



GUAM MEMORIAL HOSPITAL AUTHORITY

ATURIDÁT ESPETÁT MIMURIÁT GUÅHÅN

850 Governor Carlos Camacho Road, Tamuning, Guam 96913
Operator: (671) 647-2330 or 2552 | Fax: (671) 649-5508



January 27, 2022

AMENDMENT #4 FOR

GMHA IFB 009-2022 LABORATORY HVAC SYSTEM UPGRADE PROJECT

TO: All prospective bidders,

This Amendment is in response to RFI:

- 1) **Vendor:** Can you provide us brand and unit model for EF-5 to EF 9 that applicable based on actual condition?

GMHA:

- 1.) Updated mechanical plans with revisions indicated under the title block;
- 2.) Equipment catalog cuts from manufacturer identifying the equipment and model number selected and used as the basis for the design requirements.

(See attachments: GMHA Mechanical Plan & GMHA Exhaust Fans)



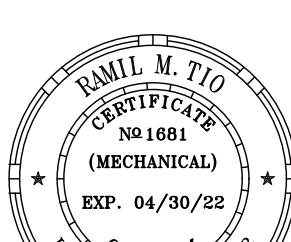

If any other questions/clarifications please send via telefax addressed to Mrs. Lillian Perez-Posadas, MN, RN.

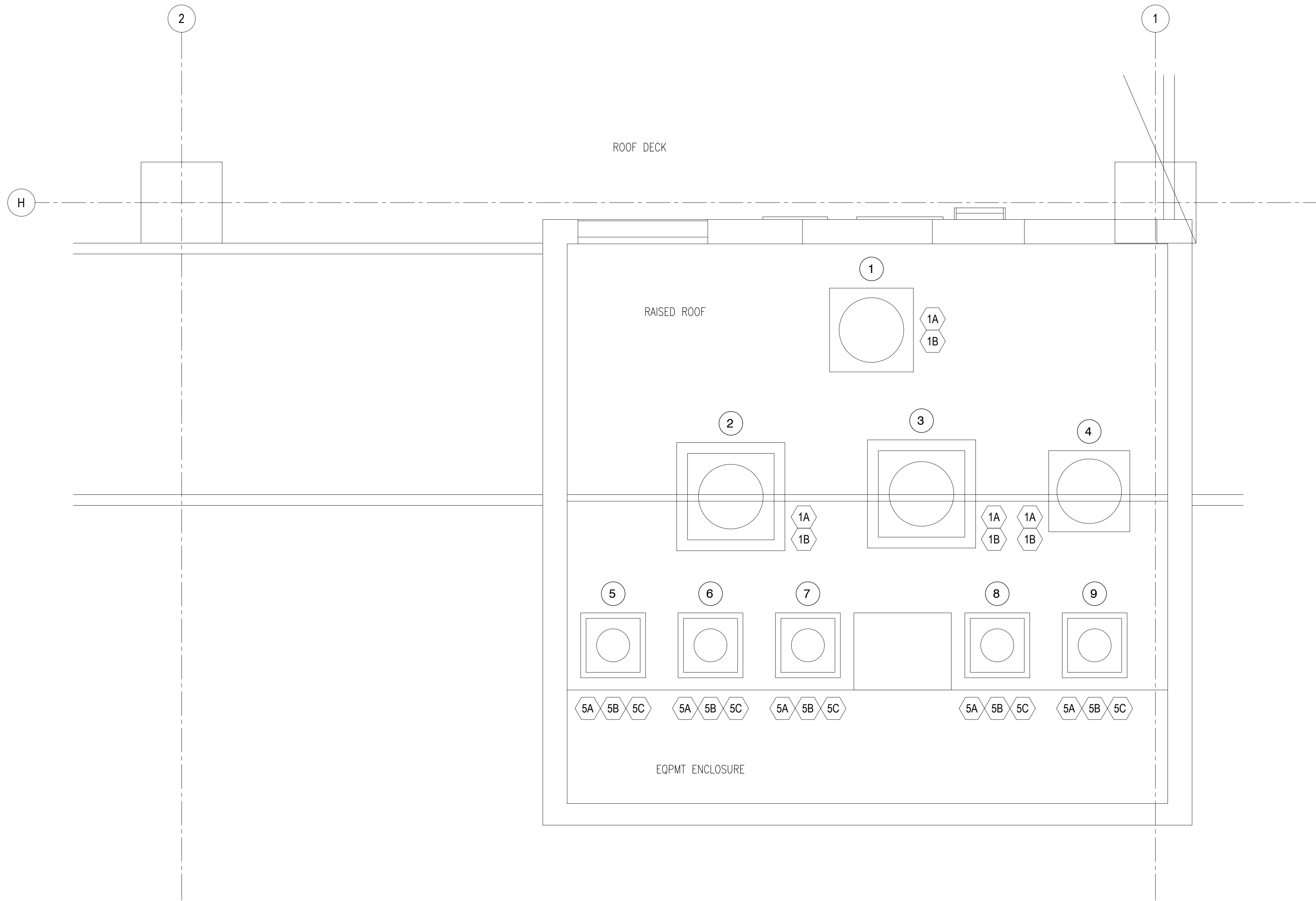
Dolores F. Pangelinan,
Hospital Materials Management Administrator

EXHAUST FAN

MARK NO.	LOCATION	AREA SERVE	CAPACITY (CFM)	ESP (IN.W.G.)	FAN RPM	MOTOR				REMARKS
						HP	VOLTAGE	PHASE	HERTZ	
EF 1	4TH FLOOR ROOF	D231 – IMMUNOLOGY (ROOM)	300	0.5	1,124	1/4	115	1	60	"GREENHECK" CUBE, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 2	4TH FLOOR ROOF	D225 – MICROBIOLOGY (ROOM)	2,230	0.5	997	1/2	115	1	60	"GREENHECK" CUBE, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 3	4TH FLOOR ROOF	D221 MEDIA ROOM (ROOM)	2,580	0.5	881	1/2	115	1	60	"GREENHECK" CUBE, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 4	4TH FLOOR ROOF	D215 NUCLEAR MEDICINE / C-ARMM	1,060	0.5	1,512	1/3	115	1	60	"GREENHECK" CUBE, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 5	4TH FLOOR ROOF	D225 – MICROBIOLOGY (HOOD)	640	1.0	2,399	3/4	115	1	60	"GREENHECK" VEKTOR, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 6	4TH FLOOR ROOF	D226 – CENTER CORE (AUTOCLAVE)	640	1.0	2,399	3/4	115	1	60	"GREENHECK" VEKTOR, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 7	4TH FLOOR ROOF	D222 – HAZARDOUS ROOM	640	1.0	2,399	3/4	115	1	60	"GREENHECK" VEKTOR, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 8	4TH FLOOR ROOF	D224 – HISTOLOGY (HOOD)	640	1.0	2,399	3/4	115	1	60	"GREENHECK" VEKTOR, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL
EF 9	4TH FLOOR ROOF	D231 – IMMUNOLOGY (HOOD)	640	1.0	2,399	3/4	115	1	60	"GREENHECK" VEKTOR, EXPLOSION PROOF MOTOR WITH COATING OR APPROVED EQUAL

3. ALL WORK SHALL BE IN ACCORDANCE WITH GOVERNMENT LAWS, ORDINANCES, RULES & REGULATIONS. MECHANICAL WORK SHALL CONFORM WITH THE 2009 EDITION OF THE INTERNATIONAL MECHANICAL CODE INTERNATIONAL BUILDING CODE AND AHJ
2. CONTRACTOR SHALL OBTAIN & PAY FOR ALL GOVERNMENT PERMITS REQUIRED AND COORDINATE INSPECTIONS BY GOVERNMENT AUTHORITIES.
3. IT IS THE INTENT OF THIS PLANS TO PROVIDE A WORKING INSTALLATION IN EVERY DETAIL AND ALL ITEMS REQUIRED SHALL BE FURNISHED WHETHER OR NOT PARTICULARLY SHOWN OR SPECIFIED. DUE TO SMALL SCALE OF DRAWINGS AND CONCEPTUAL LAYOUT OF DUCTS, PIPING, AND EQUIPMENT, CONTRACTOR IS REQUIRED TO SUBMIT FOR APPROVAL BY OWNER SHOP DRAWINGS TO INDICATE EXTENT, SCOPE & CONSTRUCTION DETAIL IN COORDINATION WITH OTHER TRADES WITHOUT ANY ADDITIONAL COST TO OWNER. WORK SHALL NOT START WITHOUT THESE SHOP DRAWINGS APPROVED FOR CONSTRUCTION.
4. ALL MECHANICAL EQUIPMENT ELECTRICAL CHARACTERISTICS, DATA, AND OTHER RELATIVE REQUIREMENT VARIES WITH MANUFACTURERS. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO SUIT PROPOSED EQUIPMENT FOR REVIEW AND APPROVAL AT NO ADDITIONAL COST TO THE CONTRACT. WORK TO INCLUDE REPLACE/UPGRADE EXISTING ELECTRICAL AT NO ADDITIONAL COST TO THE OWNER.
5. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY. CONTRACTOR TO PROVIDE SHOP DRAWING PRIOR TO START OF WORK.
6. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES & REGULATIONS.
7. PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
8. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, ELECTRICAL & OTHER TRADES SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
9. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.
10. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
11. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND RESULTS MUST BE DETERMINED BY CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
12. ALL DUCTWORK SIZES, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND OVERALL DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING AND/OR EXTERNAL INSULATION THICKNESS.
13. PROVIDE STAINLESS PIPE OR DUCT SLEEVES IN PIPE OR DUCT PENETRATION THRU WALLS AND FLOORS AND PROPERLY CAULKED IN A MANNER APPROVED BY ENGINEER.
14. CONTRACTOR SHALL SUBMIT TO THE ARCHITECT-ENGINEER AND/OR OWNER ONE (1) SET OF NON-REPRODUCIBLE AS-BUILT DRAWINGS AFTER CONCLUSION OF WORK.
15. "EXISTING EXHAUST FAN WAS ACTIVE AND BEING USED BY GMH. WORK WILL BE DONE IN PHASING AND MUST BE COORDINATED WITH GMH ENGINEERING. REMOVAL AND INSTALLATION SHOULD BE DONE PER SYSTEM, ONE AT A TIME. NO WORK WILL BE DONE WITHOUT APPROVAL FROM ENGINEERING DEPARTMENT"

