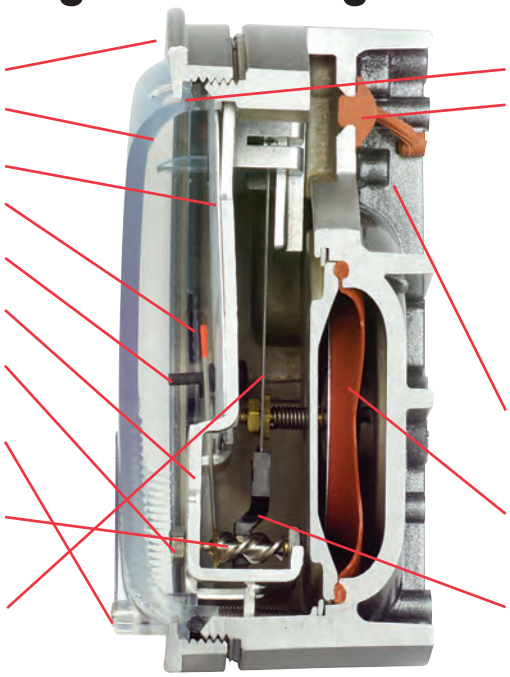
Model A-605 Air Filter Gage Accessory Kit
Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4″ aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings 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

Series 2000

Magnehelic® Gage Models & Ranges



Bezel provides flange for flush mounting in panel.

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

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

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

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

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

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

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

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

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

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

OVERPRESSURE PROTECTION
Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads. The blowout plug is not used on models above 180″ of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm. The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

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

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

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

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10

Model	Range, Pa
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-1000
Zero Center Ranges	
Model	Range, Pa
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, in w.c.	Range, Pa or kPa
2000-00D†••	0-.25	0-62 Pa
2000-0D†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

VELOCITY AND VOLUMETRIC FLOW UNITS
Scales are available on the Magnehelic® that read in velocity units (FPM, m/s) or volumetric flow units (SCFM, m^3/s, m^3/h). Stocked velocity units with dual range scales in inches w.c. and feet per minute are shown above. For other ranges contact the factory.
When ordering volumetric flow scales please specify the maximum flow rate and its corresponding pressure. Example: 0.5 in w.c. = 16,000 CFM.

ACCESSORIES
A-321, Safety Relief Valve
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-135, Rubber gasket for panel mounting

A-310A 3-Way Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A

ADVANCED DIRECT DRIVE PLENUM FANS

ENERGY STAR PARTNER

ISO9001 CERTIFIED

NO APPLICATION IS TO 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.

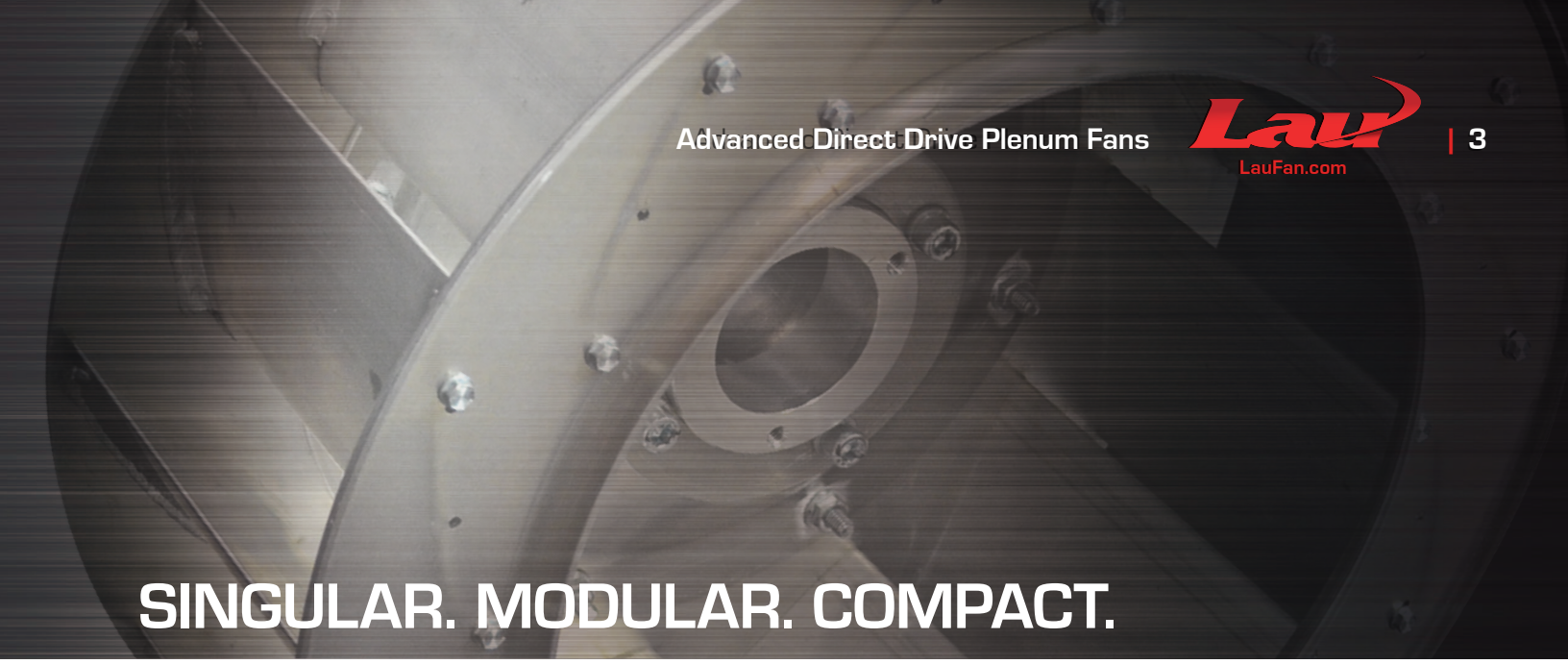
www.LauFan.com

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.

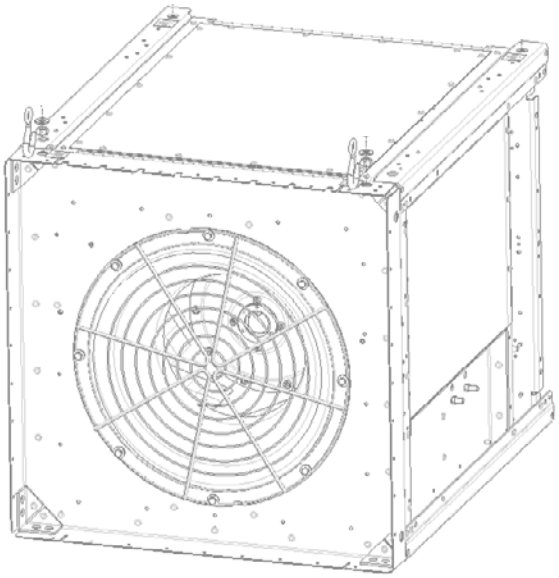
Eliminates all resonance conditions.

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.

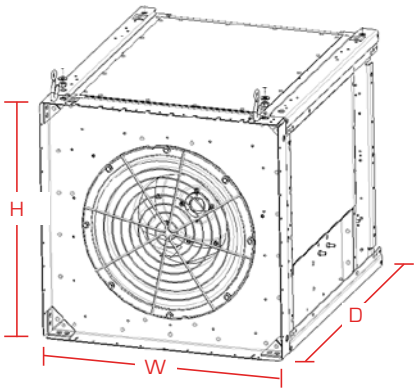
SIMPLE, STACKABLE APPLICATION

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

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

WARRANTY

STANDARD LIMITED WARRANTY
ENGINEERED SYSTEMS EQUIPMENT

SERVICE POLICY Supersedes: 50.05-NM2 (812) Form 50.05-NM2 (1212)

POLICY STATEMENT

Johnson Controls (JCI) warrants all equipment and associated factory supplied materials or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of eighteen (18) months from date of shipment, or twelve (12) months from date of start up, whichever occurs first. Subject to the exclusions listed below, Johnson Controls, at its option, will repair or replace, FOB point of shipment, such products or components as it finds defective.

Except for reciprocating replacement compressors, which Johnson Controls warrants for a period of twelve (12) months from date of shipment, Johnson Controls warrants Johnson Controls reconditioned or replacement materials, or installation or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of (90) days from date of shipment.

The above represents the minimum warranty policy Johnson Controls will extend to customers. Additional product specific coverage is provided as outlined in related warranty policies. No warranty repairs or replacements will be made until payment for all equipment, materials, or components has been received by Johnson Controls.

EXCLUSIONS:

Unless specifically agreed to in the contract documents, this warranty does not include the following costs and expenses:

1. Labor to remove or reinstall any equipment, materials or components.

2. Shipping, handling or transportation charges, including cranes, safety walks or other safety requirements specific to jobsites.

3. Cost of refrigerant.

4. Freight damage.

5. Field applied coatings added to any surface or heat exchanger.

6. Rental Chillers.

ALL WARRANTIES ARE VOID IF:

1. Equipment is used with refrigerants, oil, additives, or antifreeze agents other than those authorized by supplying factory.

2. Equipment is used with any material or any equipment such as evaporators, tubing, other low side equipment or refrigerant controls not approved by supplying factory.

3. Equipment has been damaged by freezing because it was not properly protected during cold weather or damaged by fire or any other conditions not ordinarily encountered.

4. Equipment is not installed, operated, maintained and serviced in accordance with instructions issued by Johnson Controls.

5. Equipment is damaged due to dirt, air, moisture, or other foreign matter entering the refrigerant system.

6. Equipment is not properly stored, protected, or inspected by the customer during the period from date of shipment to date of initial start-up.

7. Field coating of coil has occurred.

8. Equipment is damaged due to acts of god, abuse, including shipping damage, neglect, sabotage, or acts of terrorists.

9. Equipment has modifications carried out that have an effect on the original design of the product without such work being authorized by the factory. Any on site design changes or unit modification/replacement shall be authorized in advance by the factory.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIAL OR EQUIPMENT INVOLVED, NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT, (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS SUPPLIERS AND SUBCONTRACTORS.

Reference: BOS 03-23.105.BEGTM

P.O. Box 423, Milwaukee, WI 53203
www.johnsoncontrols.com

Printed in USA 50.05-NM2 (1212)
Replaces: 50.05-NM2 (812)

STANDARD LIMITED LABOR WARRANTY
SOLUTION XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: SOLUTION XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for eighteen (18) months from the date of shipment from Seller's facility or twelve (12) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

Notification of defect and any warranty claim must be made in writing, postage paid, with a brief written description of the problem to Buyer's local Johnson Controls' sales/service office. Nothing herein us intended to provide warranty coverage to lessees or anyone other than Buyer and no third-parties are intended to be beneficiaries of this warranty.

BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

(Product Code Ref: 8513

5 YEAR PARTS & LABOR LIMITED WARRANTY YORK®
SOLUTION™ XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: YORK® SOLUTION™ XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for sixty-six (66) months from the date of shipment from Seller's facility or sixty (60) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

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BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

RECEIVING/RIGGING

RECEIVING / RIGGING INSTRUCTIONS

The installing contractor is responsible to provide Johnson Controls / YORK with a contact to coordinate the delivery of the equipment in this submittal. Please fill out the information requested in the Submittal Approval Form section in the back of this submittal.

It is the installing contractor's responsibility to verify the following prior to signing the bill of lading presented by the transportation company:

- Ensure everything on the bill of lading was delivered.
- Visually perform a thorough inspection of all equipment for any signs of shipping damage

Any short-shipments or shipping damage must be noted on the bill of lading prior to signing.

The transportation company will provide you withinstructions for filing a claim. It is the installing contractor's responsibility to work directly with the transportation company to resolve any shipping claims.

1.0 PRE-INSTALLATION

RECEIVING

All units leaving the plant have been inspected to ensure the shipment of quality products. All reasonable means are utilized to properly package the air handling units.

CAUTION

Johnson Controls will NOT be responsible for any damage or loss of parts in shipments or at the job site. Receiver is solely responsible for noting Bill of Lading and filing freight claims IMMEDIATLY. Refer to Shipping Damage Claims Form 50.15-NM available from Johnson Controls Sales representative.

RIGGING OF INDOOR AND OUTDOOR UNITS

WARNING

All lifting points must be used to avoid personal injury or death and to avoid damage to the equipment.

NOTE

SHIPPED LOOSE DAMPERS. When large units are ordered with MZ segments in rear discharge location (on the end of the unit), the units will ship with the top section (hot deck) separated. In these cases, the complete multizone damper assembly (hot deck and cold deck together) will ship loose.

FIG. 1-1 – RECOMMENDED LIFTING WITH FOUR LIFTING POINTS

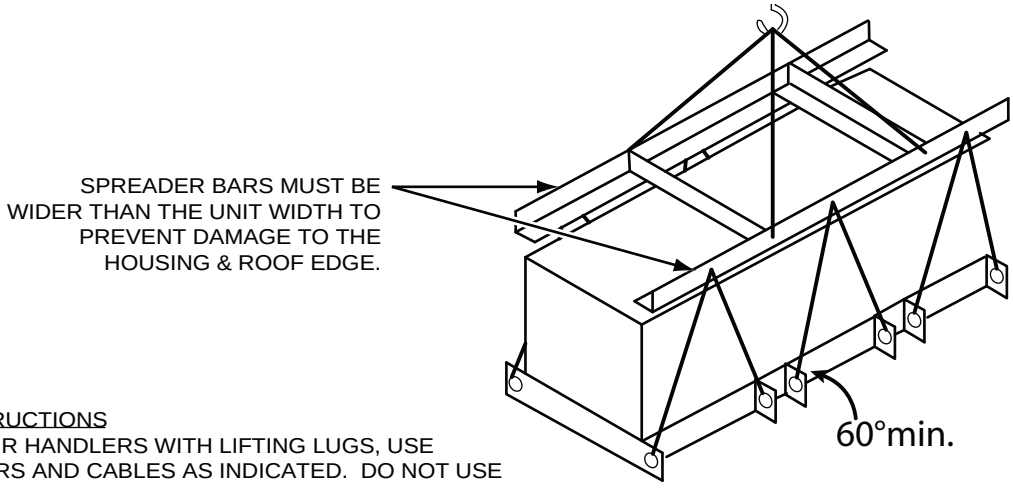


FIG. 1-2 – RECOMMENDED LIFTING WITH MULTIPLE POINTS

OFF-LOADING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the air and watertight seams in the unit casing. Prevent unnecessary jarring or rough handling.

For lifting air handling units with lifting lugs or corner connectors; proper spreader bars and hoisting line must be used when rigging to prevent damage to the unit casing *(see Fig. 1-1)*. When lifting long units a special system must be used to insure a minimum 60° angle between lifting lug and spreader bar/frame *(see Fig. 1-2 & Table 1-1)*. It is also mandatory that an experienced and reliable rigger be selected to handle unloading and final placement of the equipment. The rigger must be advised that the unit contains internal components and that it be handled in an upright position. Care must be exercised to avoid twisting the equipment structure.

NOTE

Refer to the submittal for the section weights.

TABLE 1-1 - SPACING REQUIREMENTS FOR OFFLOADING LONG UNITS		
UNIT HT.	MAX. LIFTING LUG SPACING	MIN. LIFTING STRAP LENGTH
≤ 72"	120"	120"
> 72"	192"	192"

NOTE

All lifting lugs must be used to avoid damage to unit. If unit does not have lifting lugs, use bottom corner connectors and intermediate raceway lifting lugs. Do not use top corner connectors.

Unit section weights are furnished on the job submittal. Due to the variance in weight of each unit design, it is not possible to list unit weights in this instruction. The submittal must be referred to when selecting a crane for rigging and figuring roof weight loads. Contact your Johnson Controls Sales representative if you have any questions regarding unit weights.

CRANE AND SPREADER BARS

See Fig's 1-1 and 1-2.

FORK LIFT

Forklifts should not be used to off-load air handlers except in special circumstances. If moving air handling equipment with a fork lift or similar means becomes necessary, always make sure the lifting forks are long enough to reach from the fork truck to the opposite side and slightly beyond. It is helpful to leave the shipping blocks attached to the bottom of the equipment until in its final location. There is no structural support under the equipment except what is visible from the perimeter.

COME-A-LONGS OR POWER PULL

See Fig1-3.

LD09613

FIG. 1-3 – TYPICAL COME-A-LONG TYPES

SHACKLES

Refer to Fig. 1-4 for proper lifting with hook and shackle at corners. Refer to Fig. 1-5 for proper lifting with hook and shackle at lifting lugs.

NOTE

Fig's 1-4 and 1-5 show YORK Solution unit without baserails. When baserails are present, always use all lifting lugs pre-mounted on baserails. Do not lift by corners.

LD13767

FIG. 1-4 – PROPER LIFTING WITH SHACKLE AT CORNER

LD13768

FIG. 1-5 – PROPER LIFTING WITH SHACKLE AT LIFTING LUG

LD13766

FIG. 1-6 – RECOMMENDED LIFTING WITH BASERAIL

INSPECTION

CHECK FOR DAMAGE

RECEIVER RESPONSIBILITY

Receiver is solely responsible for noting freight bill and filling freight claims IMMEDIATLY *(see "Receiving" in this section).*

Visible damage should be noted on the signed and dated bill of lading with a request that the carrier inspect the damage within 72 HRS. of notification. The shipping wrapper must be removed and replaced with a tarp or similar protective covering. Any concealed damaged reported after 15 days will compromise a claim settlement. Inspection requests may be done by telephone or in person, but should be confirmed in writing. If assistance is needed with the claim process, contact your Johnson Controls Sales representative.

INDOOR UNITS

It is Johnson Controls intention that a shipping wrapper be applied to unpainted indoor units for protection from weather, road dirt, etc. during inland transit and that the wrapper be removed at the time of delivery to allow for a thorough inspection, both inside and out.

OUTDOOR UNITS

Outdoor units are not fully wrapped. Exposed openings are covered for protection from weather, road dirt, etc. during inland transit. A thorough inspection, both inside and out, should be done at the time of delivery.

CHECKING FOR NON MOUNTED PARTS

- Check the packing list for non-mounted ship loose parts. (Check inside all segments.)
- Packing list will note how many and type of parts.
- Shortages must be reported within 10 days after receipt of order.

See Ship Loose Parts, Fig 2-8 thru 2-14

STORAGE

SHORT-TERM STORAGE

Indoor Units:

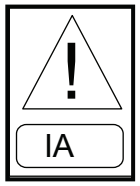
Under no circumstances should outdoor storage be used

Outdoor Units:

Be sure all shipping covers are reapplied after inspection, or tarps are used during storage.

Short-term storage is considered six (6) months or less from date of shipment. Storage maintenance during this time is usually limited to the following.

- Rotate fans every four (4) weeks beginning upon arrival to prevent moisture from damaging bearing.
- If the units are to be stored out-of-doors, prior to installation, special care must be taken to cover and protect the units from dust, rain, snow and rodents. The units must be protected from constant exposure to rain and snow.
- Store on a firm, flat surface to prevent distortion. Block the unit off the ground to protect components from water.



Protect all parts and porous materials from rain and other sources of moisture. Decontaminate or replace as needed to ensure microbial growth is not introduced to the air handler.

- The unit must also be protected from damage to the exterior of the cabinet or coil connections by construction vehicles and personnel.

Equipment ReSubmittal For Approval Rev 2

Project:

VEGA AMERICAS

York Solution XTI Indoor Air Handling Unit (AHU-5)

SUBMITTED TO:
FELDKAMP ENTERPRISES

ATTENTION: HEATHER WYATT

DATE:
April 1, 2021

SUBMITTED BY:

CHARLES E. LEWIS
SYSTEMS APPLICATION ENGINEER
Johnson Controls
Equipment Sales – Cincinnati, OH

TABLE OF CONTENTS

Submittal Comments

- **Verify Single Point Power Connection, Required For Unit.**
  AHU Can Not Be Single Point Power. JCI Is Not Providing Motor Control For Either The Supply Fan Or Return Fan. Please Coordinate With Electrical Contractor.

- **Verify APD Was For Unit At Full 20,000 CFM Of Unit, Not Reduced Heating Airflow**
  APD Are Calculated With The Design CFM

- **Cooling Coil: Provide Minimum 756 Total MBH And 567.7 Sensible MBH Per Schedule**
  JCI Has ReSelected Coil To Meet Capacity Requirements On Schedule

- **Coordinate Transitions From Unit Opening To Relief Air Duct**
  JCI Will Coordinate With Install Contractor

- **Verify Updated Unit Dimensions Do Not Conflict With Anything In Model**
  JCI Will Coordinate With Install Contractor

- **Coordinate Both Relief Air and Return Air Connections**
  JCI Will Coordinate With Install Contractor

Submittal Notes

- JCI has officially announced a 2.5% price increase for the AHUs provided in this submittal. In order to avoid the price increase JCI will need to receive approved submittals and a release of the AHUs by 4-23-21 in order to process and meet the required factory release date of 4-30-21. If JCI receives this AHU submittal approved after 4-23-21, JCI will required a 2.5% price increase to meet costs driven by macro-economic factors.
- All air intake and relief dampers are provided with Tampco 9000 SC as specified.
- AHU-1 and AHU-2 are provided with 65kA SCCR supply fan circuit ratings.
- Lead Time is approximately 13 weeks from time of approved submittal.
- Before release, Feldkamp is to verify that all split sections are as required for AHUs to be maneuvered on site.
- Field installed VFD's will be furnished and installed by FEI per spec section 237300, 2.10 A.
- All controls to be field mounted on the AHU by JCI controls division.
- Outside airflow measuring station provided and field installed by JCI controls division.
- AHU is provided with base rail height per detail drawing M200. Feldkamp to provide any changes before release on returned submittal.
- Field leakage testing is not included or available per ASHRAE 111 standards. Any field leakage testing is to be provided by Feldkamp. AHU will conform to ASHRAE Standard 111 Class 6 low-leak casing design.
- AHUs will include a 5 year parts and labor warranty from time of substantial completion of startup.
- Due to the short filter section scaled on detail drawing M200, some filters will be provided as front loading with no side access door. The front access provides better access to all of the filters due to the deep width of these units. Providing side access will increase the overall length to the AHUs that are currently exceeding the maximum length specified.
- All AHUs and their current sizes with connected ductwork have been plotted using Feldkamp's shop drawings. Currently there does not seem to be anything that could cause an issue due to some of the AHU units being longer or wider.
- All fan segments are sized for fan/motor removal.
- Three sets of filters will be provided for each AHU.
- **Feldkamp to verify unit handing configuration before release**
- **Feldkamp to verify overall unit dimensions for space before release.**

- **Feldkamp to verify required shipping splits before release. Every additional shipping split will increase the length by 3”**
- **Feldkamp to verify all duct connections before release.**
- Disconnects are furnished on all supply fans via MMP panel.

PERFORMANCE

YORK® Solution™ Air Handling Unit Performance Report

Job Summary

Project Name:	VEGA Americas - Bid Day		
Unit Tag(s):	AHU-5		
Quantity:	1	**Environment:**	Indoor

Unit Overview

Model	Airflow (CFM)	Altitude (ft)	Operating Weight (lbs)
XTI-72x126	20,000	1,004	11,007

Segment Sequence

(DP FS)(CC-2 CC-1)(RF EE)(EE)(FR XA MB)

Unit Construction

Casing Details

Segment(s)	Thickness (in)	Exterior Paint	Exterior Gauge and Material	Interior Gauge and Material	Insulation Thickness and Material	Bulkhead Material
MB , XA , FR , EE , RF , CC-1 , CC-2 , FS , DP	2	None	STD Ga. G-90 Galvanized	STD Ga. G-90 Galvanized	2" Foam	Galvanized

Base Details

Segment(s)	Base		Floor				
	Material	Paint	Gauge and Material	Paint	Insulation	Attachment	Tread Plate
MB , XA , FR , EE , RF , CC-1 , CC-2 , FS , DP	Standard Formed Steel	None	STD Ga. G-90 Galvanized	None	N/A	-	None

Unit Electrical

Circuit Details

Circuit #	Component(s)	V/Ph/Hz	Full Load Amps (FLA)	Minimum Current Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
1	Manual Motor Protection	460/3/60	36.2	40.7	50.0
2	Manual Motor Protection	460/3/60	14.4	16.2	20.0
3	Lights and Outlets	120/1/60	-	-	15.0

Electrical Details

Minimum Unit SCCR	5 kA rms Symmetrical	**ETL Label (UL1995/NEC-2002)**	Yes

Unit Light Type	Unit Light Switch
Vaporproof LED	External

Supply Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	II	245	100	100	2	20,000	1,004	4.55	2.50	1,877	12.45

Drive Type	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Isolation Type	Total Eficiency (%)	Outlet Velocity (ft/s)	Max Speed (RPM)
Direct Drive	SWSI	Airfoil	Aluminum	Galvanized Steel	Blank-off Plate	Yes (K=2941.00)	Rubber Pad	57.45	7,692	2,269

Motor Details

Type	Manufacturer	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	Motor Speed (RPM)	Frame Size	Full Load Amps (Amps)	Efficiency	Location
TEFC	Baldor	15.0	460/3/60	2	H	1,800	254	18.10	Premium	Direct Drive

At Motor Synchronous Details

TSP (in w.g.)	Total Air Flow (CMF)	Fan Speed (RPM)	Motor Correction Factor(%)	Fan Power (BHP)	Total Eficiency (%)
4.55	10,000	1,877	92.4	12.45	57.45

Return Fan(s)

Performance Details

Fan Manufacturer	Model	Class	Size	% Wheel Width	% Wheel Diameter	Quantity	Total Airflow (CFM)	Altitude (ft)	TSP (in w.g)	ESP (in w.g)	Fan Speed (RPM)	Fan Power (BHP)
Lau	SF	II	245	120	100	2	20,000	1,004	0.53	0.50	1,245	2.8

Max RPM	Fan Power with Drive Loss (HP)	Wheel Type	Blade Type	Wheel Material	Base Material	Fan Flow Isolation	AirFlow Monitoring	Inverter Drive Balancing	Isolation Type	Thrust Restraints
2,269	-	SWSI	Airfoil	Aluminum	Galvanized Steel	Blank-off Plate	Yes (K=2941.00)	-	Rubber Pad	-

Drive Type	Drive SF	Spare Belts	Spare Sheave	Inlet Screen	Fan Cage	Belt Guard	Lube Lines	Bearings	Fan Stand	Motor Removal Rail	Seismic Snubber
Direct Drive	-	-	-	Yes	-	-	None	-	-	-	-

Motor Details

Type/MFG	Motor Power (HP)	V/Ph/Hz	Quantity	Insulation Class	RPM	Frame Size	FLA (Amps)	Efficiency	Location	SGR
TEFC/Baldor	5.0	460/3/60	2	H	1,200	215	7.20	Premium	Direct Drive	Yes

Water Coil(s)

Performance[1] Details

Coil	Fluid Type	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
							DB	WB	DB	WB									
CC-1	Water	1	8	4	301	301	41.9	-	66.7	-	11,000	232	0.03	10.9	150.0	93.7	1.3	1.0	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size (in)	
CC-1	0	Right	0	Steel	0	MPT	1	1-1/2	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-1	1	Full	60.50	113	47.5	AL	.006	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-1	-	250	56	.9	Copper	Galvanized	304 Stainless Steel	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)

Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7H
- CDW Tube Spacing: 1.50 x 1.30
- CC-1[1][0]: This coil is 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.

Glycol Coil(s)

Performance[1] Details

Coil	Glycol Type	Glycol %	Rows	Fin Spacing (FPI)	TPC	TMBH	SMBH	EAT (°F)		LAT (°F)		Airflow (CFM)	FV (ft/min)	APD	Flow (GPM)	EWT (°F)	LWT (°F)	Fluid Vel. (ft/s)	WPD	Alt. (ft)
								DB	WB	DB	WB									
CC-2	Propylene	30%	10	10	10	776	574	78.7	65.5	52.2	52.1	20,000	421	0.94	122.0	45.0	58.4	3.5	17.6	1,004

Construction Details

Coil	Location		Offset (in)	Connection Material[3]	Connection Rotation (degrees)	Connection Type	Supply Connection (Per Coil)		Coil Stack Rack
	Coil Index[2]	Connection					Qty	Size	
CC-2	0	Right	0	Steel	0	MPT	1	3	-

Coil	# of Coils High	Face Type	Total Fin Height (in)	Fin Length (in)	Coil Face Area (ft²)	Fin Material	Fin Thickness (in)	Fin Type	Tube Diameter (in)	Tube Material	Tube Wall Thickness (in)
CC-2	1	Full	60.50	113	47.5	AL	.010	Sine	5/8	Copper	.025

Coil	Coil Coating	Dry Weight (lbs)	Fluid Weight (lbs)	Fluid Volume (ft³)	Header Material	Casing Material	Intermediate Drain Pan Material	Fouling Factor (hr.ft².°F/BTU)
CC-2	-	1804	522	8.1	Copper	Galvanized	304 Stainless Steel	-

Coil Notes

- [1]Performance is shown for the entire coil bank. Performance is not per coil.
- [2]Coil index indicates position in segment. Example: CC-1, index 0; Spacer, index 1; CC-2, index 2
- [3]Johnson Controls suggests using red brass or copper connectors when the coil is to be attached to a copper or brass piping system.
- All coils are rated with a fouling factor of 0.00000 hr.ft².°F/BTU unless otherwise noted
- Ratings are for coils manufactured by Johnson Controls, Inc., 507 E. Michigan St., Milwaukee WI 53202.
- Coil DLL Version: 7.7I
- CDW Tube Spacing: 1.50 x 1.30
- CC-2[1][0]: This coil is 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.

Drain(s)

Details			
Segment	Drain Pan		
	Liner Material	Connection Location	Liner Coating
CC-1	Galvanized	Right	None
CC-2	Stainless Steel	Right	None

Filter(s)

Details							
Segment	Type	Depth	Filter Loading	Media/MERV	# of Spares	Spare Filter Media	Frame Material
RF	Pre-Filter	2"	Upstream	Pleated 30% (MERV 8)	2	Pleated 30% (MERV 8)	Galvanized
RF	Primary Filter	4" Mini-Pleat	Upstream	80-85% Eff, (MERV 13)	2	80-85% Eff, (MERV 13)	Galvanized

Sizes						Filter Gauge Details		
Segment	Filter	1st Filter Size H x W (in)	1st Qty	2nd Filter Size H x W (in)	2nd Qty	Location	Type	Range (in w.g)
RF	Pre-Filter	20x24	12	20x20	3	Door	Magnehelic	0 - 2
RF	Primary Filter	20x24	12	20x20	3	Door	Magnehelic	0 - 2

Damper(s)

Details													
Segment	Air Path	H x W (in)	Qty	Total Face Velocity (ft/min)	Face Area	CFM	Minimum Allowable OA CFM	Damper Type	Damper Config	Model	Material	Blade Orientation	Actuator Type	Fail Position
EE	Exhaust Air	26.75 x 108.00		997		20,000	-	Control	100%	CD50	Aluminum	Parallel	-	-
EE	Outside Air	26.75 x 108.00		997		20,000		Insulated	100%	CDTI50	Aluminum	Parallel	-	-
EE	Mixed Air	26.75 x 108.00		997		20,000	-	Control	100%	CD50	Aluminum	Parallel	-	-

Door(s)

Details										
Segment(s)	Location	Swing	Hinge Location	H x W x T (in)	View Port	Test Port	Spare Gasket	Thermal Break	Safety Latch	Noncontact Safety Interlock
EE, DP	Right	Outward	Upstream Side	66 x 24 x 2	STD Double Pane	Yes	-	-	Yes	-
EE	Right	Outward	Upstream Side	66 x 24 x 2	STD Double Pane	Yes	-	-	-	-
CC-1	Right	Outward	Upstream Side	66 x 18 x 2	STD Double Pane	Yes	-	-	-	-
CC-2	Right	Outward	Downstream Side	66 x 18 x 2	STD Double Pane	Yes	-	-	-	-

Motor Control(s)

Details										
Segment	Type	MMP	V/Ph/Hz	Input/Output Amps*	Efficiency	Heat Loss (at 100% load)	Enclosure	Bypass	Disconnect Type	RFI/EMI EMC Filter
FR	MMP only	Yes	460/3/60	31.0/31.0	-	540	NEMA 3R	-	None	No
FS	MMP only	Yes	460/3/60	87.0/87.0	-	1090	NEMA 3R	-	None	No

Notes
*Drives are rated for use below 3,000 ft and 104°F. Use Derating Charts in Air-Mod Engineering Guide Form 100.42-EGI (212) for use above these limits.
Storage Temperature: -40°F to 158°F
Humidity: MAX 95% RH non-condensing
Altitude: 3,300 ft. without derate (1% derate for each additional 330 ft.)
Overload Current Rating: 100% for 1 minute every 10 minutes.
The Class 10 trip rating of the MMP device will not withstand an across-the-line start of a fan and should not be used with VFDs with bypass circuits.
The customer must provide a platform or catwalk for accessing the power-disconnect.
Copper Conductors Only.

Face Velocity and Static Pressure

Summary						
Segment	Description	Face Area (sq. ft)	Airflow (CFM)	Face Velocity (ft/min)	Supply Fan Static Pressure (in w.g.)	Exhaust/Return Fan Static Pressure (in w.g.)
MB	Opening	0.0	20,000	0.00	0.00	0.00
FR	External Static - User Entered	0.0	20,000	0.00	0.00	0.50
EE	Opening	0.0	20,000	0.00	0.00	0.00
EE	Control Aluminum (CD50)	0.0	20,000	0.00	0.00	0.03
EE	Opening	0.0	20,000	0.00	0.00	0.00
EE	Insulated Aluminum (CDTI50)	0.0	20,000	0.00	0.03	0.00
RF	2" Pleated 30% (MERV 8)	48.3	20,000	414.00	0.20	0.00
RF	Dirty Filter Allowance - Prefilter	0.0	20,000	0.00	0.20	0.00
RF	4" Mini-Pleat 80-85% Eff, (MERV 13)	48.3	20,000	414.00	0.45	0.00
RF	Dirty Filter Allowance	0.0	20,000	0.00	0.20	0.00
CC-1	Heating 1 rows 8 fins	47.5	20,000	232.00	0.03	0.00
CC-2	Cooling 10 rows 10 fins	47.5	20,000	421.00	0.94	0.00
FS	External Static - User Entered	0.0	20,000	0.00	2.50	0.00
DP	Opening	0.0	20,000	0.00	0.00	0.00
				Total	4.55	0.53

Dimensions and Weight

Details					
Segment	**Description**	**Length[1] (in)**	**Width[2] (in)**	**Height (in)**	**Weight (lbs)**
MB	Mixing Box	24	126	72	678
XA	Variable Length Access	6	126	72	87
FR	Multiple Return Fan - SWSI	47	126	72	2,215
EE	Economizer	88	126	72	968
RF	High Efficiency Filter	13	126	72	336
CC-1	Variable Length Cooling Coil	30	126	72	980
CC-2	Variable Length Cooling Coil	43	126	72	2,724
FS	Multiple Supply Fan - SWSI	47	126	72	2,411
DP	Discharge Plenum	30	126	72	682
Overall[3]		**328**			**11,081**

Notes

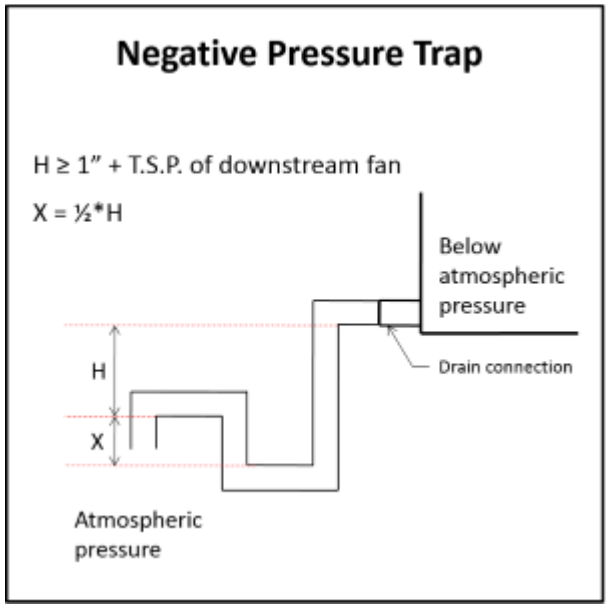
[1]The length includes bottom tier segments only

[2]The 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.

[3]Unit level and other loose components may be excluded from segment weights and overall segment weights. For total unit weight reference Unit Overview.

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-1	Supply Fan	4.55	Negative	5.55	2.78	8.33	5.75	8.75	6"
CC-2	Supply Fan	4.55	Negative	5.55	2.78	8.33	5.75	8.75	6"



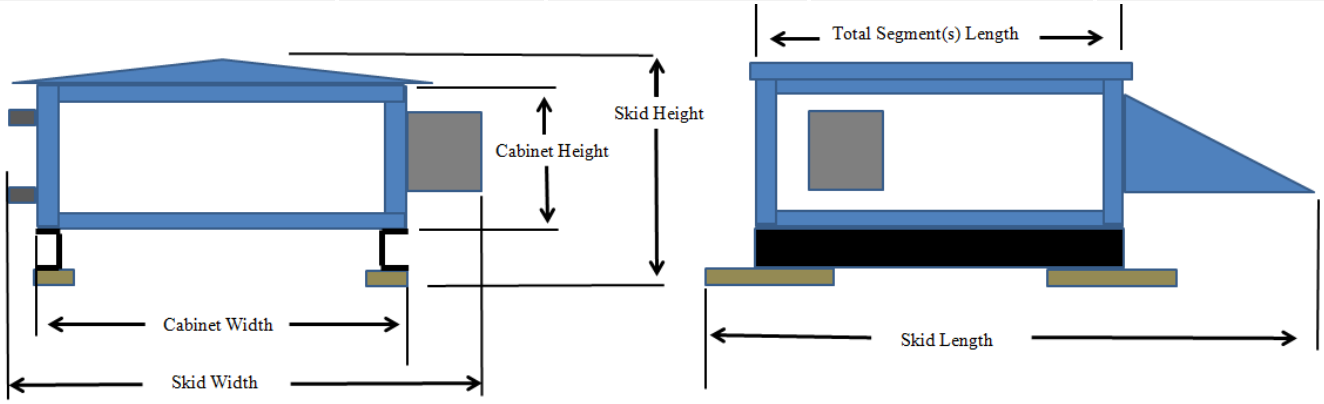
Notes
Formulas and calculations are recommendations only. Contractor shall determine actual dimensions required for each trap based on jobsite conditions, and application requirements.
Refer to the Installation Manual of the IOM for more information.