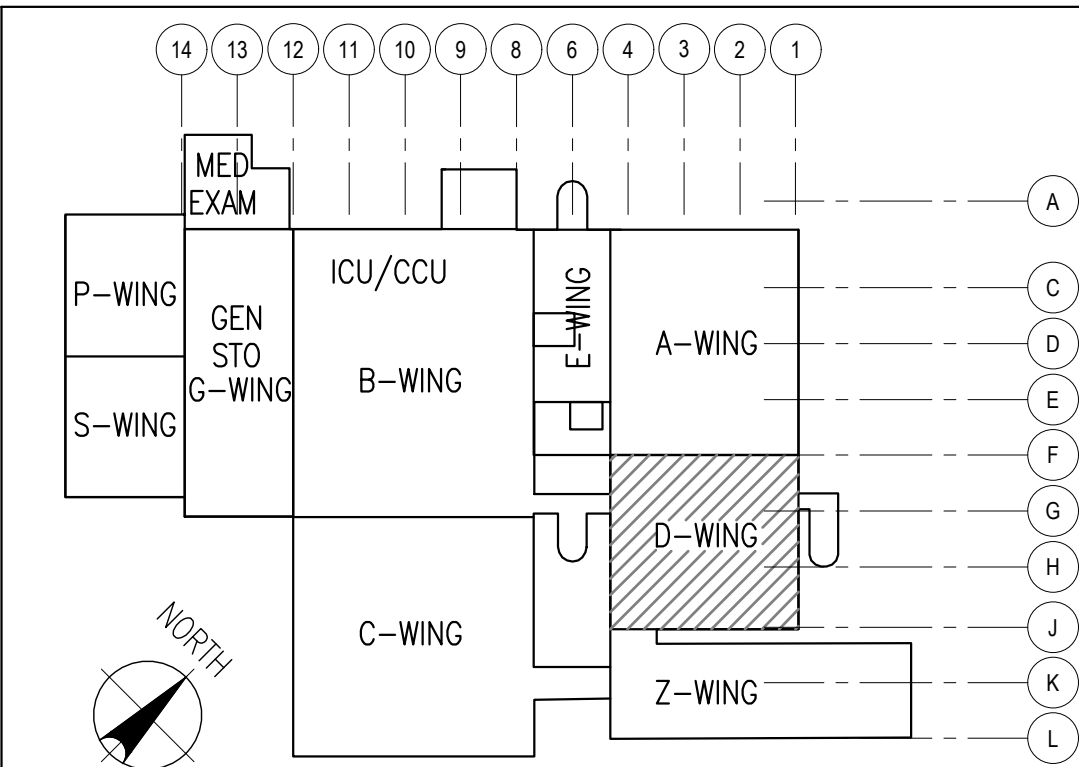
 <p>EMPSCO Engineering Management & Planning Services Corporation 1998 ANNET DRIVE, 2F EMPSCO BUILDING ROUTE 10, STEVEDO, GUAM 96909 Tel: (671) 638-3716 • 638-4710 Fax: (671) 638-2106</p>	 <p>01-25-22</p>	<p>CONTRACTOR RFI #1</p>			
	REV.	DATE	BY	DESCRIPTION	APPROVED BY
 <p>I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION</p> <p>DATE: _____</p>	GMHA NO. _____ GRANT ID NO. _____ CONTRACT NO. _____		<div style="text-align: center;">  <p>GOVERNMENT OF GUAM</p> <p>GUAM MEMORIAL HOSPITAL AUTHORITY <small>ATUNEDAT ESPERAT PUNIRUAT GUAMAN</small></p> </div> <div style="text-align: center; font-size: 24pt; font-weight: bold; margin-top: 20px;">ENGINEERING DIVISION</div>		
	PROJECT NO. _____ GMHA 001-2021		PROJECT: GMHA HOSPITAL AND ENVELOP UPGRADE PROJECT SCHEDULE A2 - MECHANICAL WORK (LABORATORY FACILITY AT D-WING)		
DES. BY: rmt DRN. BY: em CHK. BY: rmt	CHIEF ENGR. : - ENGR. SUP: - PROJ. ENGR. : -		CONTENTS: EQUIPMENT SCHEDULE AND GENERAL NOTES ~		DRAWING NO. <div style="font-size: 24pt; font-weight: bold; text-align: center;">M-1.0</div> <div style="text-align: center;">SHT. <u>3</u> OF <u>9</u></div>



1 RAISED ROOF ENCLOSURE - MECHANICAL DEMOLITION PLAN
MD-2.1 MD-2.1 SCALE: 1/2" = 1' - 0"

REMOVAL & DEMO WORK KEY NOTES:

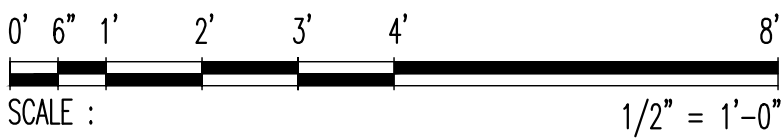
- 1A** REMOVE EXISTING EXHAUST FAN AND RELATED ACCESSORIES.
- 1B** REMOVE EXHAUST FAN ROOF CURB.
- 5A** REMOVE EXISTING EXHAUST FAN AND RELATED ACCESSORIES.
- 5B** REMOVE EXISTING EXHAUST FAN EXHAUST STACK AND RELATED ACCESSORIES.
- 5C** REMOVE ALL EXISTING EXHAUST FAN FLEXIBLE CONNECTION.



KEY PLAN

<div><div><div><div><div><div></div></div></div><div><div><div></div><div><div>EMPSCO</div></div></div></div><div><div>Engineering Management & Planning Services Corporation</div><div>1988 ARMY DRIVE, 3RD FLOOR BUILDING ROUTE 16, DEDDIE, GUAM 96939 Tel: (671) 638-2116 / 638-4710 Fax: (671) 638-2130</div></div></div><div><div><div><div><div></div><div><div>FAMIL M. TIO</div></div><div><div>CERTIFICATE</div></div><div><div>NO 1681</div></div><div><div>(MECHANICAL)</div></div><div><div>EXP. 04/30/22</div></div><div><div>GUAM</div></div><div><div>PROFESSIONAL ENGINEER</div></div></div></div><div><div>I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION</div><div>DATE:-----</div></div></div></div></div></div>					
	REV	DATE	BY	DESCRIPTION	APPROVED BY
	GMHA NO.		<div><div><div><div><div></div><div><div>GOVERNMENT OF GUAM</div></div></div><div><div><div><div><div></div><div><div>GUAM MEMORIAL HOSPITAL AUTHORITY</div></div></div><div><div>ATURIDAT ESPETAT MIMUNAT GUAAHAN</div></div></div></div></div></div></div></div>		
	GRANT ID NO.		<div><div><div><div><div></div><div><div>ENGINEERING DIVISION</div></div></div></div></div></div>		
	CONTRACT NO.		<div><div><div><div><div></div><div><div>PROJECT:</div></div><div><div>GMHA HOSPITAL AND ENVELOP UPGRADE PROJECT SCHEDULE A2 - MECHANICAL WORK (LABORATORY FACILITY AT D-WING)</div></div></div></div></div></div>		
<div><div>DES. BY: rmt</div><div>DRN. BY: em</div><div>CHK. BY: rmt</div></div>	PROJECT NO.		CONTENTS:		DRAWING NO.
	GMHA 001-2021		RAISED ROOF ENCLOSURE - MECHANICAL DEMOLITION PLAN		MD-2.1
	CHIEF ENGR: .		ENGR. SUP: .		SHT. 4 OF 9
	PRDJ. ENGR: .				

GRAPHIC SCALE:





The Key Plan shows the layout of the hospital wings. At the top, a row of 14 numbered circles (14 to 1) represents the main entrance area. Below this, the wings are arranged as follows:

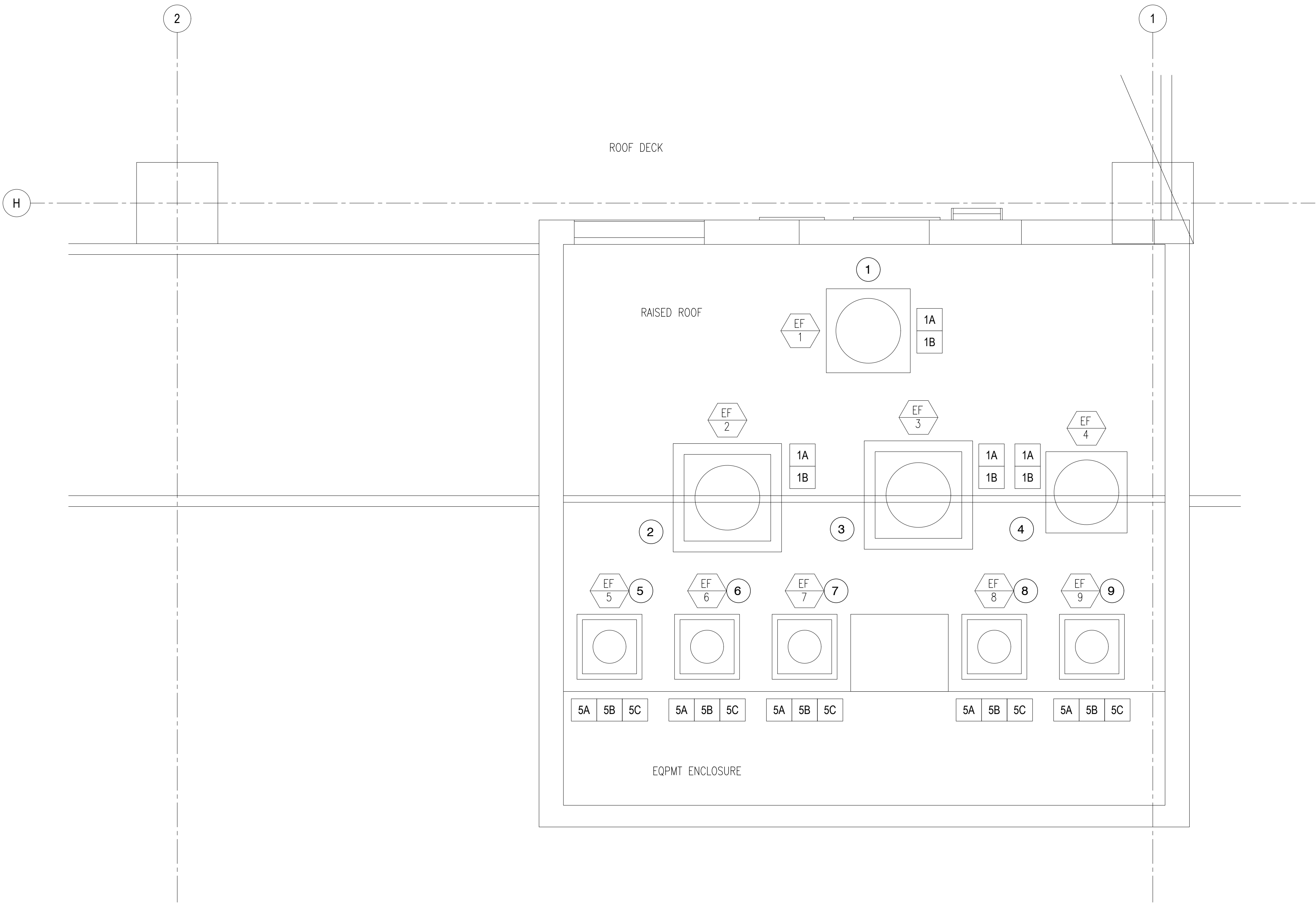
- Top Wing:** MED EXAM (above GEN STO G-WING), ICU/CCU (above B-WING), and A-WING (above D-WING).
- Left Wing:** P-WING (above S-WING).
- Center Wing:** GEN STO G-WING (above B-WING), B-WING (above C-WING), and C-WING (above Z-WING).
- Right Wing:** E-WING (above D-WING), D-WING (shaded area), and Z-WING.

A compass rose in the bottom left corner indicates North is towards the top-left. On the right side, a vertical column of letters (A through L) is connected to the wings by dashed lines: A to MED EXAM, C to P-WING, D to S-WING, E to GEN STO G-WING, F to B-WING, G to C-WING, H to A-WING, I to D-WING, J to Z-WING, K to C-WING, and L to Z-WING.

GRAPHIC SCALE:

0' 6" 1' 2' 3' 4' 8'

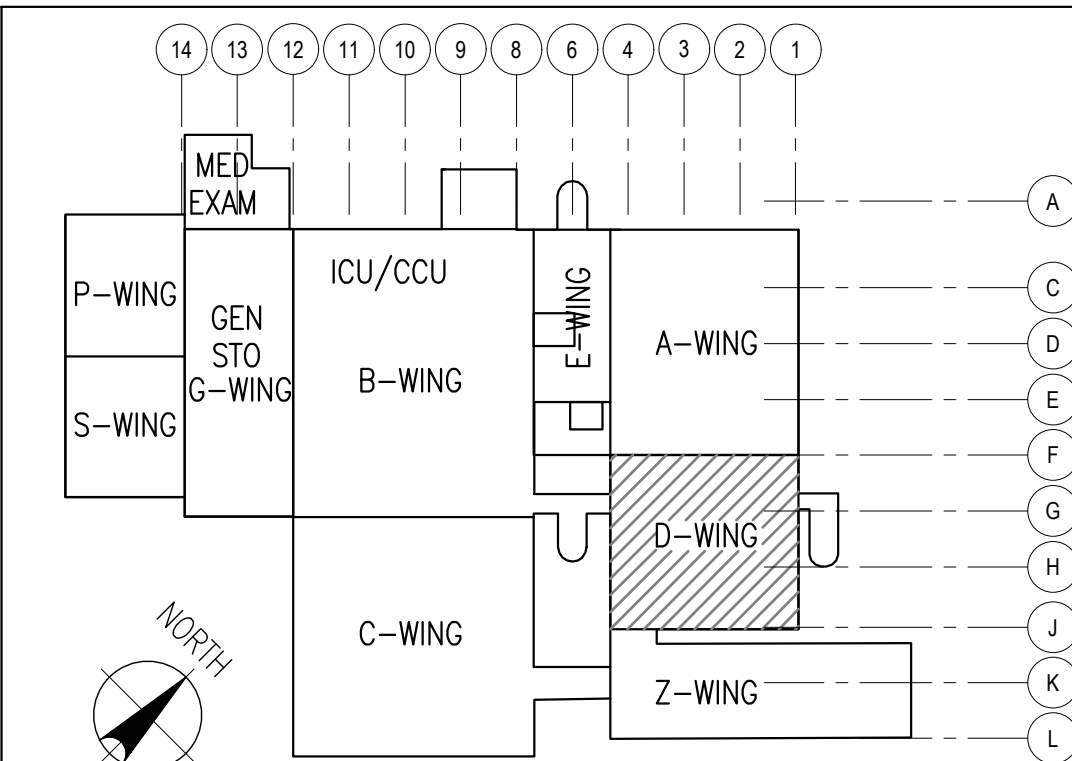
SCALE : $1/2" = 1'-0"$



1 RAISED ROOF ENCLOSURE - MECHANICAL PLAN
M-2.1 M-2.1 SCALE: 1/2" = 1' - 0"

NEW WORK KEY NOTES:

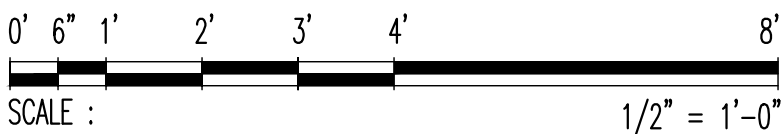
- 1A PROVIDE NEW EXHAUST FAN AND RELATED ACCESSORIES. WORKS TO INCLUDE EXHAUST FAN CONTROL. EXHAUST FAN WILL BE EXPLOSION PROOF MOTOR. FAN CASING WILL HAVE COATING FOR CORROSION PROTECTION. CONNECT ELECTRICAL POWER WITH EXISTING. INSTALL EXHAUST FAN AS PER EXHAUST FAN ROOF DETAIL.
- 1B PROVIDE 6" HIGH CONCRETE ROOF CURB. PROVIDE FLASHING AROUND. OPENING SHOULD BE COORDINATED/UPGRADE WITH NEW EXHAUST FAN OPENING REQUIREMENT. CONNECT POWER TO EXISTING.
- 5A PROVIDE NEW EXHAUST FAN AND RELATED ACCESSORIES. WORKS TO INCLUDE EXHAUST FAN CONTROL. EXHAUST FAN WILL BE EXPLOSION PROOF MOTOR. FAN CASING WILL HAVE COATING FOR CORROSION PROTECTION. CONNECT ELECTRICAL POWER WITH EXISTING.
- 5B PROVIDE STAINLESS STEEL EXHAUST STACK. SIZE WILL BE THE SAME AS EXISTING. INSTALL AS PER EXHAUST STACK DETAILS.
- 5C PROVIDE NEW EXHAUST FAN FLEXIBLE CONNECTION WITH STAINLESS STEEL HARD DUCT CONNECTED GOING INSIDE THE CHASED. EXTEND EXHAUST FAN PAD AS NECESSARY TO ACCOMMODATE THE ADDITIONAL STAINLESS STEEL HARD DUCT. EXHAUST NEED TO SLOPE DOWN TOWARDS THE EXHAUST FAN. PROVIDE TOP COVER AROUND IT THAT WILL BE FLASH TO THE EXISTING WALL.