Statement of Compliance

Details
YORK® Solution XT AHU's meet IBC seismic requirements for non-critical equipment (Ip = 1.0) for locations with design spectral response Sds <= 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 SubmittalDrawing 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)**	**Skid Weight (lbs)**
(DP FS)	77	82	131	3,093
(CC-2 CC-1)	73	82	134	3,703
(RF EE)	87	82	131	536
(EE)	63	82	131	768
(FR XA MB)	77	82	129	2,980



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).

Special Quote(s)

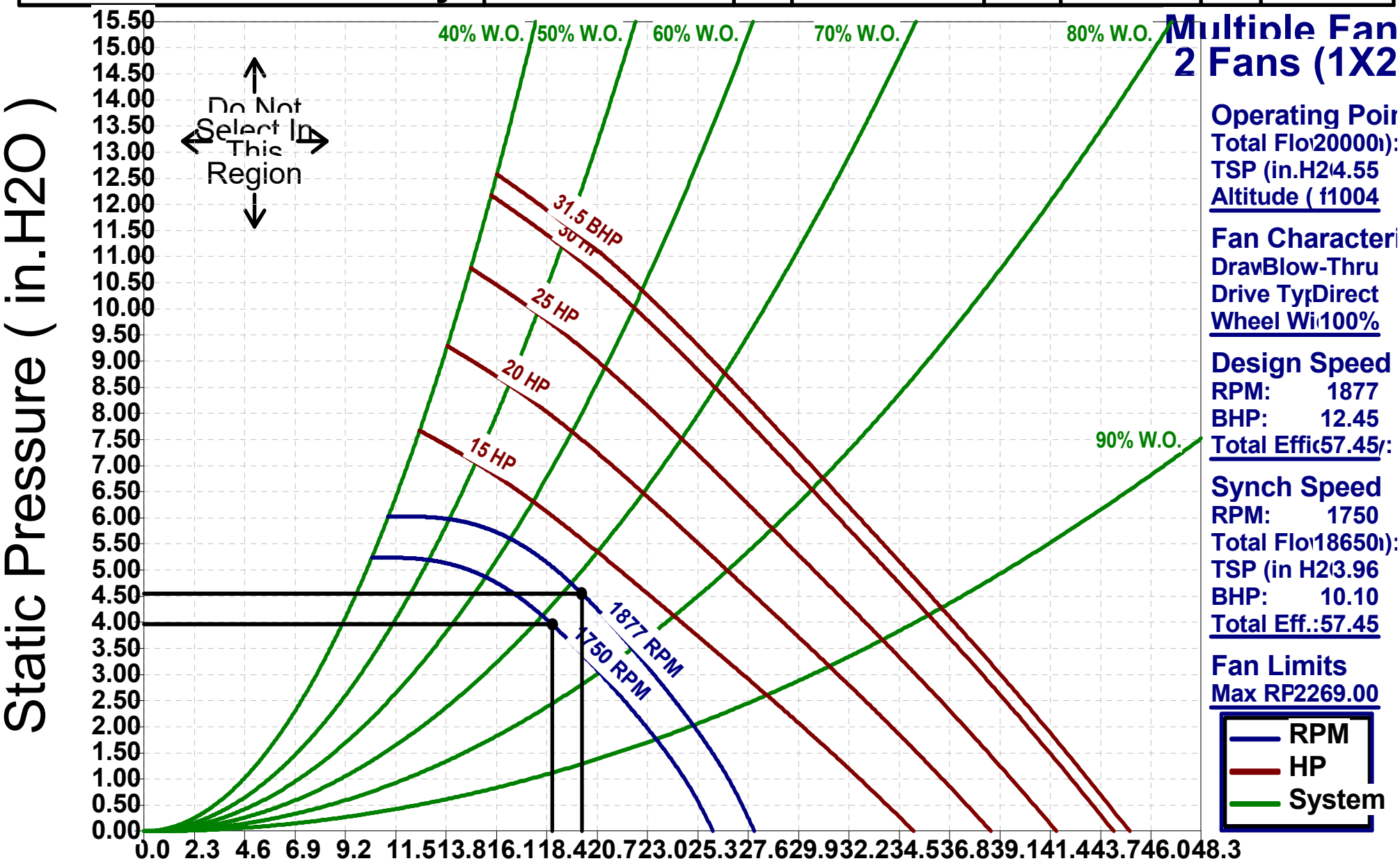
Details		
Segment	**SQ Number**	**Resolution**
Unit	SQ21-000442-001	AE-KR, ENG-SV MLP deduct to provide the following modifications: Delete XA segment in its entirety. Delete shipping split between EE and FR segments. Shorten EA portion of EE (EE1) by 29", making it 27"L. Ref. SQ-007 for Tamco dampers in EE segments. Crosscheck locations of EE parts. Maintain EE door, allowing it to infringe upstream into FR segment. ADD 3" to EE-2, making it 35"L. Shorten DP segment by 6", making it 24"L. Maintain DP door, allowing it to infringe upstream into FS segment. Resultant overall unit length to be 290"L. Ref. submittal drawing for layout.
EE	SQ21-000442-007	***LONG LEAD TIME ITEM*** Tamco dampers have a 5 week lead time. AE-KR, ENG-N/A MLP add for the factory to provide and install 26.75"Hx108"W Tamco PB 9000 OA damper in lieu of YW selected. Locate damper 6" downstream of shipping split and centered in unit width. Provide and install 26.75"Hx108"W Tamco PB 9000 EA damper in lieu of YW selected. Locate damper 6" upstream of shipping split and centered in unit width. Dampers include: Extruded Aluminum Frame Extruded Aluminum Blades Extruded EPDM Blade seals (SC option) Extruded silicon frame seals (SC option) Celcon bearings Leakage Class 1A at 1â W.G. static pressure differential Jackshafts
Unit	SQ21-000442-008	***Information ONLY*** Unit is at minimum length. Ref. SQ-001 for details.
Unit	SQ21-000442-009	***Information ONLY*** Unit is at minimum length. Ref. SQ-001 for details.
EE	SQ21-000442-010	AE-KR, ENG-N/A MLP add for the factory to provide and install a light in EE-1 and EE-2.
FR	SQ21-000442-011	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
FS	SQ21-000442-012	***Information ONLY*** AE-KR, ENG-N/A SQ CANNOT be completed at this time. Per vendor, "fan cages are not yet available".
EE	SQ21-000442-013	AE-KR, ENG-SV Shorten EA portion of EE (EE1) by 29", making it 27"L. Ref. SQ-007 for Tamco dampers in EE segments. Crosscheck locations of EE parts. Maintain EE door, allowing it to infringe upstream into FR segment. Ref. SQ-001 for details.
EE	SQ21-000442-014	AE-KR, ENG-SV ADD 3" to EE-2, making it 35"L. Ref. SQ-001 for details.
DP	SQ21-000442-015	AE-KR, ENG-SV Shorten DP segment by 6", making it 24"L. Maintain DP door, allowing it to infringe upstream into FS segment. Ref. SQ-001 for details.
Unit	SQ21-000442-016	***Information ONLY*** See attached CAD drawing.

FAN CURVE

Johnson Controls

Solution XT Fan Rating Curve

Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-5	1	XTI-72x126	FS	PL-SF		245-12-1(



Multiple Fan
2 Fans (1X2

Operating Poi
Total Flo 20000):
TSP (in.H2 4.55
Altitude (f 1004

Fan Characteri
Draw Blow-Thru
Drive Ty Direct
Wheel Wi 100%

Design Speed
RPM: 1877
BHP: 12.45
Total Effic 57.45/:

Synch Speed
RPM: 1750
Total Flo 18650):
TSP (in H2 3.96
BHP: 10.10
Total Eff.: 57.45

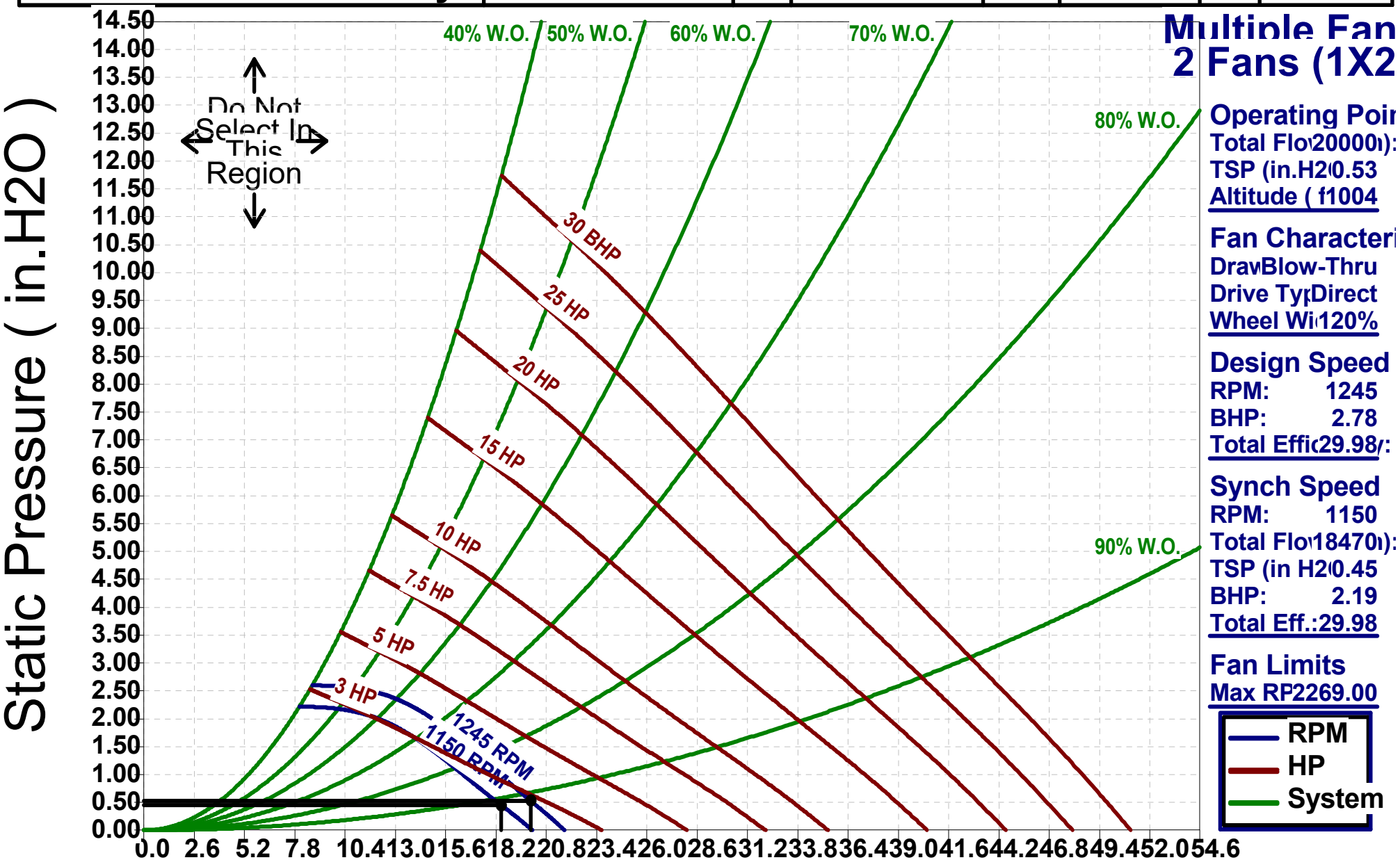
Fan Limits
Max RP 2269.00

RPM
HP
System

Johnson Controls

Solution XT Fan Rating Curve

Project Name	Unit Tag	Qty	Model	Seg	Fan Type	Class	Size
EGA Americas - Bid Day	AHU-5	1	XTI-72x126	FR	PL-SF	I	245-9-12



Multiple Fan
2 Fans (1X2

Operating Poi
Total Flo 20000):
TSP (in.H2 0.53
Altitude (f 1004

Fan Characteri
Draw Blow-Thru
Drive Ty Direct
Wheel Wi 120%

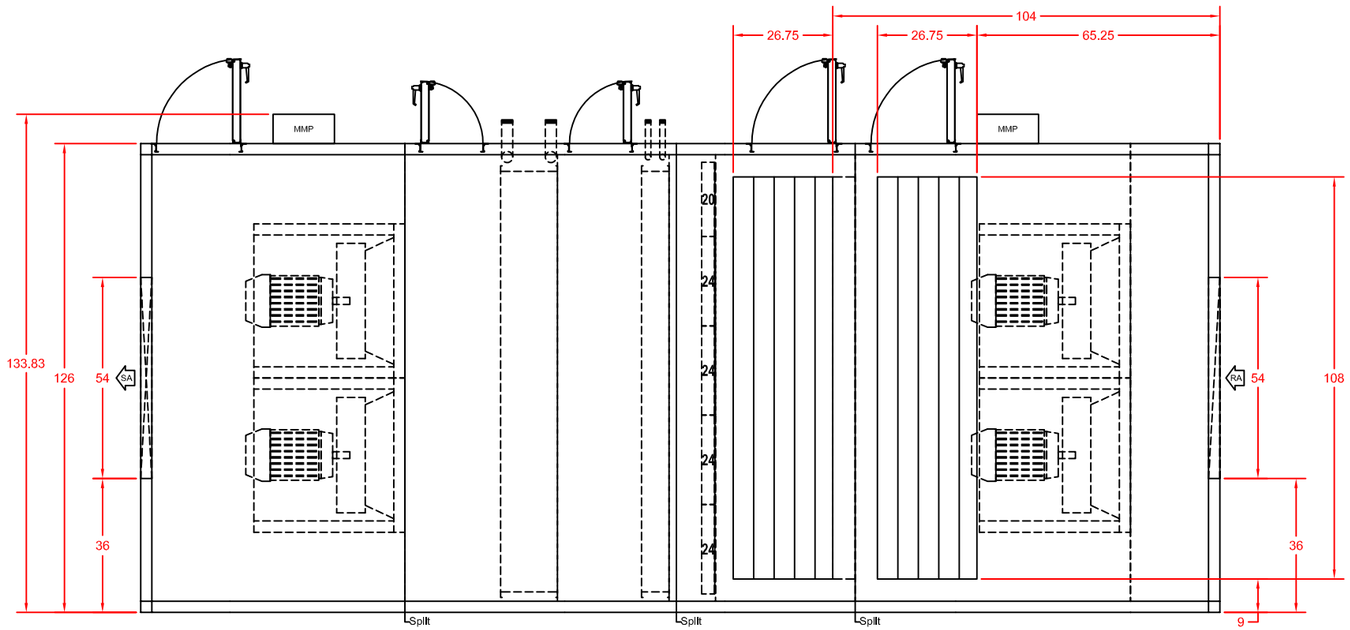
Design Speed
RPM: 1245
BHP: 2.78
Total Effic 29.98/:

Synch Speed
RPM: 1150
Total Flo 18470):
TSP (in H2 0.45
BHP: 2.19
Total Eff.: 29.98

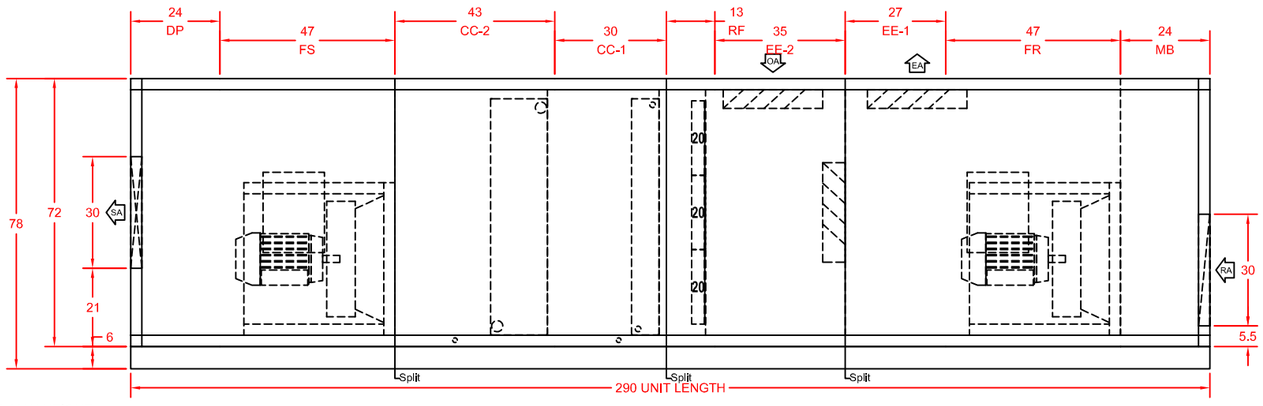
Fan Limits
Max RP 2269.00

RPM
HP
System

UNIT AND WIRING DRAWINGS



PLAN VIEW



* NOTE: MAX HEIGHT

ELEVATION VIEW

UNIT CONSTRUCTION

Model: Solution-XTI-72x126 **Construction:** Indoor
Motor Location:
Unit Weight: 11,231 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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

Ⓢ - Designates Shipped Loose Item(s)

PIPING CONNECTIONS
(In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	3"	3"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
FR	Return Fan - 245 - SF
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 245 - SF
DP	Discharge Plenum

DWG #	S21-2407
Version:	2
Ver. Date:	3/4/21
SQ:	21-000442
DRN BY:	KR
CKD BY:	1
SHEET:	1

PRODUCT DRAWING

SOLUTION XT AIR HANDLING UNIT DETAIL
MODEL: Solution-XTI-72x126
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

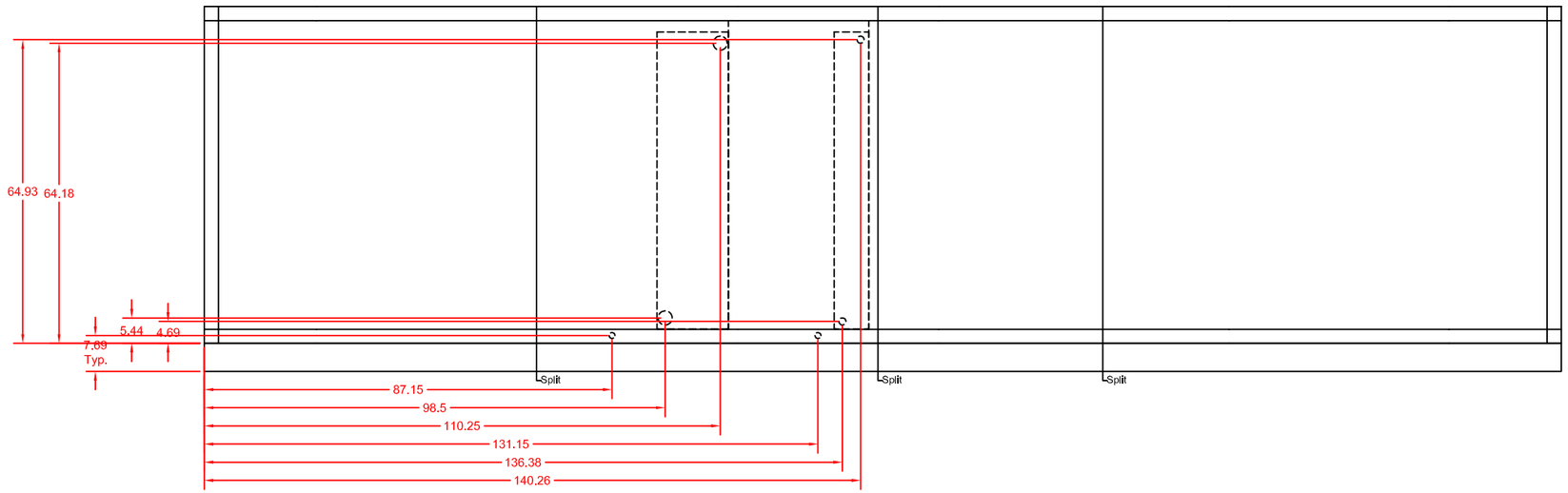
Sold To:
Cust Purch Order#:
Contract#:
UNIT TAG: AHU-5 - Sheet 1

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls

YORKworks Version: 21.00 Drawing Generator Version : 01:00:19906



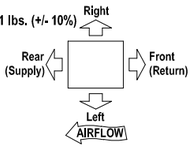
UNIT CONSTRUCTION

Model: Solution-XTI-72x126 **Construction: Indoor**

Motor Location:

Unit Weight: 11,231 lbs. (+/- 10%)

PLAN VIEW



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.

The overall unit length includes an additional 1/4" per shipping split due to additional gasketing and split connection hardware.

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

Ⓢ - Designates Shipped Loose Item(s)

PIPING CONNECTIONS (In order of Airflow)

Segment	Type	Hand	Quantity	Supply	Return
CC	MPT	Right	1 Sup 1 Ret	1 1/2"	1 1/2"
CC	MPT	Right	1 Sup 1 Ret	3"	3"

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

SECTION LIST

SECT	DESCRIPTION
MB	Mixing Box
XA	Variable Length Access
FR	Return Fan - 245 - SF
EE-1	Economizer
EE-2	Economizer
RF	High Efficiency Filter
CC-1	Cooling Coil
CC-2	Cooling Coil
FS	Supply Fan - 245 - SF
DP	Discharge Plenum

DWG #	S21-2407
Version:	COIL
Ver. Date:	2/24/21
SQ:	21-000442
DRN BY:	KR
CKD BY:	1
SHEET:	2

Coil Connections

PRODUCT DRAWING

SOLUTION XT COIL CONNECTION DETAIL

MODEL: Solution-XTI-72x126

NOT FOR CONSTRUCTION

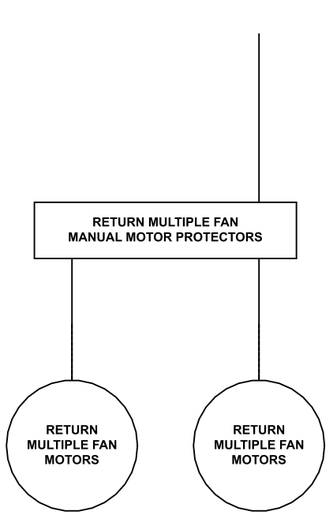
Project Name: VEGA Americas - Bid Day
Location: ,
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#:
UNIT TAG: AHU-5 - Sheet 2

Date:
Version:
Form No.:
Dwg. Lev.: 5/03
Dwg. Scale: NTS

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

Johnson Controls



PRODUCT DRAWING

YORK Custom Field Wiring
MODEL:
NOT FOR CONSTRUCTION

Project Name: VEGA Americas - Bid Day
Location:
Engineer:
Contractor:
For:

Sold To:
Cust Purch Order#:
Contract#: 1N060131
UNIT TAG: AHU-5 - Sheet 1

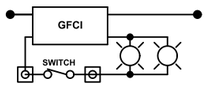
Date: 3/30/2021 8:14:57
Version:
Form No.: 100.09-EG1
Dwg. Lev.: 12/03
Dwg. Scale: NTS

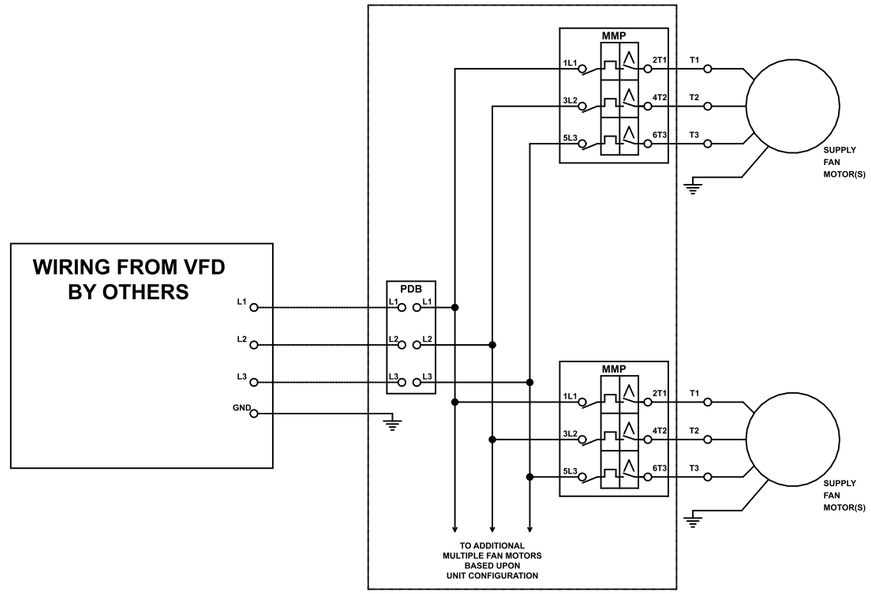
Serial Number:
SQ Database Number:
YORKworks Release:
Dwg. Name:
Dwg. Location:

Johnson Controls

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

NOTE:
CUSTOMER REQUIRED TO PROVIDE BRANCH CIRCUIT PROTECTION AND DISCONNECT MEANS PER NEC AND LOCAL CODES.





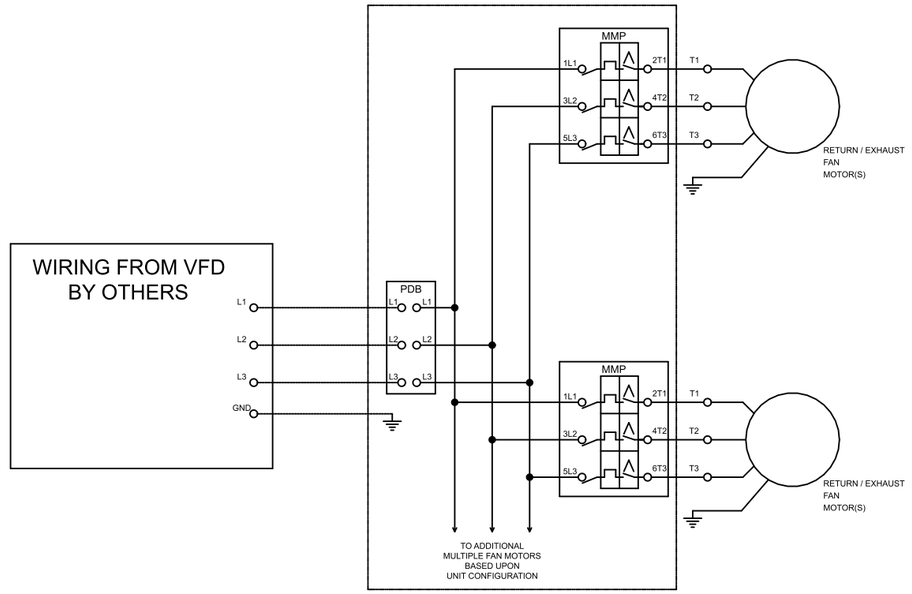
IF (2) VFD'S ARE REQUIRED FOR A SUPPLY FAN CONFIGURATION THEN THE SECOND VFD WIRING WILL BE IDENTICAL TO THE FIRST VFD.

- TERMINAL POINT
- REMOTE DEVICE (BY OTHERS)
- OPTIONAL PANEL COMPONENTS
- FIELD WIRING
- WIRE PER TRANSFORMER LABEL PER VOLTAGE.
* USE MINIMUM 75°C COPPER WIRE ONLY

PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-5 - Sheet 2	Date: 3/30/2021 8:14:57 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:

NOTE:
CUSTOMER REQUIRED TO PROVIDE BRANCH CIRCUIT PROTECTION AND DISCONNECT MEANS PER NEC AND LOCAL CODES.

TO SERVICE LIGHTS / OUTLETS SEE ADDITIONAL WIRING DIAGRAM



IF (2) VFD'S ARE REQUIRED FOR A RETURN/EXHAUST FAN CONFIGURATION THEN THE SECOND VFD WIRING WILL BE IDENTICAL TO THE FIRST VFD.

- TERMINAL POINT
- REMOTE DEVICE (BY OTHERS)
- OPTIONAL PANEL COMPONENTS
- FIELD WIRING
- WIRE PER TRANSFORMER LABEL PER VOLTAGE.
* USE MINIMUM 75°C COPPER WIRE ONLY

PRODUCT DRAWING YORK Custom Field Wiring MODEL: **NOT FOR CONSTRUCTION**	Project Name: VEGA Americas - Bid Day Location: Engineer: Contractor: For:	Sold To: Cust Purch Order#: Contract#: 1N060131 UNIT TAG: AHU-5 - Sheet 3	Date: 3/30/2021 8:14:57 Version: Form No.: 100.09-EG1 Dwg. Lev.: 12/03 Dwg. Scale: NTS	Serial Number: SQ Database Number: YORKworks Release: Dwg. Name: Dwg. Location:	Johnson Controls

YORKworks Version: 21.01 Drawing Generator Version : 01:00:16194

SCHEMATIC LEGEND SYMBOLS

TERMINAL IN PANEL

FUSE BLOCK

1 POLE
CIRCUIT BREAKER

2 POLE
CIRCUIT BREAKER

3 POLE
CIRCUIT BREAKER

R — CONTROL RELAY COIL

TDR — CONTROL TIMER COIL

24 HR — 24 HOUR PIN TIMER

HM — MOTOR HOUR METER

CC — MOTOR CYCLE COUNTER

FLOAT SWITCH CLOSES
ON RISING LEVEL

FLOAT SWITCH OPENS
ON RISING LEVEL

PRESSURE SWITCH CLOSES
ON RISING PRESSURE

PRESSURE SWITCH OPENS
ON RISING PRESSURE

TEMPERATURE SWITCH OPENS
ON RISING TEMPERATURE

TEMPERATURE SWITCH CLOSES
ON RISING TEMPERATURE

FLOW SWITCH CLOSES
ON INCREASING FLOW

NORMALLY OPEN RELAY CONTACT

NORMALLY CLOSED RELAY CONTACT

NORMALLY OPEN TIMER CONTACT

NORMALLY CLOSED TIMER CONTACT

FIELD WIRING

NORMALLY OPEN PUSHBUTTON
MOMENTARY

NORMALLY CLOSED PUSHBUTTON
MOMENTARY

NORMALLY CLOSED EMERGENCY
STOP PUSHBUTTON

THREE POSITION H.O.A.
SELECTOR SWITCH
(ILLUMINATED ON NON-ILLUMINATED)

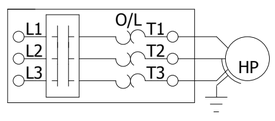
SELECTOR SWITCH
(ADDITIONAL CONTACTS MAY BE ADDED)

DISTRIBUTION BLOCK

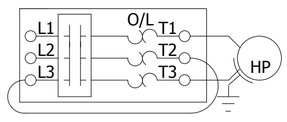
SOLENOID VALVE

WIRE CONTINUATION

DISCONNECT



3 %%C MOTOR STARTER
WITH OVERLOAD



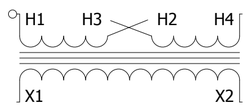
1 %%C MOTOR STARTER
WITH OVERLOAD

M — MOTOR STARTER/CONTACTOR
COIL

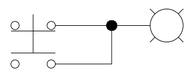
CONTACTOR

GROUND

DUPLEX RECEPTACLE



TRANSFORMER



PUSH-TO-TEST
PILOT LIGHT

PILOT LIGHT

CONTROL PANEL WIRE COLOR CODING

BLACK	ALL UNGROUNDED CONTROL CIRCUIT CONDUCTORS OPERATING AT THE SUPPLY VOLTAGE
RED	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE
BLUE	UNGROUNDED DC CONTROL CIRCUITS
YELLOW	UNGROUNDED AC CONTROL CIRCUITS OPERATING AT A VOLTAGE LESS THAN THE SUPPLY VOLTAGE (CLASS 2)
WHITE OR NATURAL GRAY	GROUNDED AC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH BLUE STRIPE	GROUNDED DC CURRENT-CARRYING CONTROL CIRCUIT CONDUCTOR
WHITE WITH YELLOW STRIPE	GROUNDED AC CONTROL CIRCUIT CURRENT-CARRYING CONDUCTOR THAT REMAINS ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE "OFF" POSITION
LIGHT BLUE	INTRINSICALLY SAFE WIRING CONTROL CIRCUIT CONDUCTOR

Previous page:

Next page: 1

Johnson Controls

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Legend

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Engineer: Electrical Engineer

Checked By:

DRC Ref Number: JOHNCO-004743

Date: 2021.02.23

Designed by: orders

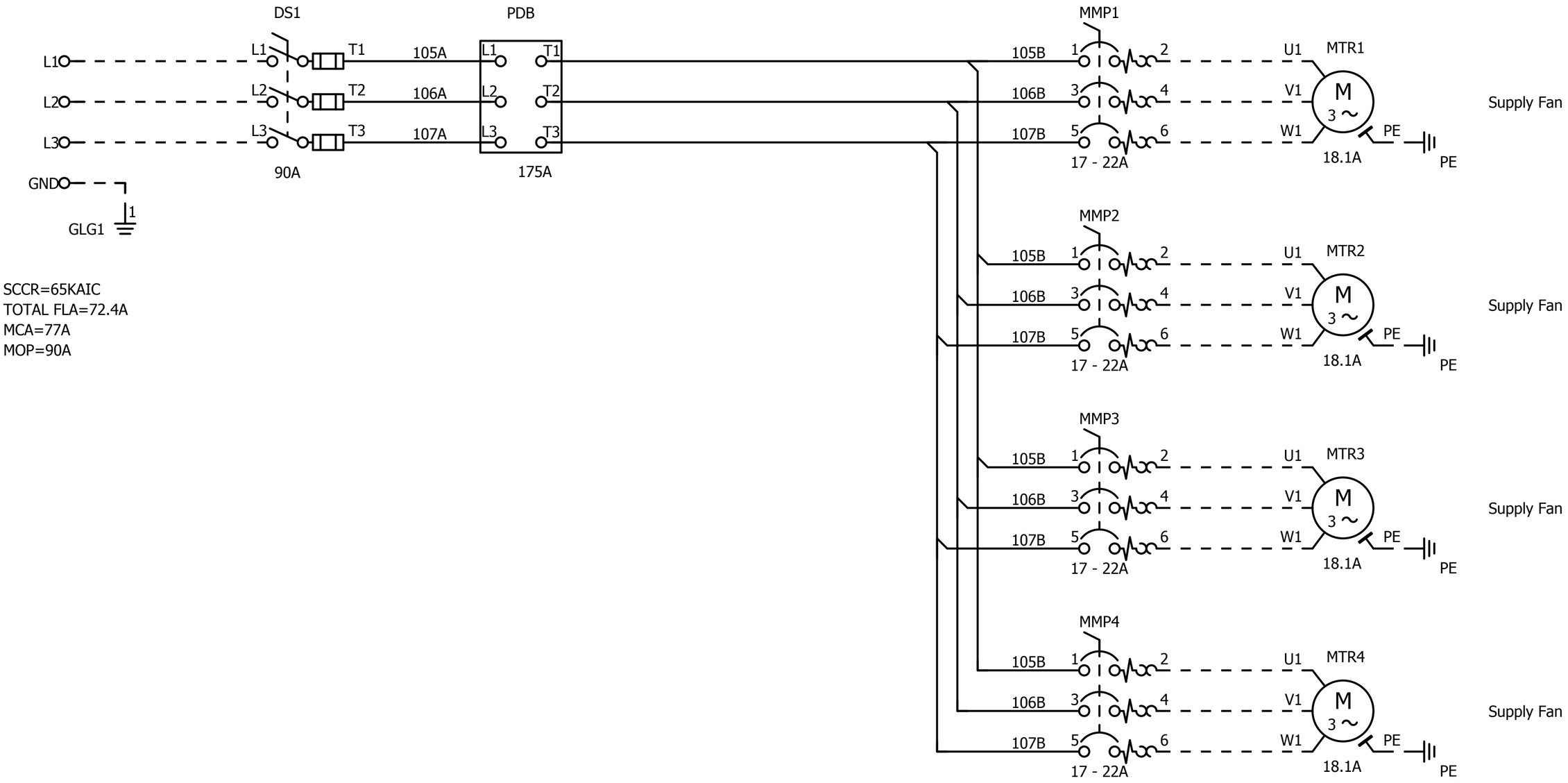
Revision B

Job Name: VEGA Americas - Bid Day

Sheet: 0

Page: 0

480Y/277V, 3 Phase, 60Hz



SCCR=65KAIC
TOTAL FLA=72.4A
MCA=77A
MOP=90A

Previous page: 0

Next page: 100

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Electrical Schematics

Project Description: AHU-1

Order No.: SQ21-000373

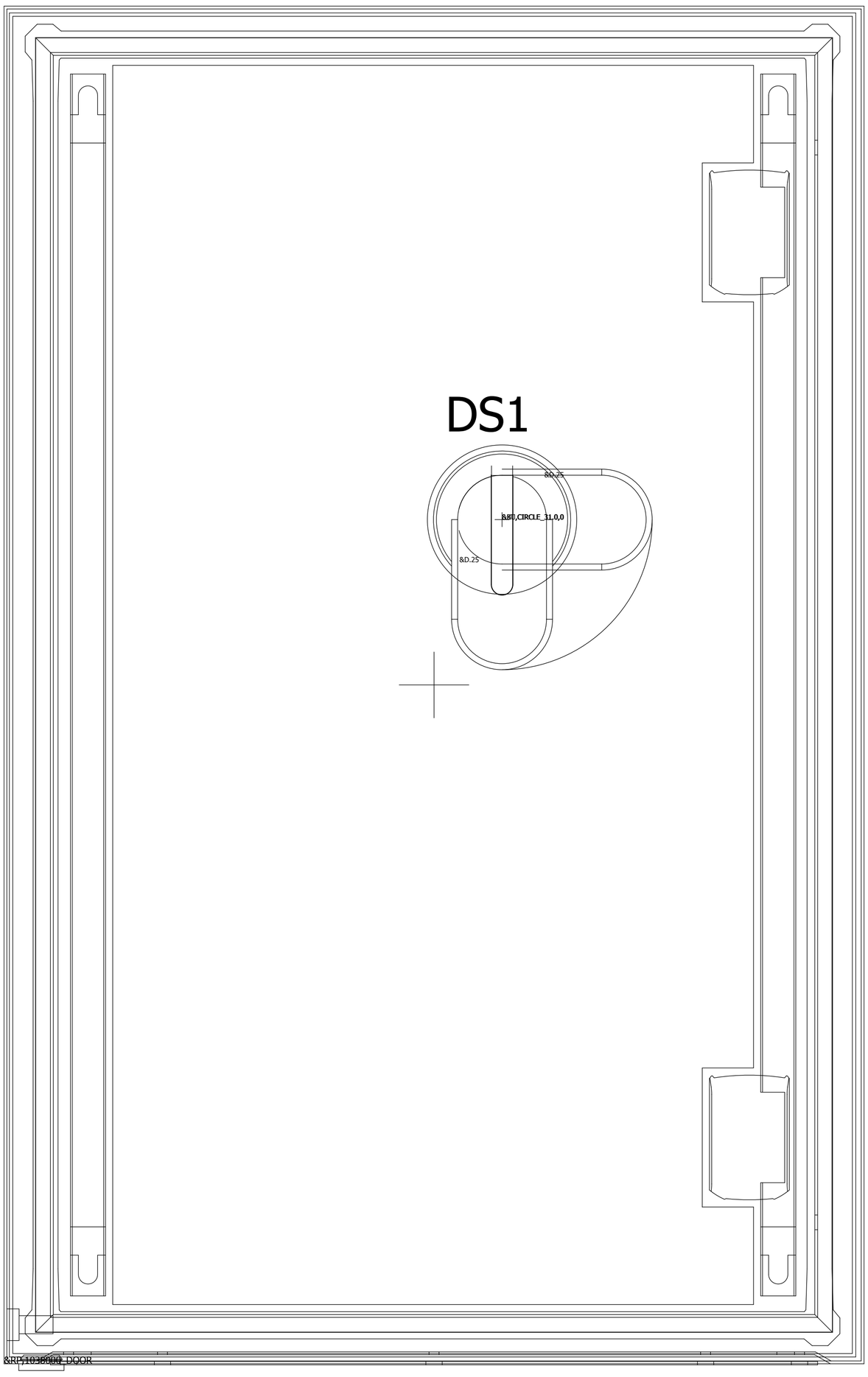
Total Sheets: 4

Job Name: VEGA Americas - Bid Day

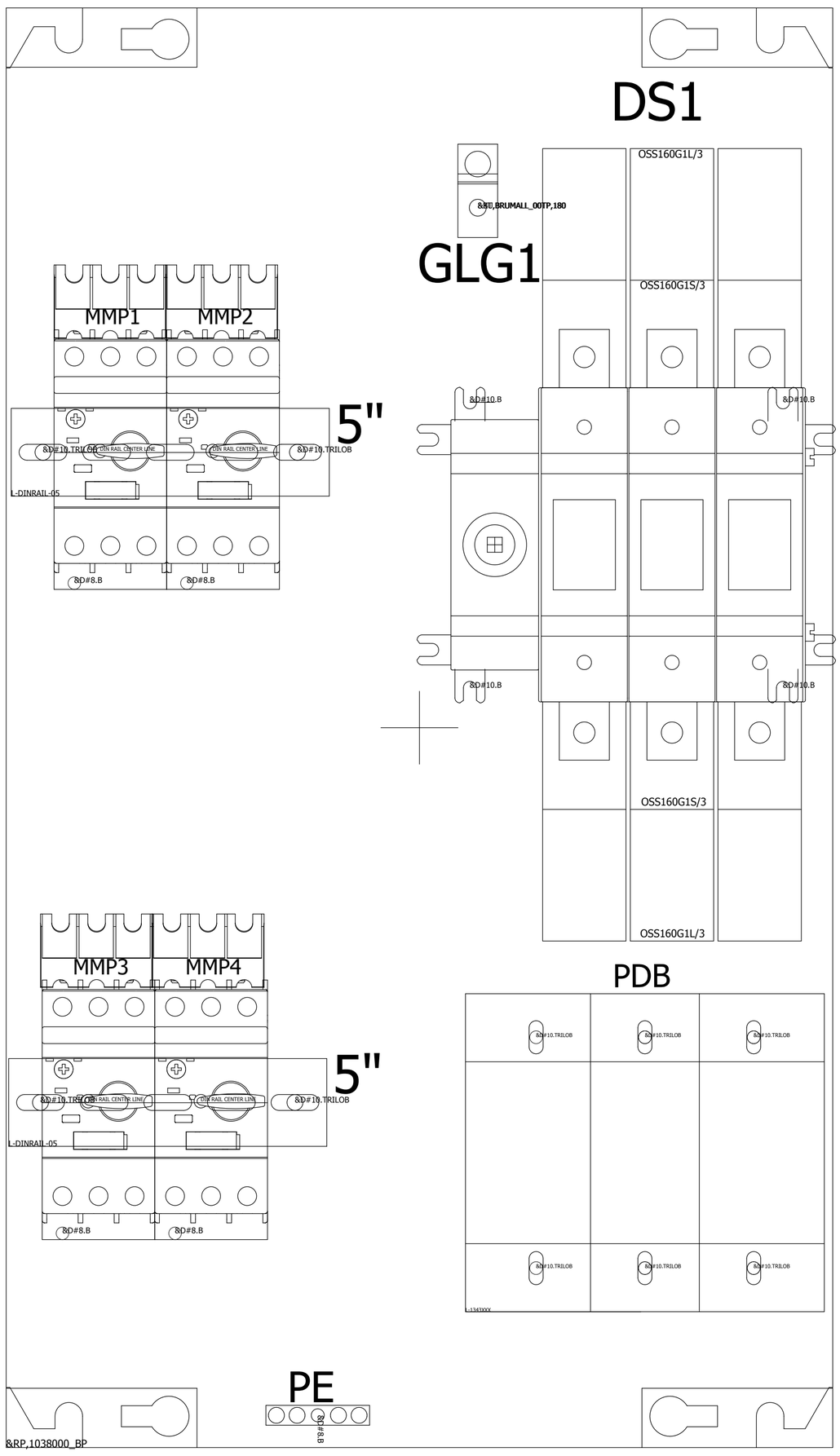
Sheet: 1

Page: 1

DOOR



24"H X 15"W X 8"D Type 1



Previous page: 1 Next page: 101

Rev:	Description:	By:	Date:
B			2021.02.23

Page Description: Panel Layout | Project Description: AHU-1 | Order No.: SQ21-000373 | Total Sheets: 4

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

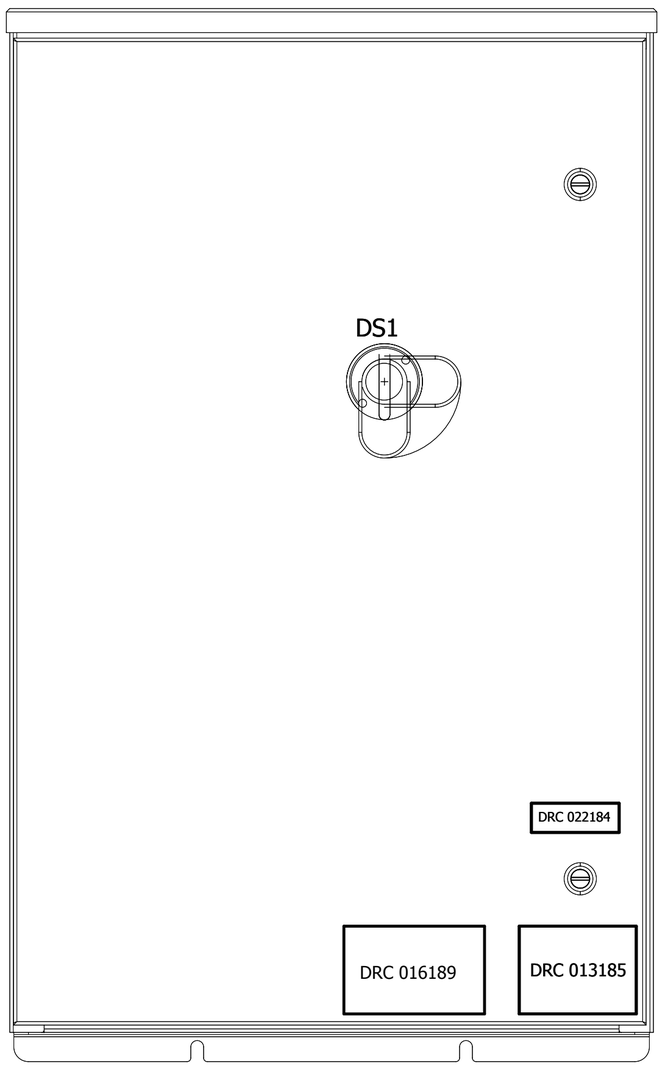
Revision B

Job Name: VEGA Americas - Bid Day

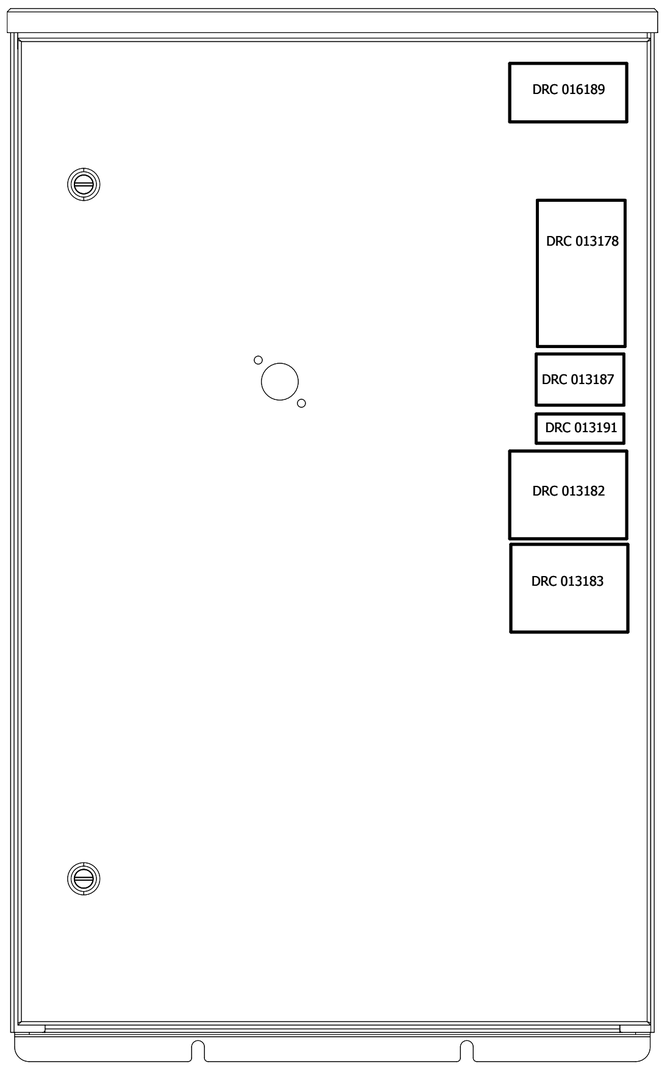
Sheet: 100 Page: 100

GENERIC LABELS LAYOUT

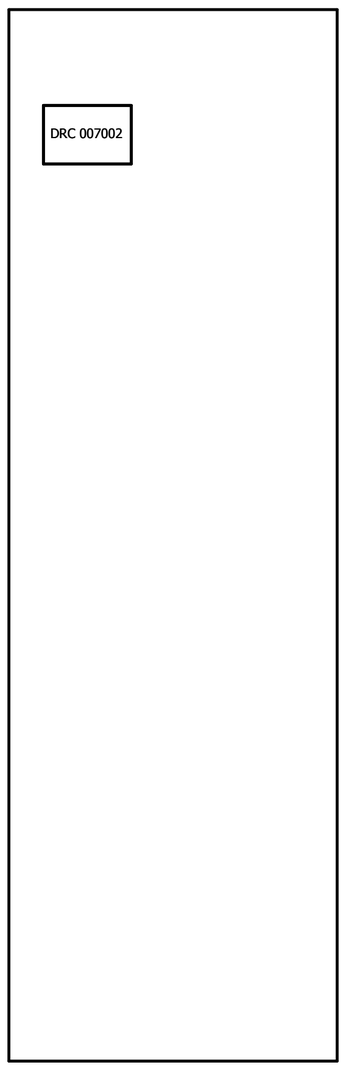
Outside Door



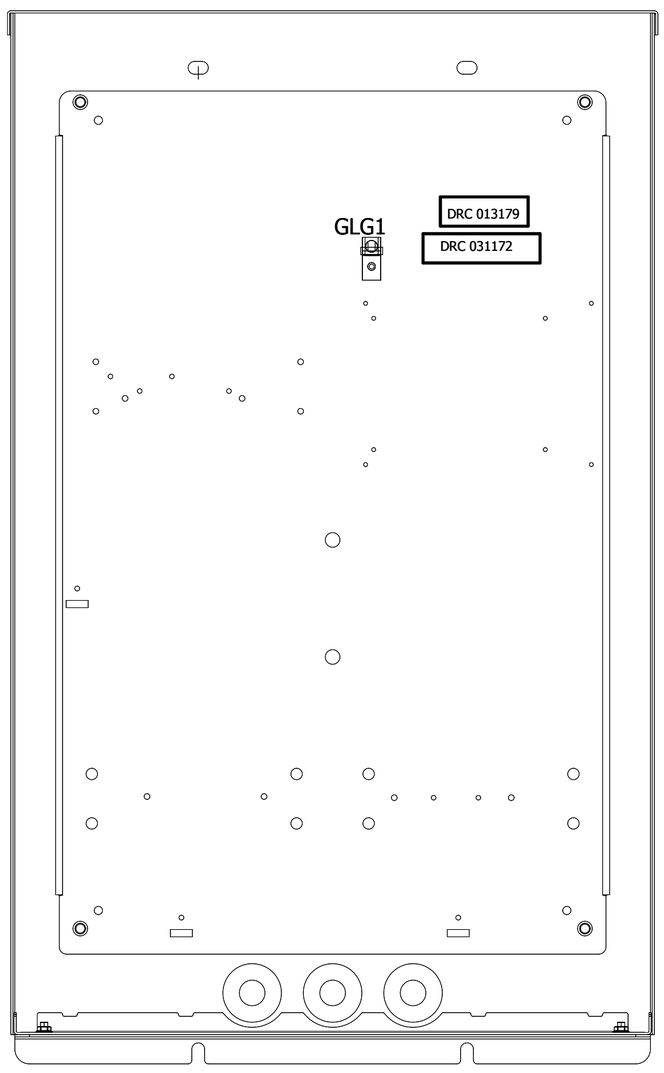
Inside Door



INSIDE LEFT SIDE



BACK PANEL



CONTROL BOX DIMENSION (INCHES) AND WEIGHT (POUNDS):

Wall Mount: 24"Hx15"Wx8.3"D, Estimated Weight: 100 Pounds

Previous page: 100

Next page:

Rev:	Description:	By:	Date:
B			2021.02.23

Engineer: Electrical Engineer
Checked By:
DRC Ref Number: JOHNCO-004743

Date: 2021.02.23
Designed by: orders

Revision B

Page Description: Label Layout

Project Description: AHU-1

Order No.: SQ21-000373

Total Sheets: 4

Job Name: VEGA Americas - Bid Day

Sheet: 101

GENERAL PRODUCT DETAILS

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite™

Self-Supporting Extended Surface Pleated Filter

High performance MERV 8 mechanical air filter media is self-supporting and requires no metal support grid downstream. No metal components means the filter is completely incinerable after use.

Exclusive vForm™ Pleating Technology maintains uniform pleat spacing in every filter. In addition, vForm™ Pleating Technology insures the same pleat configuration used for decades in our original Multi-Pleat products. Same aerodynamic v-shaped pleat design, same superior performance.

Sturdy, moisture-resistant, beverage board perimeter frame and cross-braces provide structural integrity even in difficult operating conditions.

The media used in the Multi-Pleat Elite is extraordinarily resilient and is engineered to endure the rigors of shipping, handling, installation and operation.

Multi-Pleat Elite earns the Koch Green Icon for one or more following categories: Earns LEED Points, Reduces Energy Costs, Extends Filter Lifecycles, Conserves Resources, and Improves Indoor Environmental Quality.

Features:

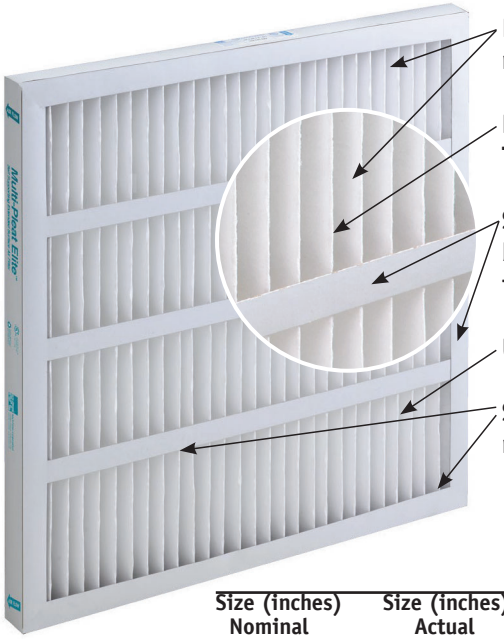
- Exclusive vForm™ Pleating Technology
- MERV 8 performance rating
- Self-supporting pleats requires no metal reinforcement
- Low resistance to airflow reduces energy costs
- Moisture-resistant beverage board frame
- Completely incinerable

Koch Filter Corporation…Durable. Reliable. Versatile.

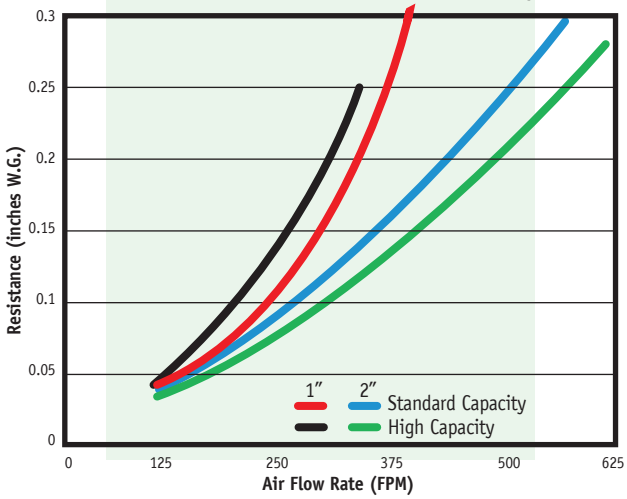
Bulletin No. K-MPE10

Koch Filter Corporation
Filtration Products Crafted with Pride

Multi-Pleat Elite Technical Data



Initial Resistance vs. Filter Face Velocity



Additional Multi-Pleat Elite Product Information
ASHRAE Test Standard 52.2-2007.
Recommended maximum continuous operational temperature is 150° F (93°C).
Multi-Pleat Elite filters are classified as Underwriter's Laboratories Class 2 according to U.L. Standard 900.