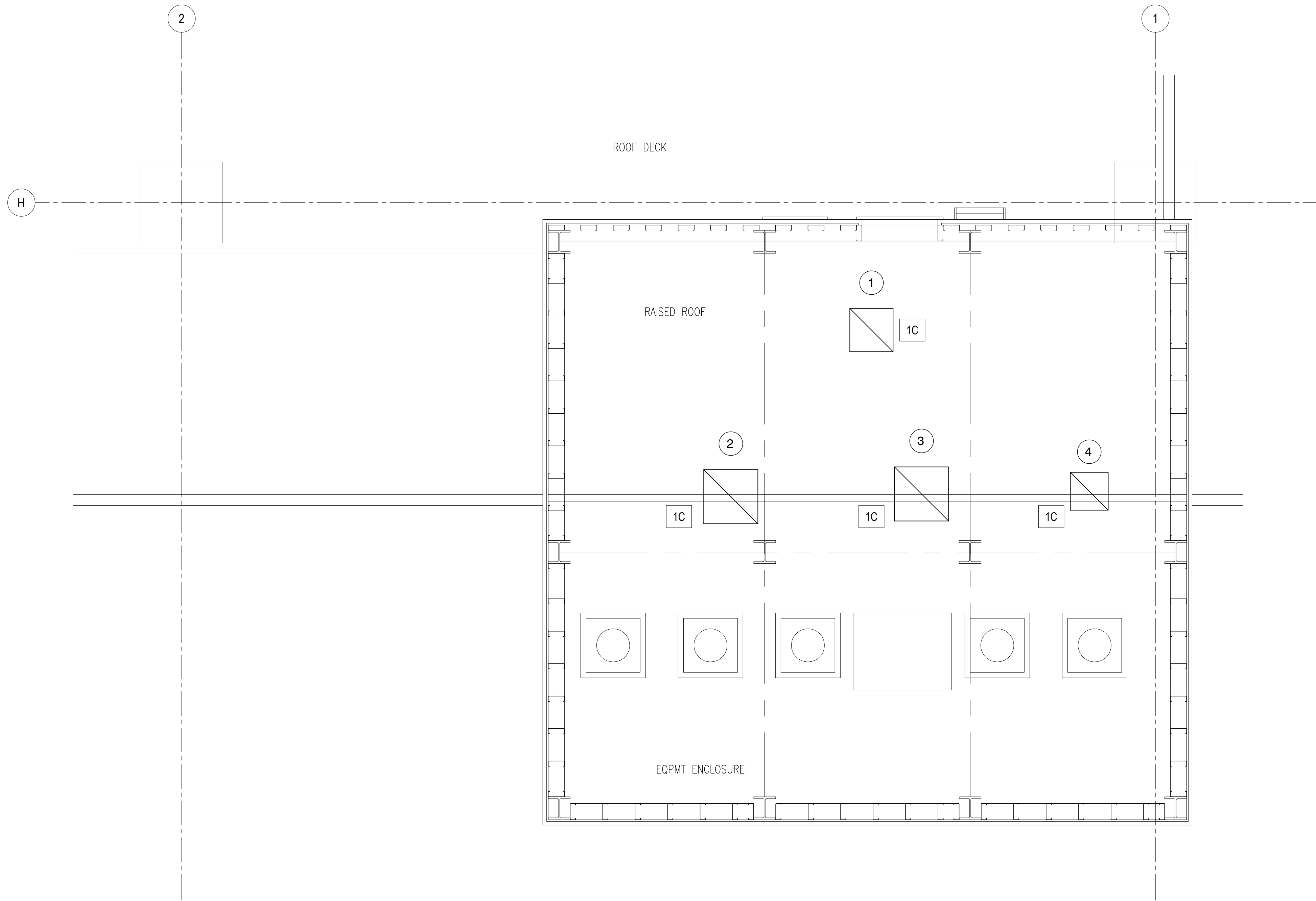


KEY PLAN

<div>EMPSCO Engineering Management & Planning Services Corporation 198 ARMY DRIVE, 3F EMPSCO BUILDING ROUTE 16, DEDDIE, GUAM 96939 Tel: (671) 638-2116 / 638-4710 Fax: (671) 638-2130</div> <div><div><div><div><div><div></div><div>FAMIL M. TIO</div></div></div><div><div><div></div><div>CERTIFICATE</div></div><div><div></div><div>NO 1681</div></div></div><div><div><div></div><div>(MECHANICAL)</div></div><div><div></div><div>EXP: 04/30/22</div></div></div><div><div><div></div><div>GUAM</div></div><div><div></div><div>PROFESSIONAL ENGINEER</div></div></div></div></div><div>I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION</div><div>DATE:</div></div>	REV	DATE	BY	DESCRIPTION	APPROVED BY
	GMHA NO.				
	GRANT ID NO.				
	CONTRACT NO.				
	PROJECT NO.				
	GMHA 001-2021				
DES. BY: rmt	CHIEF ENGR: .	CONTENTS: RAISED ROOF ENCLOSURE - MECHANICAL PLAN ---			DRAWING NO. M-2.1
DRN. BY: em	ENGR. SUP: .				
CHK. BY: rmt	PRD. ENGR: .				SHT. 6 OF 9

GRAPHIC SCALE:

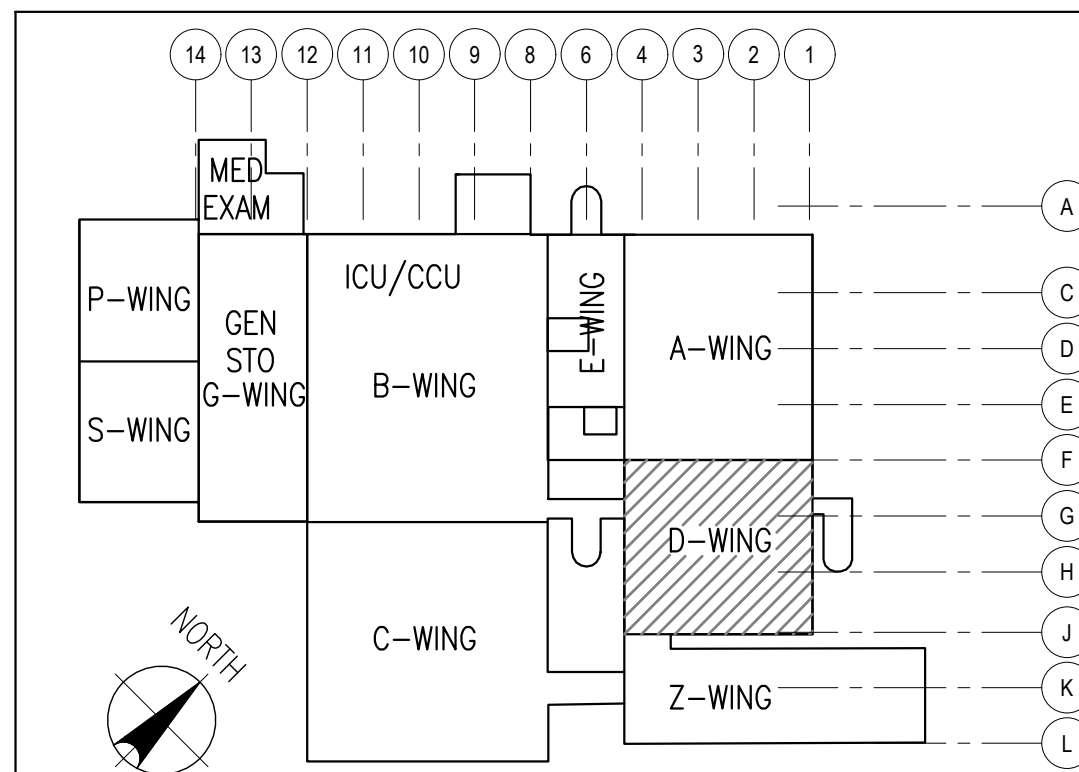




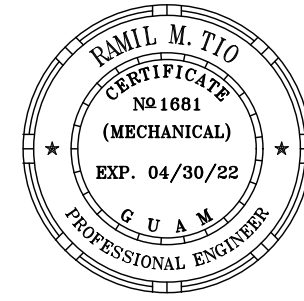

1 DUCT SPACE BELOW RAISED ROOF - MECHANICAL PLAN
M-2.2 M-2.2 SCALE: 1/2" = 1' - 0"

NEW WORK KEY NOTES:

1C PROVIDE NEW STAINLESS STEEL EXHAUST DUCTWORK. DUCTWORK SIZE WILL BE THE SAME AS EXISTING. NEW DUCTWORK WILL BE UP TO THE FLOOR SLAB. DUCTWORK WILL BE SLOPE TOWARDS THE EXHAUST FAN.



KEY PLAN

<div>EMPSCO Engineering Management & Planning Services Corporation 1008 ARMY DRIVE, 3RD FLOOR BUILDING SUITE 16, DEDDIE, GUAM 96909 Tel: (671) 638-2116 / 638-4710 Fax: (671) 638-2100</div> <div></div> <div>I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION DATE: _____ .</div>	REV	DATE	BY	DESCRIPTION	APPROVED BY
	GMHA NO.			GOVERNMENT OF GUAM	
	GRANT ID NO.			 GUAM MEMORIAL HOSPITAL AUTHORITY ATURIDAT ESPATAT MIMUNIAAT GUAAHAN	
	CONTRACT NO.			ENGINEERING DIVISION	
DES. BY: rmt DRN. BY: em CHK. BY: rmt	PROJECT NO.			PROJECT: GMHA HOSPITAL AND ENVELOP UPGRADE PROJECT SCHEDULE A2 - MECHANICAL WORK (LABORATORY FACILITY AT D-WING)	
	GMHA 001-2021			CONTENTS: DUCT SPACE BELOW RAISED ROOF - MECHANICAL PLAN ---	
	CHIEF ENGR. : .			DRAWING NO. M-2.2	
	ENGR. SUP. : .			SHT. <u>7</u> OF <u>9</u>	
PROJ. ENGR. : .					

GRAPHIC SCALE:

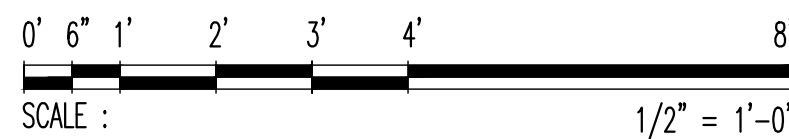




PHOTO: 1



PHOTO: 1



PHOTO: 2

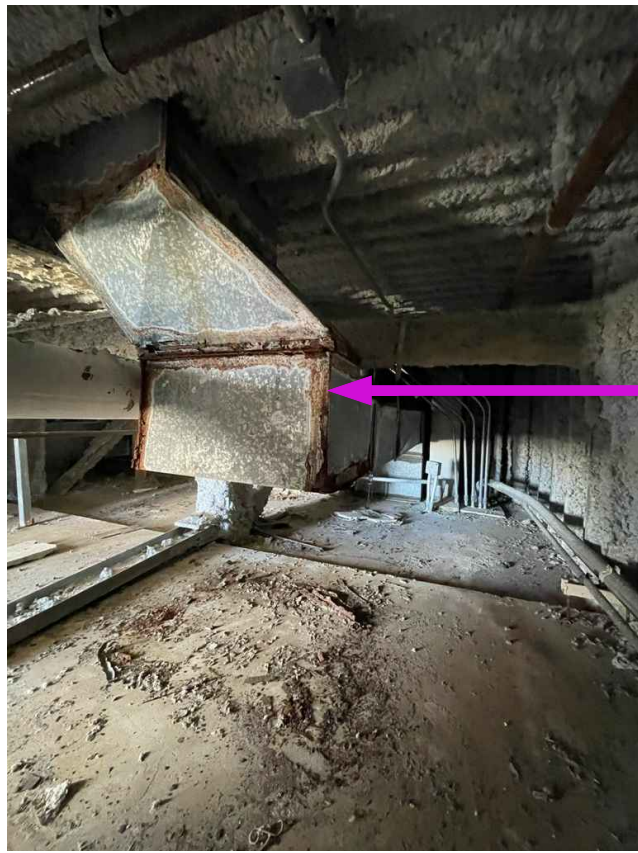


PHOTO: 2



PHOTO: 3



PHOTO: 3



PHOTO: 4

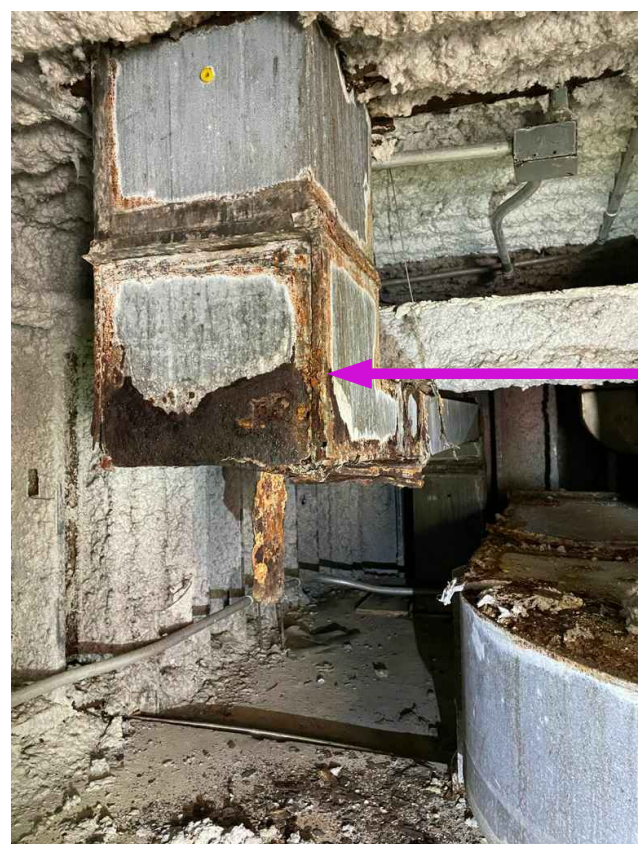


PHOTO: 4



PHOTO: 5 6 7



PHOTO: 8

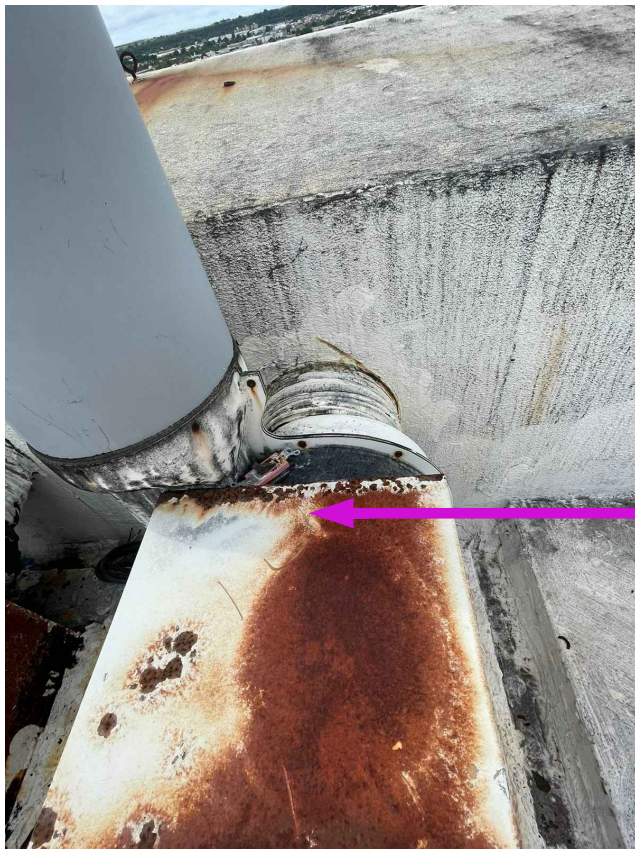


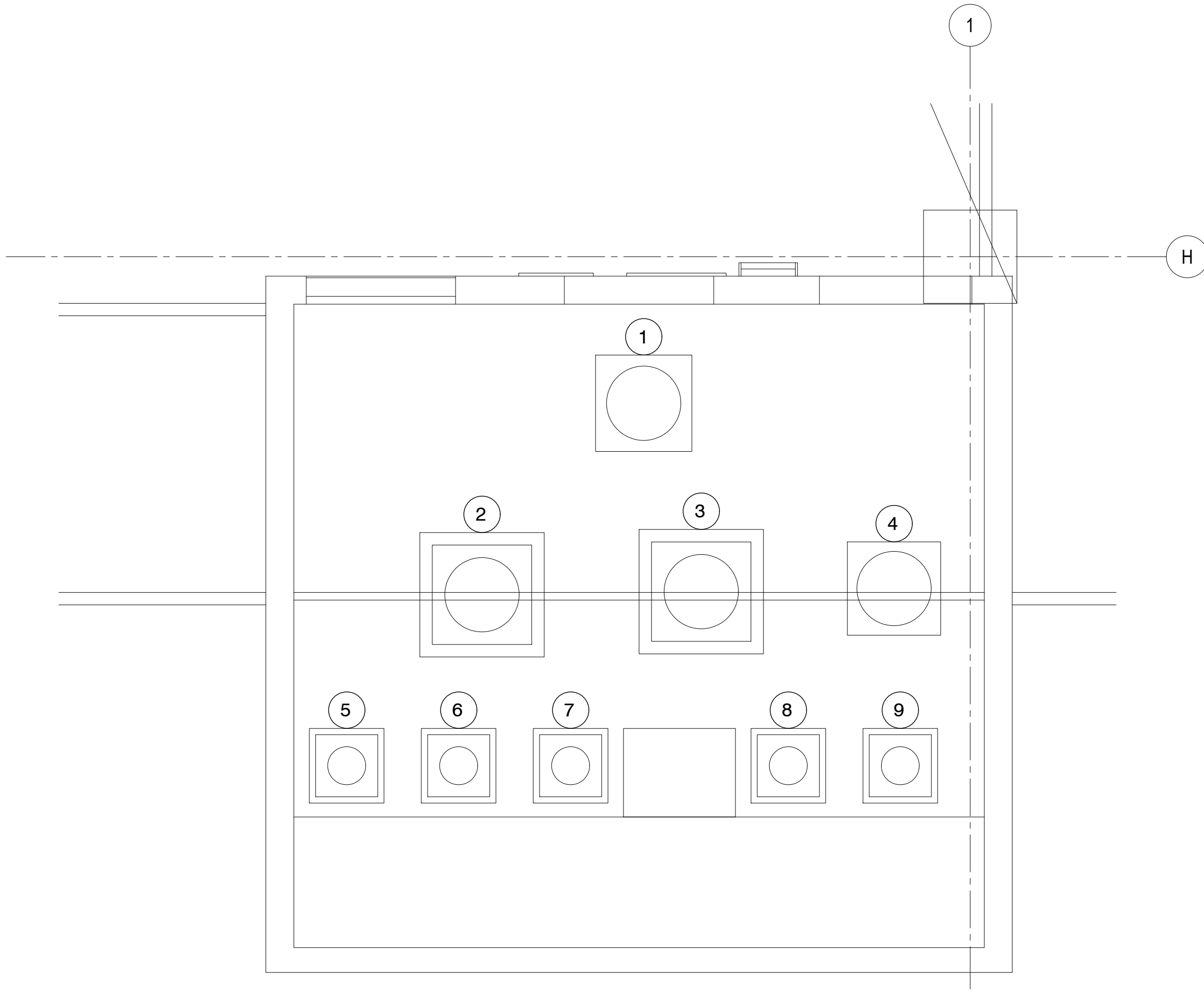
PHOTO: 5 6 7



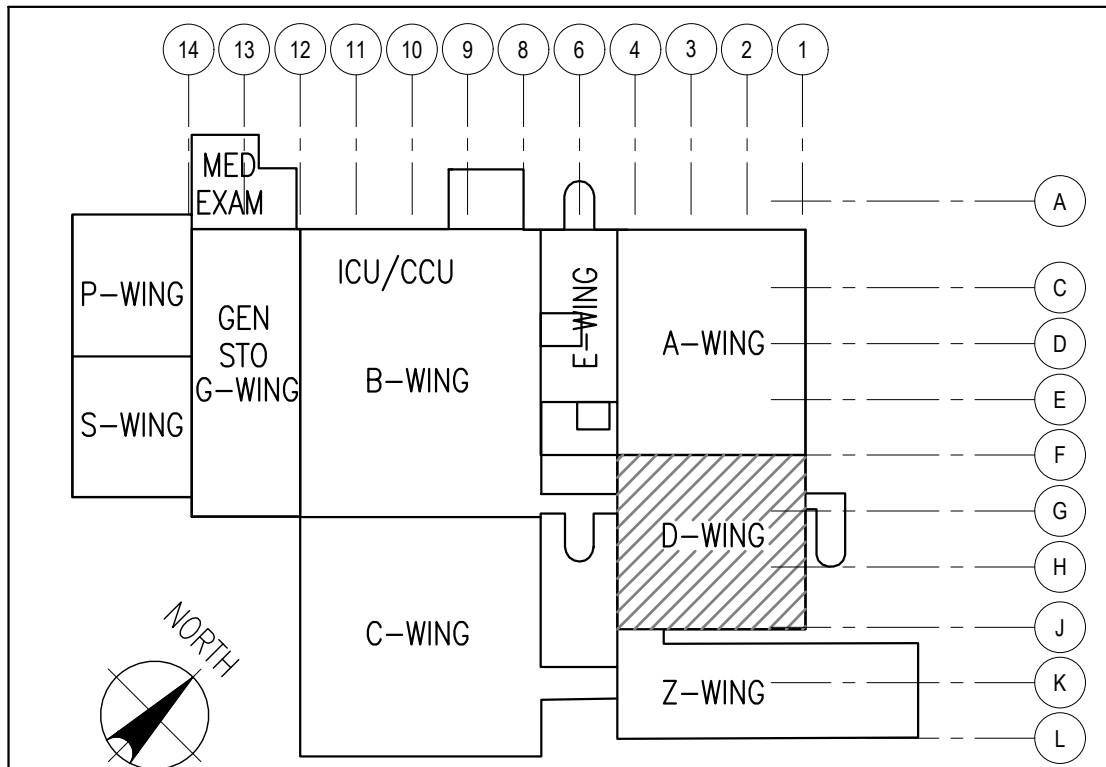
PHOTO: 5 6 7



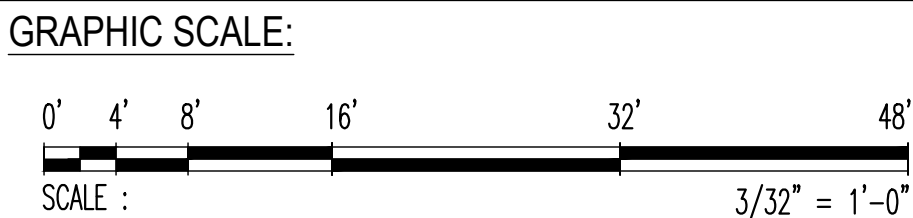
PHOTO: 9

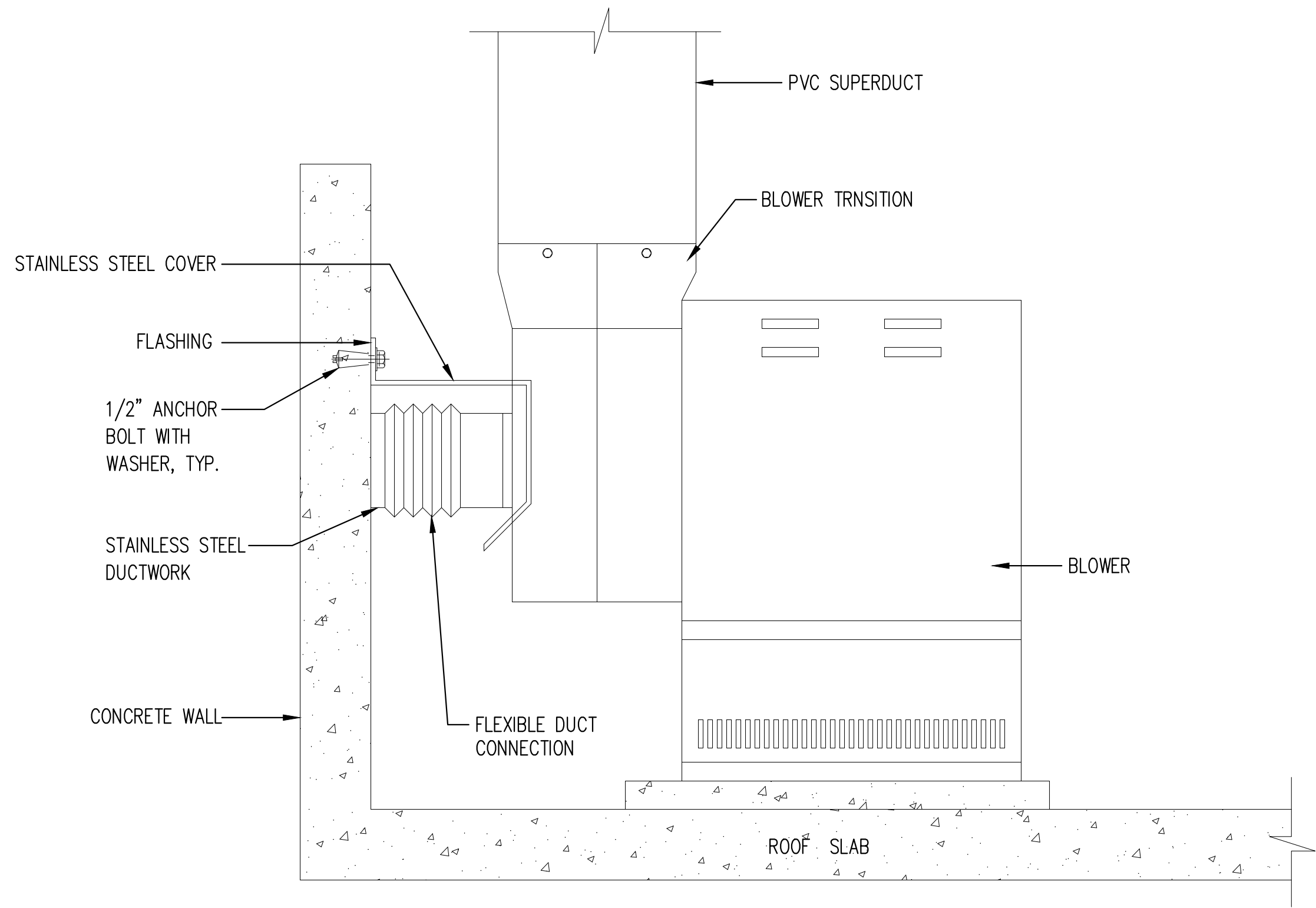


1
M-1.1 M-1.1 SCALE: 3/8" = 1' - 0"

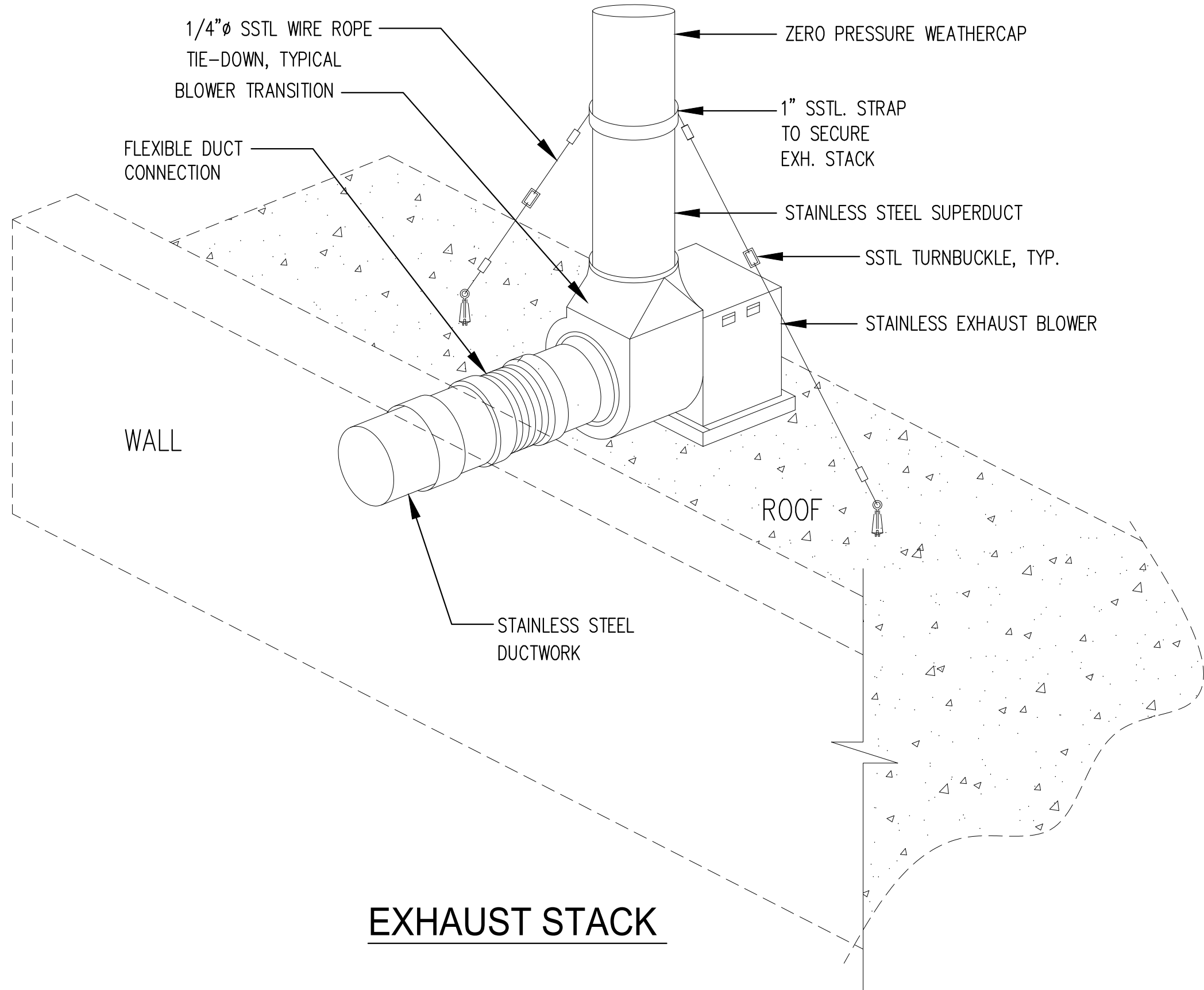


EMPSCO Engineering Management & Planning Services Corporation 198 ARMY DRIVE, 3RD FLOOR, GUAM TEL: (671) 638-2116 / 638-4710 FAX: (671) 638-2120		REV	DATE	BY	DESCRIPTION	APPROVED BY
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION DATE: _____		GMHA NO.		GOVERNMENT OF GUAM		
DES. BY: rmt		GRANT ID NO.		GUAM MEMORIAL HOSPITAL AUTHORITY ATURIDAT ESPETAT MIMUNAT GUAHAN		
DRN. BY: em		CONTRACT NO.		ENGINEERING DIVISION		
CHK. BY: rmt		PROJECT NO.		PROJECT: GMHA HOSPITAL AND ENVELOP UPGRADE PROJECT SCHEDULE A2 - MECHANICAL WORK (LABORATORY FACILITY AT D-WING)		
		GMHA 001-2021		CONTENTS: MECHANICAL PLAN, PHOTOS & EQUIPMENT		
				DRAWING NO. M-3.1		
				SHT. 8 OF 9		