Size (inches) Nominal W x H x D	Size (inches) Actual W x H x D	Capacity (CFM)	Standard Capacity Elite Initial Resistance (in. W.G.)	Standard Capacity Elite Media Area (Sq. Ft.)	High Capacity Elite Initial Resistance (in. W.G.)	High Capacity Elite Media Area (Sq. Ft.)
12 x 24 x 1	$11^{3/8}$ x $23^{3/8}$ x $^{3/4}$	600	0.29	3.3	0.20	3.8
14 x 20 x 1	$13^{1/2}$ x $19^{1/2}$ x $^{3/4}$	590	0.29	3.4	0.20	3.8
14 x 25 x 1	$13^{1/2}$ x $24^{1/2}$ x $^{3/4}$	730	0.29	4.3	0.20	4.8
15 x 20 x 1	$14^{1/2}$ x $19^{1/2}$ x $^{3/4}$	630	0.29	3.6	0.20	4.1
16 x 20 x 1	$15^{1/2}$ x $19^{1/2}$ x $^{3/4}$	670	0.29	3.8	0.20	4.3
16 x 24 x 1	$15^{1/2}$ x $23^{3/8}$ x $^{3/4}$	800	0.29	4.6	0.20	5.2
16 x 25 x 1	$15^{1/2}$ x $24^{1/2}$ x $^{3/4}$	840	0.29	4.8	0.20	5.4
20 x 20 x 1	$19^{1/2}$ x $19^{1/2}$ x $^{3/4}$	840	0.29	4.7	0.20	5.4
20 x 24 x 1	$19^{1/2}$ x $23^{3/8}$ x $^{3/4}$	1000	0.29	5.7	0.20	6.5
20 x 25 x 1	$19^{1/2}$ x $24^{1/2}$ x $^{3/4}$	1050	0.29	6.0	0.20	6.8
24 x 24 x 1	$23^{3/8}$ x $23^{3/8}$ x $^{3/4}$	1200	0.29	7.1	0.20	8.1
12 x 24 x 2	$11^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	1000	0.26	5.4	0.20	7.8
14 x 20 x 2	$13^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	980	0.26	5.5	0.20	7.9
14 x 25 x 2	$13^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1215	0.26	6.9	0.20	9.9
15 x 20 x 2	$14^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1050	0.26	6.0	0.20	8.4
16 x 20 x 2	$15^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1115	0.26	6.5	0.20	8.8
16 x 24 x 2	$15^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1340	0.26	7.8	0.20	10.6
16 x 25 x 2	$15^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1400	0.26	8.1	0.20	11.0
18 x 24 x 2	$17^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1500	0.26	8.4	0.20	12.3
20 x 20 x 2	$19^{1/2}$ x $19^{1/2}$ x $1^{3/4}$	1400	0.26	8.0	0.20	11.1
20 x 24 x 2	$19^{1/2}$ x $23^{3/8}$ x $1^{3/4}$	1675	0.26	9.6	0.20	13.4
20 x 25 x 2	$19^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	1740	0.26	10.0	0.20	14.0
24 x 24 x 2	$23^{3/8}$ x $23^{3/8}$ x $1^{3/4}$	2000	0.26	11.4	0.20	16.2
25 x 25 x 2	$24^{1/2}$ x $24^{1/2}$ x $1^{3/4}$	2170	0.26	12.5	0.20	17.4

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

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.***

Koch Filter Corporation
Filtration Products Crafted with Pride

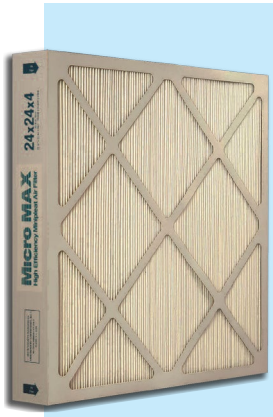
MicroMax™

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

Bulletin No. K-195-B

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 thress-per-carton. This multiple packaging means substantial reductions in shipping costs.

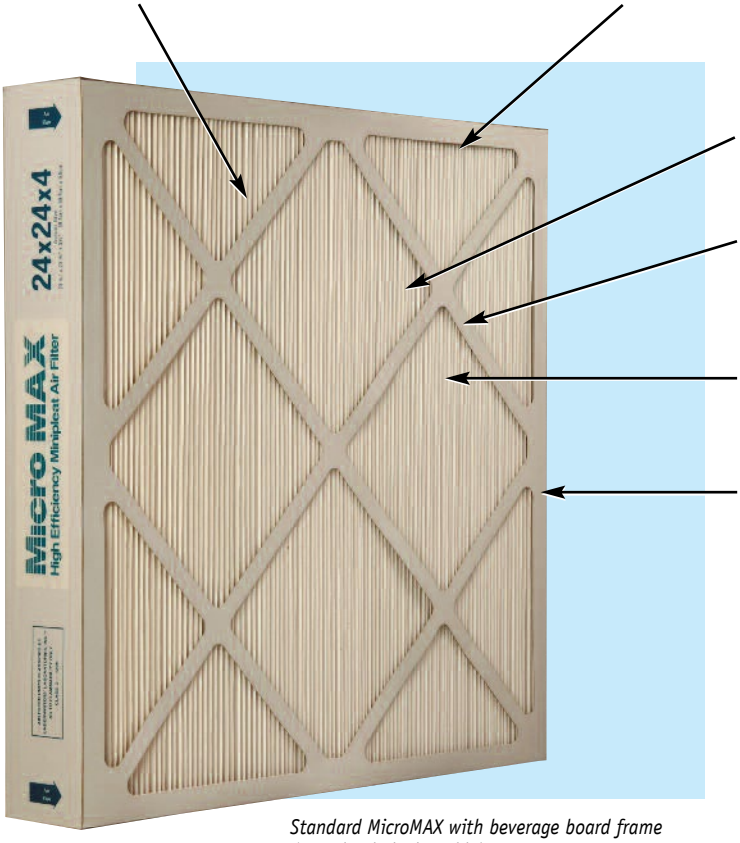
...Saves Space

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.

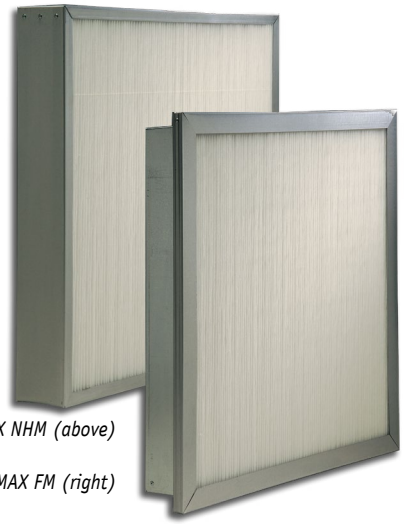
Specially-formulated adhesive bead insures even airflow and filter strength.

Available with double-walled, moisture resistant, beverage board frame (completely incinerable) or galvanized stell 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

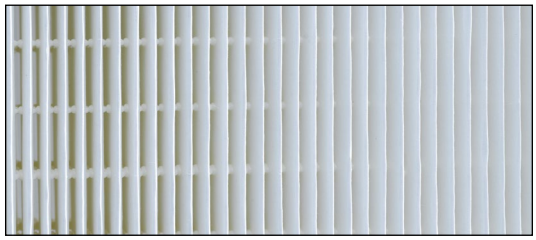
The media used in MicroMAX minipleat filters is composed of microfiberglass paper, treated with a specially-formulated, water-repllent binder. Millions of fibers are constructed into a Graded Density mat, with coarse fibers upstream and finer fibers on the air-exiting side. This dual-density insures 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 seprators uniformly secure the pleats to allow maximum air flow with minimal pressure drop.



Koch Filter Corporation
Filtration Products Crafted with Pride

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	23-3/8x23-3/8x3-3/4	2000	0.68	1.5	120	20
MX-9-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.68	1.5	111	18
MX-9-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.68	1.5	106	16
MX-9-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.68	1.5	95	11
MX-9-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.68	1.5	88	11
MX-9-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.68	1.5	70	9
MX-9-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.68	1.5	63	19
MicroMAX 80 - 85% (MERV 13)								
MX-8-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.59	1.5	120	20
MX-8-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.59	1.5	111	18
MX-8-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.59	1.5	106	16
MX-8-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.59	1.5	95	11
MX-8-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.59	1.5	88	11
MX-8-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.59	1.5	70	9
MX-8-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.59	1.5	63	19
MicroMAX 60 - 65% (MERV 11)								
MX-6-444	500	24x24x4	23-3/8x23-3/8x3-3/4	2000	0.40	1.5	120	20
MX-6-054	500	20x25x4	19-1/2x24-1/2x3-3/4	1750	0.40	1.5	111	18
MX-6-044	500	20x24x4	19-3/8x23-3/8x3-3/4	1650	0.40	1.5	106	16
MX-6-004	500	20x20x4	19-1/2x19-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-844	500	18x24x4	17-3/8x23-3/8x3-3/4	1500	0.40	1.5	95	11
MX-6-654	500	16x25x4	15-1/2x24-1/2x3-3/4	1400	0.40	1.5	88	11
MX-6-604	500	16x20x4	15-1/2x19-1/2x3-3/4	1100	0.40	1.5	70	9
MX-6-244	500	12x24x4	11-3/8x23-3/8x3-3/4	1000	0.40	1.5	63	19

1 . Shipping weights listed above apply to MicroMAX with beverage board frames. Add 10 lbs. per carton for metal framed models.

2. Data based on ASHRAE 52.1 and 52.2.

3. MicroMAX filters are classified as U.L. Class 2. Testing conducted according to U.L. Standard 900.

4. Width and height dimensions are interchargeable. MicroMAX filters may be installed with pleats in either direction.

5. Filters may be operated at up to 125% of rated face velocity.

6. MicroMAX filters should be used with a perfilters for maximum performance.

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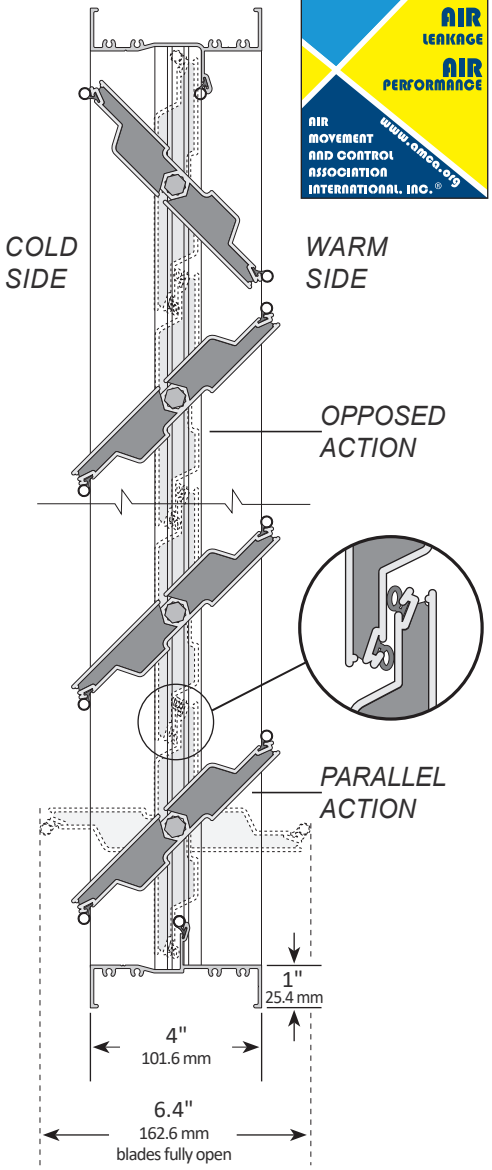
*Denotes manufacturing site.

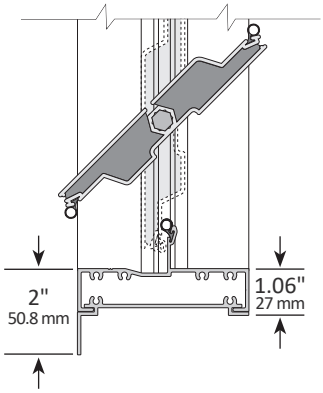
SUBMITTAL DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

Tampco 9000 SC dampers are provided on all AHU outside air intake and relief dampers as specified.

In Duct or Flanged to Duct Install Types



Extended Rear Flange Install Type



1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted.
3. Blade seals are extruded EPDM. Frame seals are extruded silicone. Seals are secured in an integral slot within the aluminum extrusions. Blade and frame seals are mechanically fastened to prevent shrinkage and movement over the life of the damper.
4. Bearings are composed of a Celcon inner bearing - fixed around a 7/16" *(11.11 mm)* aluminum hexagon blade pivot pin - rotating within a polycarbonate outer bearing inserted in the frame. This eliminates action between metal-to-metal or metal-to-plastic riding surfaces.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are zinc-plated steel. These provide a positive connection to blades and linkage.
6. Aluminum and corrosion-resistant zinc-plated steel linkage hardware is installed in the frame side, complete with cup-point trunnion screws for a slip-proof grip.
7. Dampers are designed for operation in temperatures ranging from -40°F *(-40°C)* to 212°F *(100°C)*.
8. Leakage Class 1A at 1 in. w.g. *(0.25 kPa)* static pressure differential. Standard air leakage data is certified under the AMCA Certified Ratings Program.
9. Dampers are custom made to required size, without blanking off free area. The blade stop is set at a fixed height and is a continuous and integral part of the top and bottom frames.
10. Dampers are available with either opposed blade action or parallel blade action.
11. Dampers are available in four install types: Installed In Duct, Flanged to Duct, Extended Rear Flange, and Square to Round Transition. *(See Install Type pages for details.)*
12. Installation of dampers must be in accordance with TAMCO's current on-line installation guidelines. *(Printed installation guidelines are provided with each damper shipment, however all technical information available on TAMCO's web site at www.tamcodampers.com supersedes information contained within printed versions.)*
13. Intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. *(See TAMCO Aluminum Damper Installation Guidelines.)*

OPTIONS FOR SP – STANDARD PROFILE:
For each option listed, replace the lines above with their corresponding lines below.

SC - SEVERE COLD TEMPERATURE OPTION:

3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.

MR - MOISTURE RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Frame is assembled using stainless steel screws.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

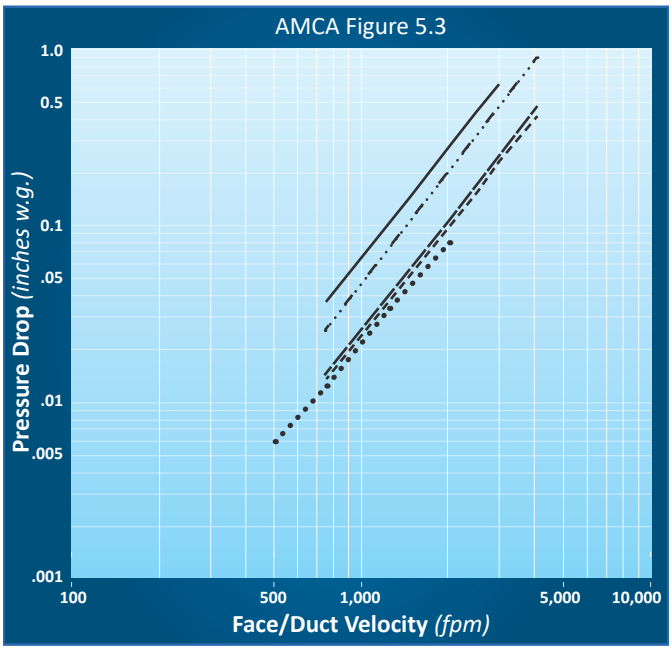
SW - SALT WATER RESISTANCE OPTION:

1. Extruded aluminum *(6063-T5)* damper frame is not less than 0.080" *(2.03 mm)* in thickness. Damper frame is 4" *(101.6 mm)* deep x 1" *(25.4 mm)*, with mounting flanges on both sides of frame. Damper frame has a 2" *(50.8 mm)* mounting flange on the rear of the damper, when ordered as Extended Rear Flange install type. Aluminum frame is clear anodized to a minimum depth of 0.7 mil *(18 microns)*. Frame is assembled using stainless steel screws.
2. Blades are maximum 6" *(152.4 mm)* deep extruded aluminum *(6063-T5)* air-foil profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29. All blades are symmetrically pivoted. Extruded aluminum blades are clear anodized to a minimum depth of 0.7 mil *(18 microns)*.
3. Blade and frame seals are extruded silicone, for reduced air leakage at colder temperatures. Blade and frame seals are secured in an integral slot within the aluminum extrusions and are mechanically fastened to prevent shrinkage and movement over the life of the damper.
5. Adjustable 7/16" *(11.11 mm)* hexagonal drive rod, U-bolt fastener, and hexagonal retaining nuts are stainless steel. These provide a positive connection to blades and linkage.
6. Clear anodized aluminum and stainless steel linkage hardware is installed in the frame side, complete with stainless steel cup-point trunnion screws for a slip-proof grip.

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With no Option or with MR Option

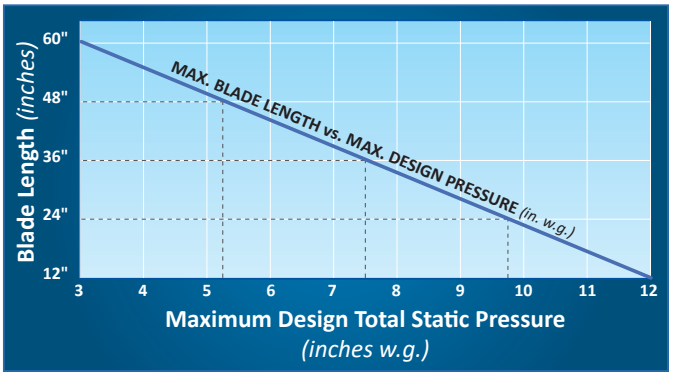
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" – – – *(610 mm x 610 mm))*
48" x 12" –·–·– *(1220 mm x 305 mm)*
12" x 48" — — *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, no Option or MR Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1
12.1 to 36.0 *(306 to 915)*	1A	1
36.1 to 48.0 *(916 to 1220)*	1A	1
48.1 to 60.0 *(1221 to 1524)*	1A	1

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* and a minimum of 70 in-lb *(7.9 N-m)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with no Option or MR Option, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

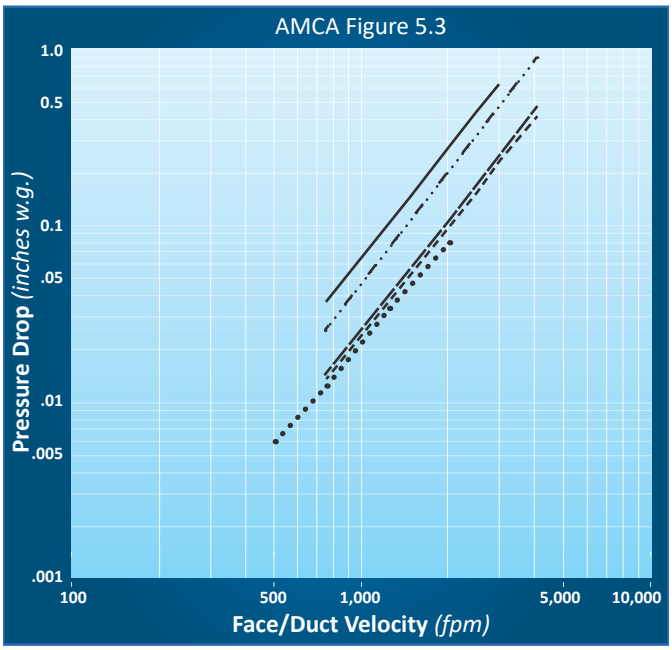
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)*	
	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*
1A	3 *(15.2)*	n/a
1	4 *(20.3)*	8 *(40.6)*
2	10 *(50.8)*	20 *(102)*
3	40 *(203)*	80 *(406)*

PERFORMANCE DATA | Series 9000 Thermally Insulated Damper with Thermally Broken Blades

SP – Standard Profile
With SC or SW Options

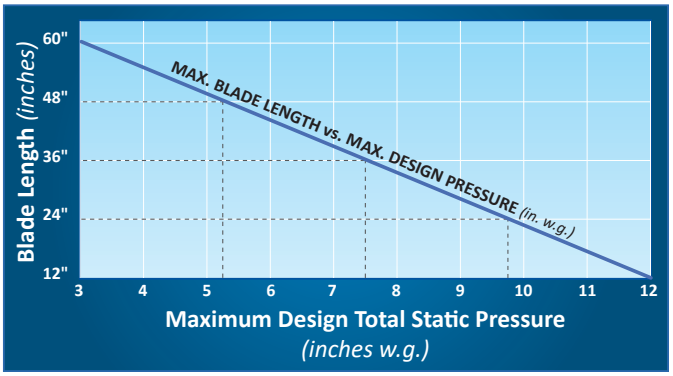
VELOCITY VS. PRESSURE DROP



LEGEND:

12" x 12" —— *(305 mm x 305 mm)*
24" x 24" - - - *(610 mm x 610 mm))*
48" x 12" -·-·- *(1220 mm x 305 mm)*
12" x 48" —— *(305 mm x 1220 mm)*
36" x 36" • • • • *(915 mm x 915 mm)*

BLADE DESIGN PRESSURE LIMITATIONS



Series 9000 dampers with SP – Standard Profile, whose blade length exceeds the maximum design pressure, may be reconfigured to maintain a blade length compatible with the required system pressure by increasing the number of sections per damper and thereby reducing each damper section's blade length. Appropriate intermediate structural support will be required for all multiple-section damper assemblies. *(Refer to line 13 of the Submittal Data and to TAMCO's Aluminum Damper Installation Guidelines.)*

Example:
A single-section damper of 60"w x 36"h *(1524 mm x 915 mm)* at 5 in. w.g. *(1.24 kPa)* would need to be built in two sections of 30"w x 36"h *(762 mm x 915 mm)*.

T.A. Morrison & Co. Inc. certifies that the TAMCO Series 9000 Thermally Insulated Damper, with Thermally Broken Blades, SC or SW Options, and SP – Standard Profile shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air leakage and air performance ratings.

FIG. 5.3 Test damper is fully ducted with a 5 diameter duct run upstream, and a 6 diameter duct run downstream.

Pressure drop values are based on Flanged to Duct install type. Pressure drop will be greater for In Duct install type dampers.

TAMCO LEAKAGE RATING

Damper Width inches *(mm)*	1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
0.0 to 12.0 *(0 to 305)*	1A	1	1	1
12.1 to 36.0 *(306 to 915)*	1A	1	1	1
36.1 to 48.0 *(916 to 1220)*	1A	1	1	1
48.1 to 60.0 *(1221 to 1524)*	1A	1	n/a	n/a

Leakage testing was conducted in accordance with ANSI/AMCA Standard 500-D, Figure 5.4. Data are based on a torque of 10.8 in-lb/ft² *(13.1 N-m/m²)* applied to close and seat the opposed blade damper during the test. Air leakage is based on operation between 32°F *(0°C)* and 120°F *(49°C)*.

The following sizes of TAMCO Series 9000 dampers with SC or SW Options, and SP – Standard Profile were tested:
12" x 48" *(305 mm x 1220 mm)*, 36" x 36" *(915 mm x 915 mm)*, 48" x 36" *(1220 mm x 915mm)*, 60" x 36" *(1524 mm x 915 mm)*.

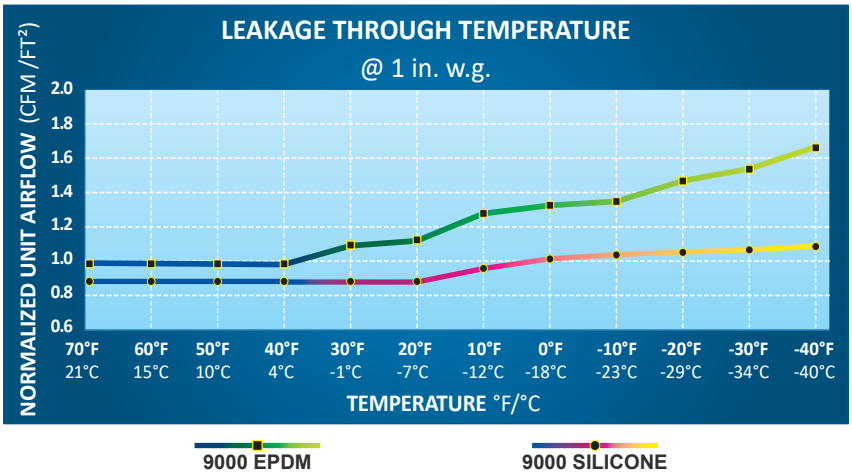
AMCA LEAKAGE CLASS DEFINITIONS

Pressure / Class	MAXIMUM ALLOWABLE LEAKAGE CFM/ft² *(l/s/m²)* 1 in. w.g. *0.25 kPa*	4 in. w.g. *1.0 kPa*	6 in. w.g. *1.5 kPa*	8 in. w.g. *2.0 kPa*
1A	3 *(15.2)*	n/a	n/a	n/a
1	4 *(20.3)*	8 *(40.6)*	9.8 *(49.8)*	11.3 *(57.4)*
2	10 *(50.8)*	20 *(102)*	24.5 *(125)*	28.3 *(144)*
3	40 *(203)*	80 *(406)*	98 *(498)*	113 *(574)*

***NOTE:** TAMCO Leakage Class Rating is not provided for dampers measuring more than 48" *(1220 mm)* wide at 6 in. w.g. *(1.5 kPa)* and at 8 in. w.g. *(2.0 kPa)*, as the recommended blade length is exceeded at these static pressures. *(Refer to the Blade Design Pressure Limitations Chart.)*

EPDM VS. SILICONE UPGRADE OPTION BLADE SEALS

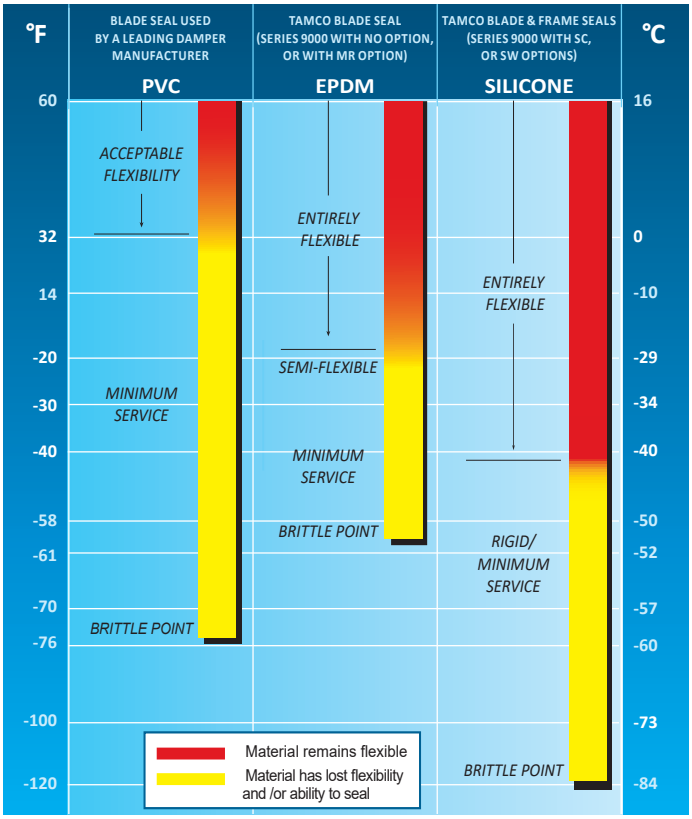
LEAKAGE COMPARISON GRAPH



Damper tests were conducted in a laboratory cold room to determine the effects of colder and severe cold temperatures *(down to -40°F (-40°C))* on sealing gaskets and leakage rates.

NOTE: Leakage rates shown in this graph are not licensed to bear the AMCA Seal. There is no AMCA standard dealing with the testing of leakage in temperatures below 32°F (0°C).

SEAL PERFORMANCE COMPARISON GRAPH



Minimum service temperatures and brittle points are as stated by material manufacturers. Flexibility, rigidity, and suitability status of various materials were determined by observation and operation of dampers in both cold room and cold box environments.

Provided on Mixed air dampers.

RUSKIN®

AMCA LICENSED
See Page 2

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

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 stystems. 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

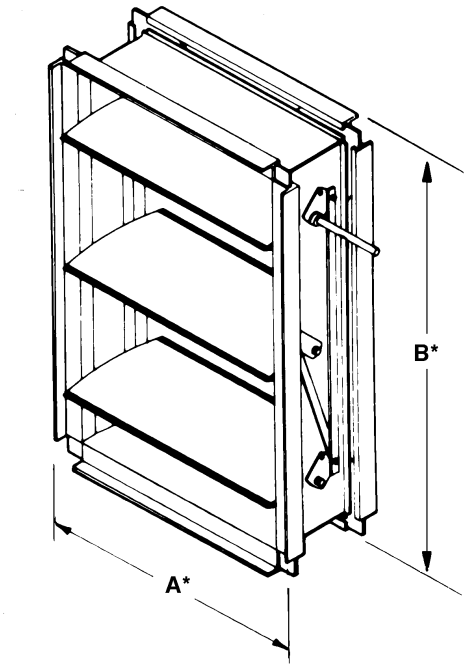
- Airfoil blade design for low pressure drop and less noise generation.
- Positive lock axles, noncorrosive bearings and shake proof linkage for low maintenance operation.
- Blade edge seals mechanically lock into the blade for superior sealing.

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.

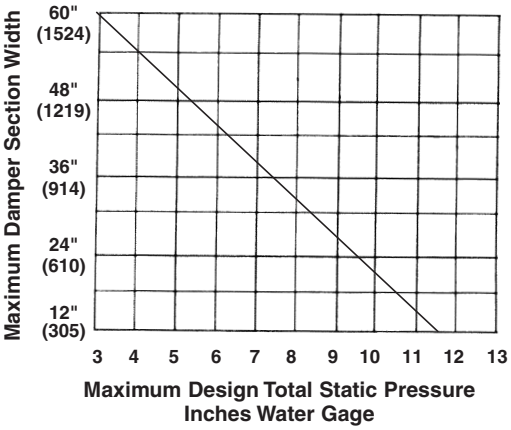
NOTE: Dimensions shown in parenthesis ( ) indicate millimeters.

*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.

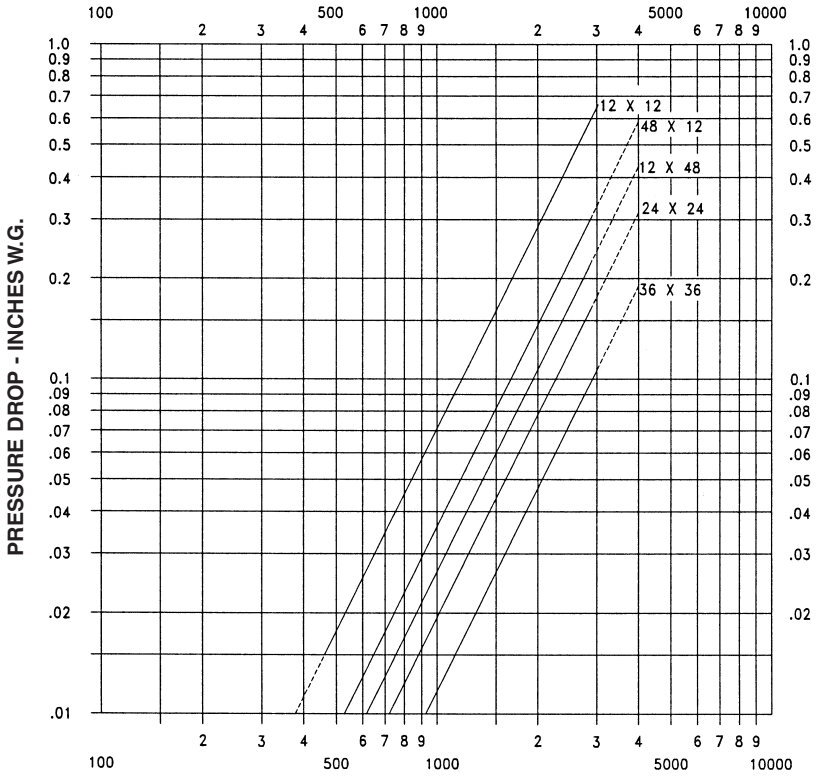
Ruskin Company certifies that the CD50 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA International Certified Ratings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

Pressure/ Class	Leakage, L/s/m² (ft³/min/ft²)			
	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



FACE VELOCITY - FEET/MINUTE
AMCA FIG. 5.3

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.

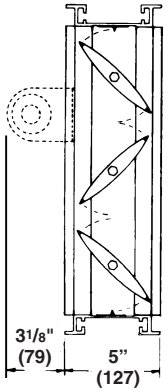
SOUND RATINGS

CD50 SOUND RATINGS

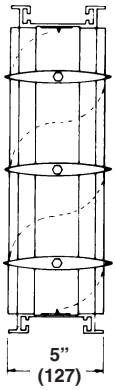
Damper Size	Damper Full Open		Damper 75% Open		Damper 50% Open		Damper 25% Open	
	CFM	NC	CFM	NC	CFM	NC	CFM	NC
12 x 12 (305 x 305)	2000	17	1500	11	1000	11	500	*
	3000	28	2250	22	1500	19	750	*
	4000	35	3000	29	2000	24	1000	*
18 x 18 (457 x 457)	2250	17	1688	10	1125	21	563	*
	4500	33	3375	26	2250	32	1125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

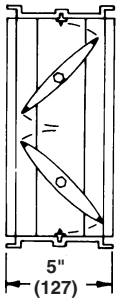
DIMENSIONAL INFORMATION



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.

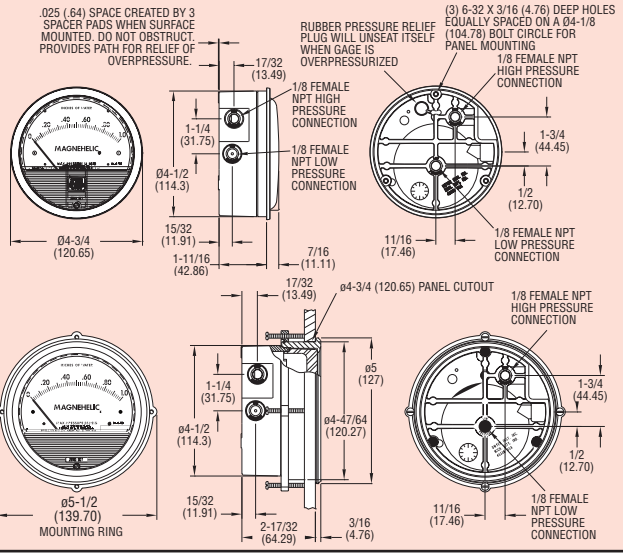
Blade edge seals shall be extruded double edge design with inflatable pocket which enables air pressure from either direction to assist in blade to blade seal off. Blades seals shall be mechanically locked in extruded blade slots, yet shall be easily replaceable in field. Adhesive or clip-on type blade 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.

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%

RoHS



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.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of 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, standhang bracket and terminal tube with holder.

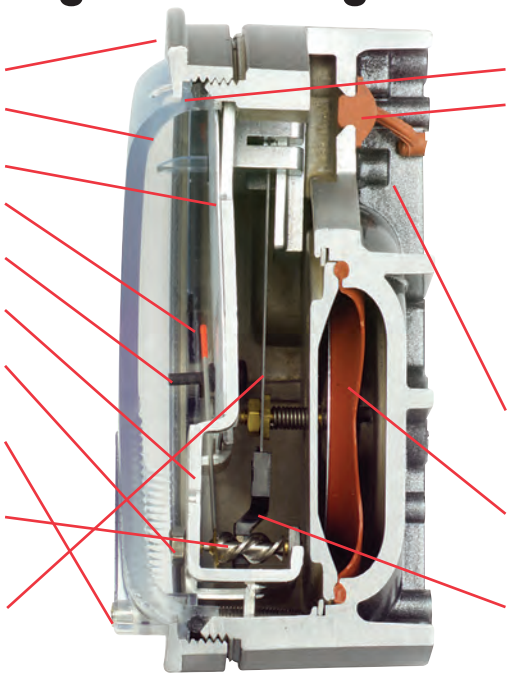
Model A-605 Air Filter Gage Accessory Kit
Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft (1.5 m) lengths of 1/4″ aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings 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

Series 2000

Magnehelic® Gage Models & Ranges



Bezel provides flange for flush mounting in panel.

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

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

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

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

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

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

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

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

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

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

OVERPRESSURE PROTECTION
Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads. The blowout plug is not used on models above 180″ of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm. The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

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

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

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

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10

Model	Range, Pa
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-1000
Zero Center Ranges	
Model	Range, Pa
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, in w.c.	Range, Pa or kPa
2000-00D†••	0-.25	0-62 Pa
2000-0D†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

VELOCITY AND VOLUMETRIC FLOW UNITS
Scales are available on the Magnehelic® that read in velocity units (FPM, m/s) or volumetric flow units (SCFM, m^3/s, m^3/h). Stocked velocity units with dual range scales in inches w.c. and feet per minute are shown above. For other ranges contact the factory.
When ordering volumetric flow scales please specify the maximum flow rate and its corresponding pressure. Example: 0.5 in w.c. = 16,000 CFM.