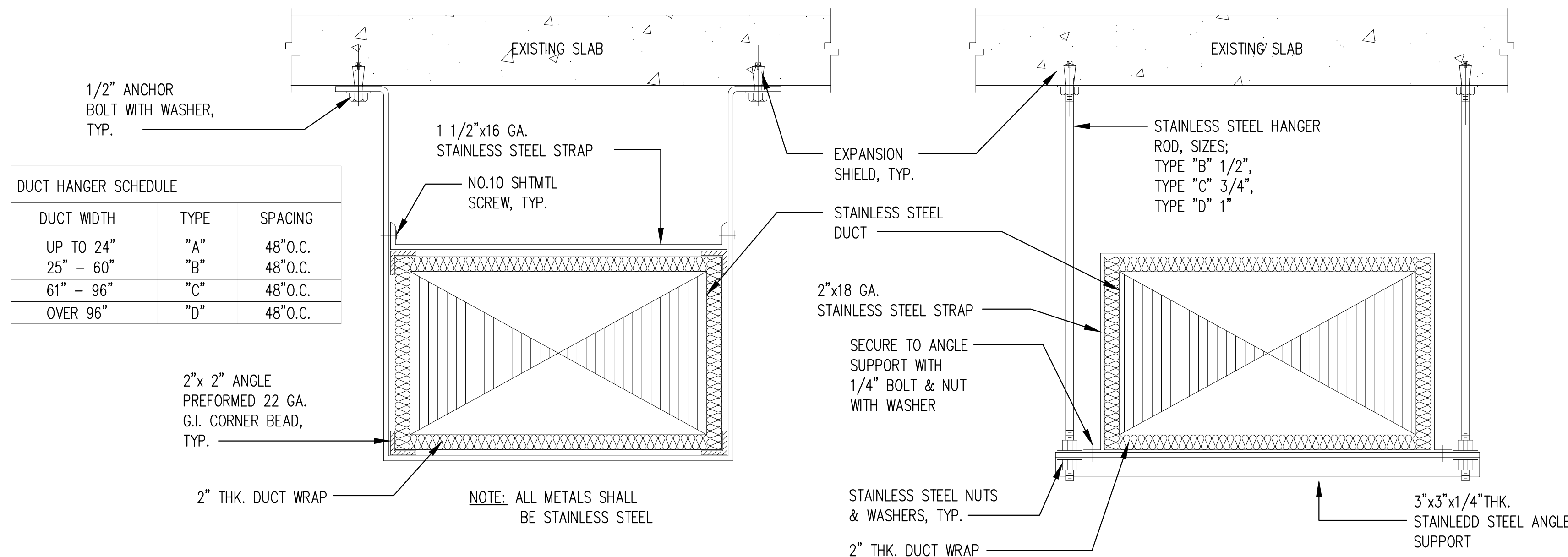




COVER DETAIL



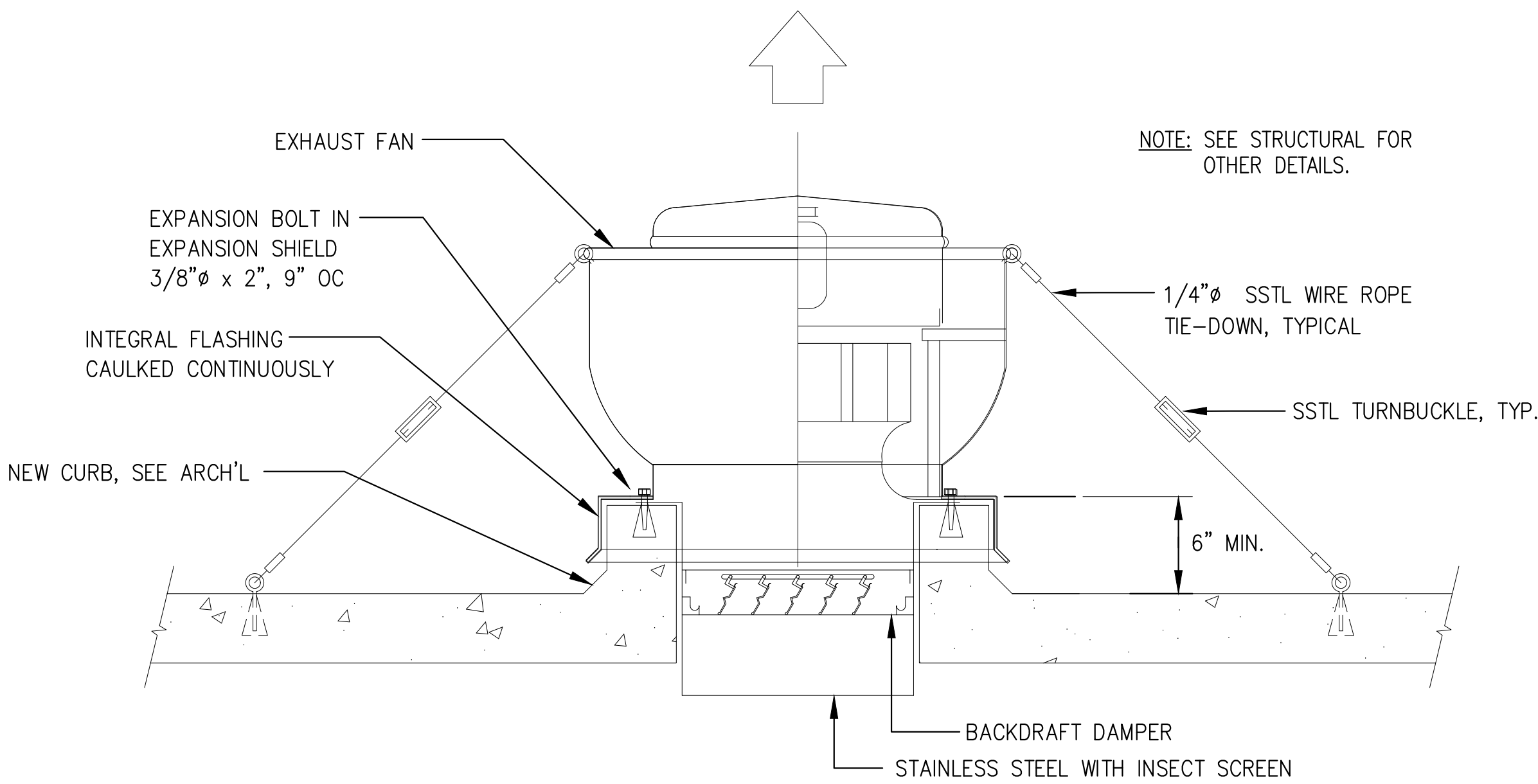
EXHAUST STACK





TYPE "A"

TYPE "B", "C", "D"

DUCT HANGER



ROOF EXHAUST FAN DETAIL

 Engineering Management & Planning Services Corporation 1008 ANAHY DRIVE, 3RD FLOOR BUILDING SUITE 10, DISTRICT, GUAM 96909 Tel: (671) 638-2116 / 638-4710 Fax: (671) 638-2130	REV	DATE	BY	DESCRIPTION	APPROVED BY
	GMHA NO.				 GOVERNMENT OF GUAM GUAM MEMORIAL HOSPITAL AUTHORITY ATURIDAT ESPETAT MIMUNAT GUAHAN
	GRANT ID NO.				
	CONTRACT NO.				
	PROJECT NO. GMHA 001-2021				PROJECT: GMHA HOSPITAL AND ENVELOP UPGRADE PROJECT SCHEDULE A2 - MECHANICAL WORK (LABORATORY FACILITY AT D-WING)
DES. BY: rmt DRN. BY: em CHK. BY: rmt				CHIEF ENGR: - ENGR. SUP: - PROJ. ENGR: -	CONTENTS: MISCELLANEOUS DETAIL SHT. 9 OF 9

Acknowledgment of Receipt: Return acknowledgment to fax number 649-3640

Company

Print Name

Signature

Date

SUBMITTAL

Job Name:

GMHA EXHAUST FAN

Engineer:

TWS

Elevation: (ft)

16

Date:

1/25/2022

Submitted By:

Almer Fabian

NORMAN S WRIGHT MECHANICAL EQUIP

PMB 879

1270 N MARINE CORPS DR STE 101

TAMUNING, GU 96913-4331

GU

Phone: 6714753911

Fax: 6714753910

Email Address: afabian@norman-wright.com



P.O. Box 410 Schofield, WI 54476 (715) 359-6171 FAX (715) 355-2399 www.greenheck.com

Model: CUBE-099-4

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	87
Weight w/ Acc's (lb)	107
Max T Motor Frame Size	56
Standard Curb Cap Size (in.)	19 x 19
Optional Damper (in.)	12 x 12
Roof Opening (in.)	14.5 x 14.5

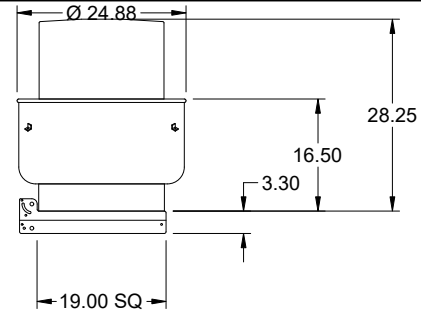
Performance	
Requested Volume (CFM)	300
Actual Volume (CFM)	300
Total External SP (in. wg)	0.5
Fan RPM	1124
Operating Power (hp)	0.08
Elevation (ft)	16
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Drive Loss (%)	29.8
Tip Speed (ft/min)	3,293
Static Eff. (%)	44