ACCESSORIES
A-321, Safety Relief Valve
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-135, Rubber gasket for panel mounting

A-310A 3-Way Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

OUR EXPERTISE, YOUR AIR-MOVING SOLUTION

STACK FAN

PART# 0601700001_rev_A

ADVANCED DIRECT DRIVE PLENUM FANS

ENERGY STAR PARTNER

ISO9001 CERTIFIED

NO APPLICATION IS TO 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.

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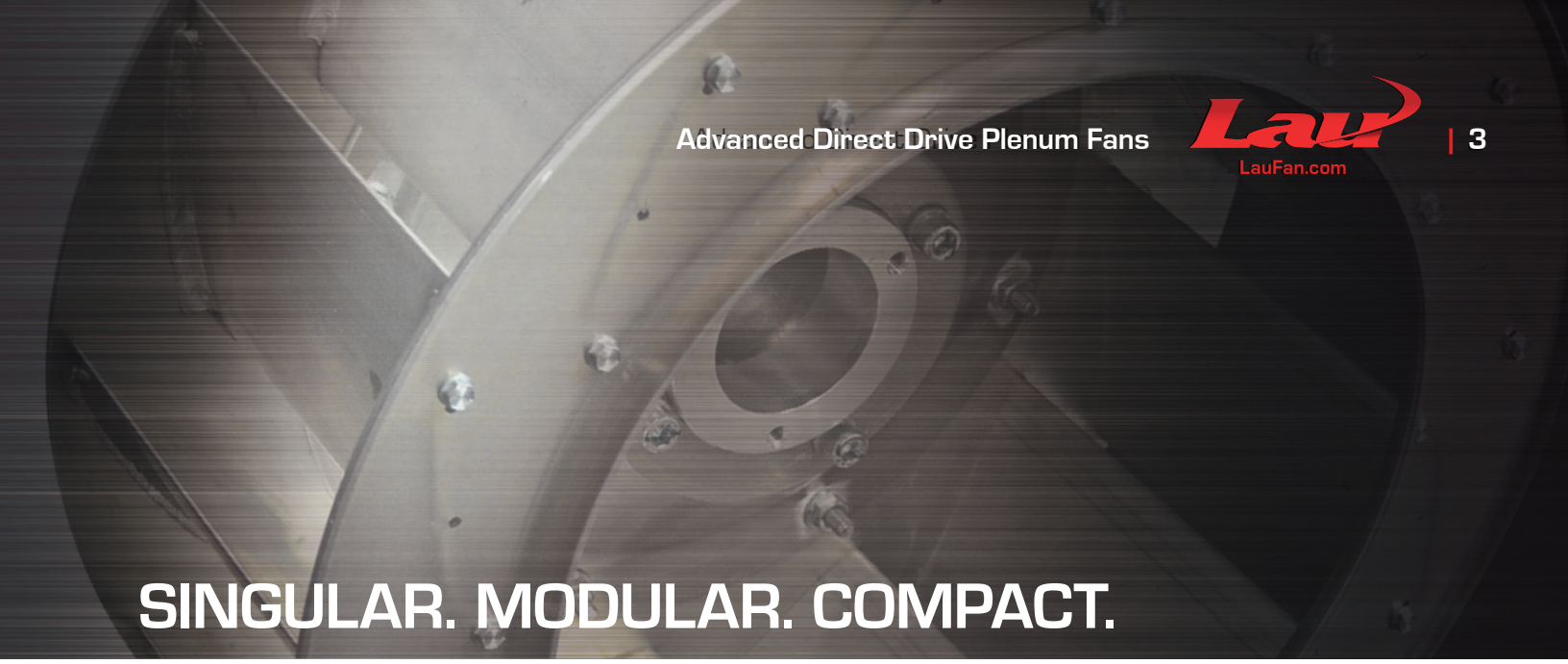
Lau

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.

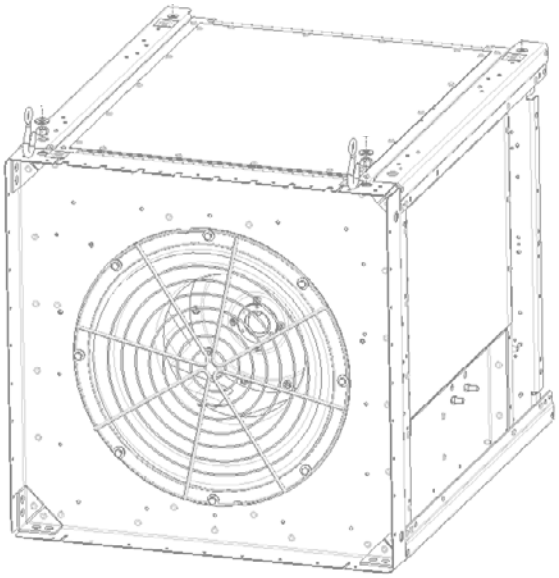
Eliminates all resonance conditions.

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.

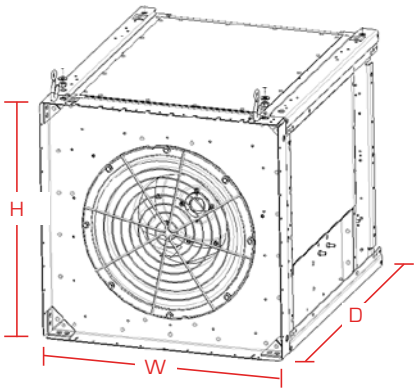
SIMPLE, STACKABLE APPLICATION

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

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

WARRANTY

STANDARD LIMITED WARRANTY
ENGINEERED SYSTEMS EQUIPMENT

SERVICE POLICY Supersedes: 50.05-NM2 (812) Form 50.05-NM2 (1212)

POLICY STATEMENT

Johnson Controls (JCI) warrants all equipment and associated factory supplied materials or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of eighteen (18) months from date of shipment, or twelve (12) months from date of start up, whichever occurs first. Subject to the exclusions listed below, Johnson Controls, at its option, will repair or replace, FOB point of shipment, such products or components as it finds defective.

Except for reciprocating replacement compressors, which Johnson Controls warrants for a period of twelve (12) months from date of shipment, Johnson Controls warrants Johnson Controls reconditioned or replacement materials, or installation or start-up services performed by Johnson Controls in connection therewith, against defects in workmanship and material for a period of (90) days from date of shipment.

The above represents the minimum warranty policy Johnson Controls will extend to customers. Additional product specific coverage is provided as outlined in related warranty policies. No warranty repairs or replacements will be made until payment for all equipment, materials, or components has been received by Johnson Controls.

EXCLUSIONS:

Unless specifically agreed to in the contract documents, this warranty does not include the following costs and expenses:

1. Labor to remove or reinstall any equipment, materials or components.

2. Shipping, handling or transportation charges, including cranes, safety walks or other safety requirements specific to jobsites.

3. Cost of refrigerant.

4. Freight damage.

5. Field applied coatings added to any surface or heat exchanger.

6. Rental Chillers.

ALL WARRANTIES ARE VOID IF:

1. Equipment is used with refrigerants, oil, additives, or antifreeze agents other than those authorized by supplying factory.

2. Equipment is used with any material or any equipment such as evaporators, tubing, other low side equipment or refrigerant controls not approved by supplying factory.

3. Equipment has been damaged by freezing because it was not properly protected during cold weather or damaged by fire or any other conditions not ordinarily encountered.

4. Equipment is not installed, operated, maintained and serviced in accordance with instructions issued by Johnson Controls.

5. Equipment is damaged due to dirt, air, moisture, or other foreign matter entering the refrigerant system.

6. Equipment is not properly stored, protected, or inspected by the customer during the period from date of shipment to date of initial start-up.

7. Field coating of coil has occurred.

8. Equipment is damaged due to acts of god, abuse, including shipping damage, neglect, sabotage, or acts of terrorists.

9. Equipment has modifications carried out that have an effect on the original design of the product without such work being authorized by the factory. Any on site design changes or unit modification/replacement shall be authorized in advance by the factory.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIAL OR EQUIPMENT INVOLVED, NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT, (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS SUPPLIERS AND SUBCONTRACTORS.

Reference: BOS 03-23.105.BEGTM

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www.johnsoncontrols.com

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STANDARD LIMITED LABOR WARRANTY
SOLUTION XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: SOLUTION XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for eighteen (18) months from the date of shipment from Seller's facility or twelve (12) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

Notification of defect and any warranty claim must be made in writing, postage paid, with a brief written description of the problem to Buyer's local Johnson Controls' sales/service office. Nothing herein us intended to provide warranty coverage to lessees or anyone other than Buyer and no third-parties are intended to be beneficiaries of this warranty.

BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

(Product Code Ref: 8513

5 YEAR PARTS & LABOR LIMITED WARRANTY YORK®
SOLUTION™ XTO/XTI
JOHNSON CONTROLS

PRODUCT TYPE: YORK® SOLUTION™ XTO/XTI STARTUP DATE:
YORK CONTRACT NO.: SHIPPING DATE:
UNIT MODEL NUMBER:
UNIT SERIAL NUMBER:
UNIT TAG ID:
UNIT LOCATION:

PROJECT NAME:
INSTALLATION
ADDRESS:

LIMITED WARRANTY

Subject to the terms, conditions, exclusions, and other limitations set forth in the Standard Limited Warranty for Engineered Systems Equipment (50.05-NM2), when properly endorsed, this protection plan between Johnson Controls, Inc. ("Seller") and the undersigned Customer ("Buyer") warrants that that each new Engineered Systems Equipment manufactured by Seller and materials, or installation or start-up services performed by Johnson Controls in connection therewith, are free from defects in material and workmanship for sixty-six (66) months from the date of shipment from Seller's facility or sixty (60) months from startup, whichever occurs first. When properly endorsed, this protection plan between the Seller and Buyer, warrants, to the customer named herein, labor for the entire air handling unit. Labor repairs must be performed in accordance with instructions issued by Johnson Controls.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESS OR IMPLIED IN LAW OR IN FACT, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTIES CONTAINED HEREIN SET FORTH BUYER'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A DEFECT IN WORKMANSHIP OR MATERIALS. IN NO EVENT SHALL JOHNSON CONTROLS' LIABILITY FOR DIRECT OR COMPENSATORY DAMAGES EXCEED THE PAYMENTS RECEIVED BY JOHNSON CONTROLS FROM BUYER FOR THE MATERIALS OR EQUIPMENT INVOLVED. NOR SHALL JOHNSON CONTROLS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THESE LIMITATIONS ON LIABILITY AND DAMAGES SHALL APPLY UNDER ALL THEORIES OF LIABILITY OR CAUSES OF ACTION, INCLUDING, BUT NOT LIMITED TO, CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF JOHNSON CONTROLS' SUPPLIERS AND SUBCONTRACTORS.

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BRANCH SERVICE OFFICE:

OFFERED BY: _____ _____
Johnson Controls Selling Representative Print/Sign — Date

APPROVED BY: _____ _____
Johnson Controls Branch Manager or other authorized individual Print/Sign — Date

ACCEPTED BY: _____ _____
Customer Signature — Date

RECEIVING/RIGGING

RECEIVING / RIGGING INSTRUCTIONS

The installing contractor is responsible to provide Johnson Controls / YORK with a contact to coordinate the delivery of the equipment in this submittal. Please fill out the information requested in the Submittal Approval Form section in the back of this submittal.

It is the installing contractor's responsibility to verify the following prior to signing the bill of lading presented by the transportation company:

- Ensure everything on the bill of lading was delivered.
- Visually perform a thorough inspection of all equipment for any signs of shipping damage

Any short-shipments or shipping damage must be noted on the bill of lading prior to signing.

The transportation company will provide you withinstructions for filing a claim. It is the installing contractor's responsibility to work directly with the transportation company to resolve any shipping claims.

1.0 PRE-INSTALLATION

RECEIVING

All units leaving the plant have been inspected to ensure the shipment of quality products. All reasonable means are utilized to properly package the air handling units.

CAUTION

Johnson Controls will NOT be responsible for any damage or loss of parts in shipments or at the job site. Receiver is solely responsible for noting Bill of Lading and filing freight claims IMMEDIATLY. Refer to Shipping Damage Claims Form 50.15-NM available from Johnson Controls Sales representative.

RIGGING OF INDOOR AND OUTDOOR UNITS

WARNING

All lifting points must be used to avoid personal injury or death and to avoid damage to the equipment.

NOTE

SHIPPED LOOSE DAMPERS. When large units are ordered with MZ segments in rear discharge location (on the end of the unit), the units will ship with the top section (hot deck) separated. In these cases, the complete multizone damper assembly (hot deck and cold deck together) will ship loose.

FIG. 1-1 – RECOMMENDED LIFTING WITH FOUR LIFTING POINTS

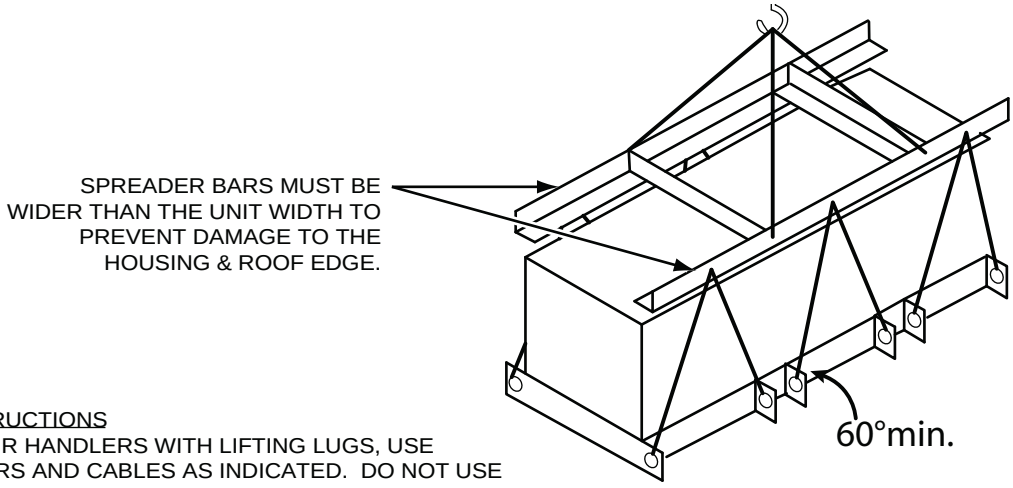


FIG. 1-2 – RECOMMENDED LIFTING WITH MULTIPLE POINTS

OFF-LOADING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the air and watertight seams in the unit casing. Prevent unnecessary jarring or rough handling.

For lifting air handling units with lifting lugs or corner connectors; proper spreader bars and hoisting line must be used when rigging to prevent damage to the unit casing *(see Fig. 1-1)*. When lifting long units a special system must be used to insure a minimum 60° angle between lifting lug and spreader bar/frame *(see Fig. 1-2 & Table 1-1)*. It is also mandatory that an experienced and reliable rigger be selected to handle unloading and final placement of the equipment. The rigger must be advised that the unit contains internal components and that it be handled in an upright position. Care must be exercised to avoid twisting the equipment structure.

NOTE

Refer to the submittal for the section weights.

TABLE 1-1 - SPACING REQUIREMENTS FOR OFFLOADING LONG UNITS		
UNIT HT.	MAX. LIFTING LUG SPACING	MIN. LIFTING STRAP LENGTH
≤ 72"	120"	120"
> 72"	192"	192"

NOTE

All lifting lugs must be used to avoid damage to unit. If unit does not have lifting lugs, use bottom corner connectors and intermediate raceway lifting lugs. Do not use top corner connectors.

Unit section weights are furnished on the job submittal. Due to the variance in weight of each unit design, it is not possible to list unit weights in this instruction. The submittal must be referred to when selecting a crane for rigging and figuring roof weight loads. Contact your Johnson Controls Sales representative if you have any questions regarding unit weights.

CRANE AND SPREADER BARS

See Fig's 1-1 and 1-2.

FORK LIFT

Forklifts should not be used to off-load air handlers except in special circumstances. If moving air handling equipment with a fork lift or similar means becomes necessary, always make sure the lifting forks are long enough to reach from the fork truck to the opposite side and slightly beyond. It is helpful to leave the shipping blocks attached to the bottom of the equipment until in its final location. There is no structural support under the equipment except what is visible from the perimeter.

COME-A-LONGS OR POWER PULL

See Fig1-3.

LD09613

FIG. 1-3 – TYPICAL COME-A-LONG TYPES

SHACKLES

Refer to Fig. 1-4 for proper lifting with hook and shackle at corners. Refer to Fig. 1-5 for proper lifting with hook and shackle at lifting lugs.

NOTE

Fig's 1-4 and 1-5 show YORK Solution unit without baserails. When baserails are present, always use all lifting lugs pre-mounted on baserails. Do not lift by corners.

LD13767

FIG. 1-4 – PROPER LIFTING WITH SHACKLE AT CORNER

LD13768

FIG. 1-5 – PROPER LIFTING WITH SHACKLE AT LIFTING LUG

LD13766

FIG. 1-6 – RECOMMENDED LIFTING WITH BASERAIL

INSPECTION

CHECK FOR DAMAGE

RECEIVER RESPONSIBILITY

Receiver is solely responsible for noting freight bill and filling freight claims IMMEDIATLY *(see "Receiving" in this section).*

Visible damage should be noted on the signed and dated bill of lading with a request that the carrier inspect the damage within 72 HRS. of notification. The shipping wrapper must be removed and replaced with a tarp or similar protective covering. Any concealed damaged reported after 15 days will compromise a claim settlement. Inspection requests may be done by telephone or in person, but should be confirmed in writing. If assistance is needed with the claim process, contact your Johnson Controls Sales representative.

INDOOR UNITS

It is Johnson Controls intention that a shipping wrapper be applied to unpainted indoor units for protection from weather, road dirt, etc. during inland transit and that the wrapper be removed at the time of delivery to allow for a thorough inspection, both inside and out.

OUTDOOR UNITS

Outdoor units are not fully wrapped. Exposed openings are covered for protection from weather, road dirt, etc. during inland transit. A thorough inspection, both inside and out, should be done at the time of delivery.

CHECKING FOR NON MOUNTED PARTS

- Check the packing list for non-mounted ship loose parts. (Check inside all segments.)
- Packing list will note how many and type of parts.
- Shortages must be reported within 10 days after receipt of order.

See Ship Loose Parts, Fig 2-8 thru 2-14

STORAGE

SHORT-TERM STORAGE

Indoor Units:

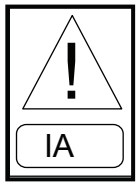
Under no circumstances should outdoor storage be used

Outdoor Units:

Be sure all shipping covers are reapplied after inspection, or tarps are used during storage.

Short-term storage is considered six (6) months or less from date of shipment. Storage maintenance during this time is usually limited to the following.

- Rotate fans every four (4) weeks beginning upon arrival to prevent moisture from damaging bearing.
- If the units are to be stored out-of-doors, prior to installation, special care must be taken to cover and protect the units from dust, rain, snow and rodents. The units must be protected from constant exposure to rain and snow.
- Store on a firm, flat surface to prevent distortion. Block the unit off the ground to protect components from water.



Protect all parts and porous materials from rain and other sources of moisture. Decontaminate or replace as needed to ensure microbial growth is not introduced to the air handler.

- The unit must also be protected from damage to the exterior of the cabinet or coil connections by construction vehicles and personnel.