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	234

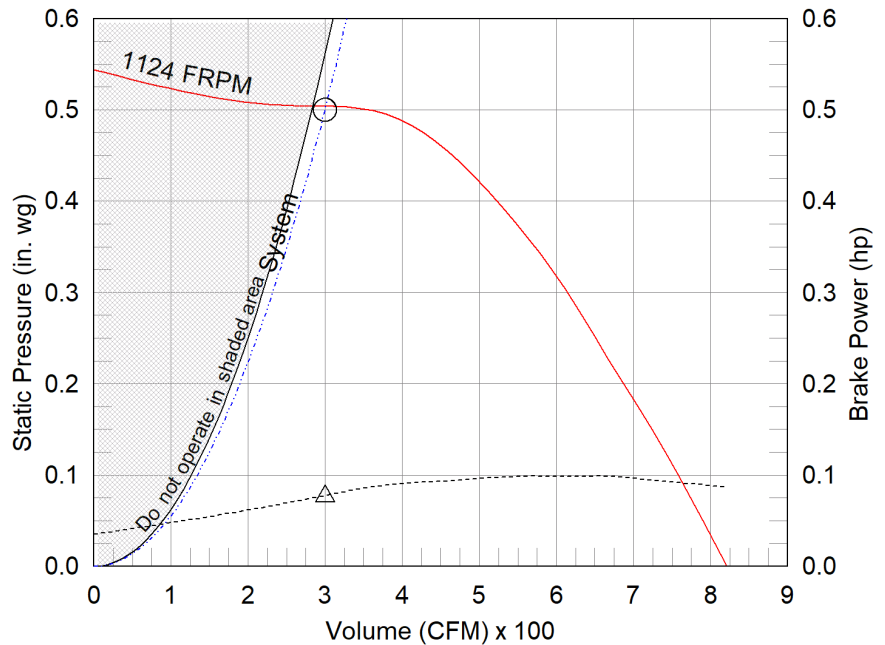
Motor	
Motor Mounted	Yes
Size (hp)	1/4
Voltage/Cycle/Phase	115/60/1
Enclosure	EXP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	5.8
Min. Circuit Ampacity (MCA)	7.25
Max. Overcurrent Protection (MOP)	15
Short Circuit Current Rtg (SCCR)	5 kA

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	72	68	63	54	51	53	46	38	60	49	5.2



OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using ANSI/AMCA 301 at 5 ft



Model: CUBE-099-4

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Drain trough - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan - Static resistant belts - Corrosion resistant fasteners - Internal lifting lugs

Selected Options & Accessories:

Standard Curb Cap Size - 19 Square
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-7 and 9, Toggle, Shipped with Unit
High Wind Rated (+/- 150 PSF Rating)
Florida Product Approval #FL13225.1 & Miami-Dade NOA #21-0318.05
Seismic Rated per IBC 2018, CBC 2019 & ASCE 7-16 Standards
OSHPD Seismic Certified, #OSP-0148-10
Hinge, Factory Installed
Foam Curb Seal (Factory Applied)
Coated with Macropoxy with UV topcoat, Concrete Gray-RAL 7023, Fan And Attached Acc
Tie Down Points - Set of 4 (Attached)
Birdscreen: Aluminum, nom. 86% Free Area
Bearings with Grease Fittings, L10 life of 100,000 hrs (L50 avg. life 500,000 hrs)
Aluminum Rub Ring
Clean-out Port - Factory Installed
Unit Warranty: 1 Yr (Standard)
Damper Shipped Loose, BD-100-PB-12X12, Gravity Operated, Not Coated

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type A: Free inlet, Free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per ANSI/AMCA Standard 301. Values shown are for installation type A: free inlet hemispherical sone levels. dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal applies to sone ratings only.

Model: CUBE-160-5

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Previously: CUBE-161-5

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	79
Weight w/ Acc's (lb)	104
Max T Motor Frame Size	145
Standard Curb Cap Size (in.)	26 x 26
Optional Damper (in.)	16 x 16
Roof Opening (in.)	18.5 x 18.5

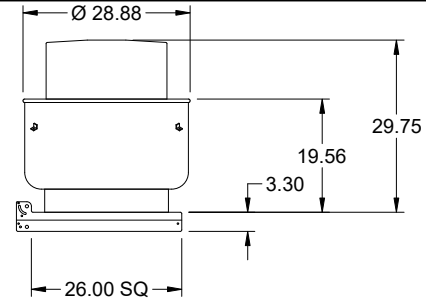
Performance	
Requested Volume (CFM)	2,230
Actual Volume (CFM)	2,230
Total External SP (in. wg)	0.5
Fan RPM	997
Operating Power (hp)	0.42
Elevation (ft)	16
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Drive Loss (%)	9.1
Tip Speed (ft/min)	4,340
Static Eff. (%)	46

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	1,297

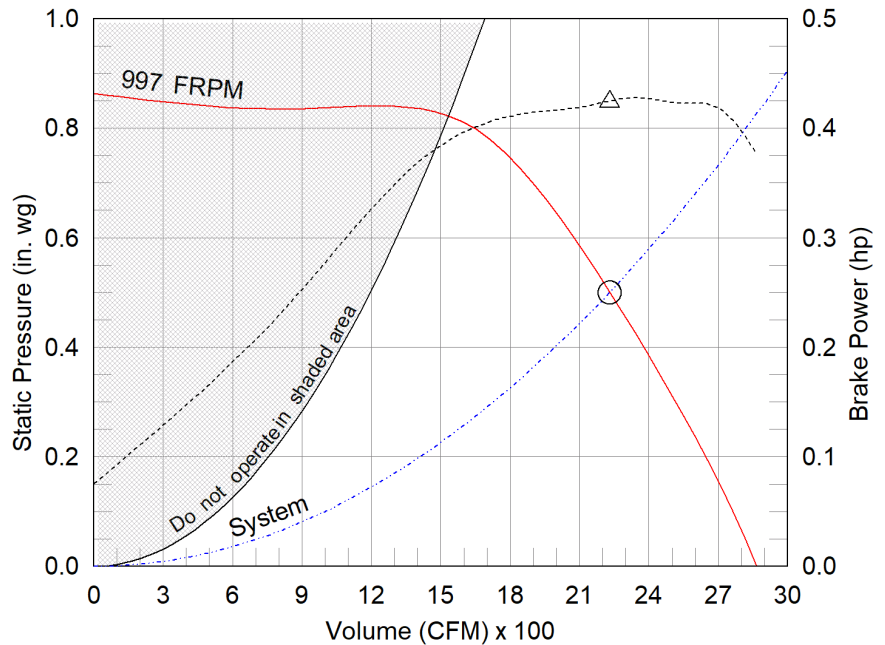
Motor	
Motor Mounted	Yes
Size (hp)	1/2
Voltage/Cycle/Phase	115/60/1
Enclosure	EXP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	9.8
Min. Circuit Ampacity (MCA)	12.25
Max. Overcurrent Protection (MOP)	20
Short Circuit Current Rtg (SCCR)	5 kA

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	72	78	75	71	68	65	60	56	74	62	11.4



OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using ANSI/AMCA 301 at 5 ft



Model: CUBE-160-5

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Drain trough - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan - Static resistant belts - Corrosion resistant fasteners - Internal lifting lugs

Selected Options & Accessories:

Larger Curb Cap Size - 26 Square
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-7 and 9, Toggle, Shipped with Unit, Division1 Wiring
Junction Box Mounted & Wired
High Wind Rated (+/- 150 PSF Rating)
Florida Product Approval #FL13225.1 & Miami-Dade NOA #21-0318.05
Seismic Rated per IBC 2018, CBC 2019 & ASCE 7-16 Standards
OSHPD Seismic Certified, #OSP-0148-10
Hinge, Factory Installed
Foam Curb Seal (Factory Applied)
Coated with Macropoxy with UV topcoat, Concrete Gray-RAL 7023, Fan And Attached Acc
Non-Stick Coated Wheel (Teflon)
Tie Down Points - Set of 4 (Attached)
Grease Trap (PN 475538)
Birdscreen: Aluminum, nom. 86% Free Area
Bearings with Grease Fittings, L10 life of 100,000 hrs (L50 avg. life 500,000 hrs)
Aluminum Rub Ring
Clean-out Port - Factory Installed
Unit Warranty: 1 Yr (Standard)
Damper Shipped Loose, BD-100-PB-16X16, Gravity Operated, Not Coated

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type A: Free inlet, Free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per ANSI/AMCA Standard 301. Values shown are for installation type A: free inlet hemispherical sone levels. dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal applies to sone ratings only.

Model: CUBE-180-5

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	106
Weight w/ Acc's (lb)	131
Max T Motor Frame Size	184
Standard Curb Cap Size (in.)	30 x 30
Optional Damper (in.)	18 x 18
Roof Opening (in.)	20.5 x 20.5

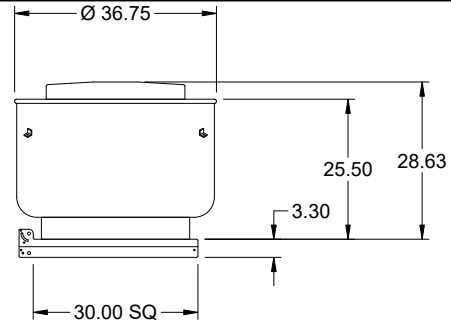
Performance	
Requested Volume (CFM)	2,580
Actual Volume (CFM)	2,580
Total External SP (in. wg)	0.5
Fan RPM	881
Operating Power (hp)	0.47
Elevation (ft)	16
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Drive Loss (%)	8.7
Tip Speed (ft/min)	4,266
Static Eff. (%)	47

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	884

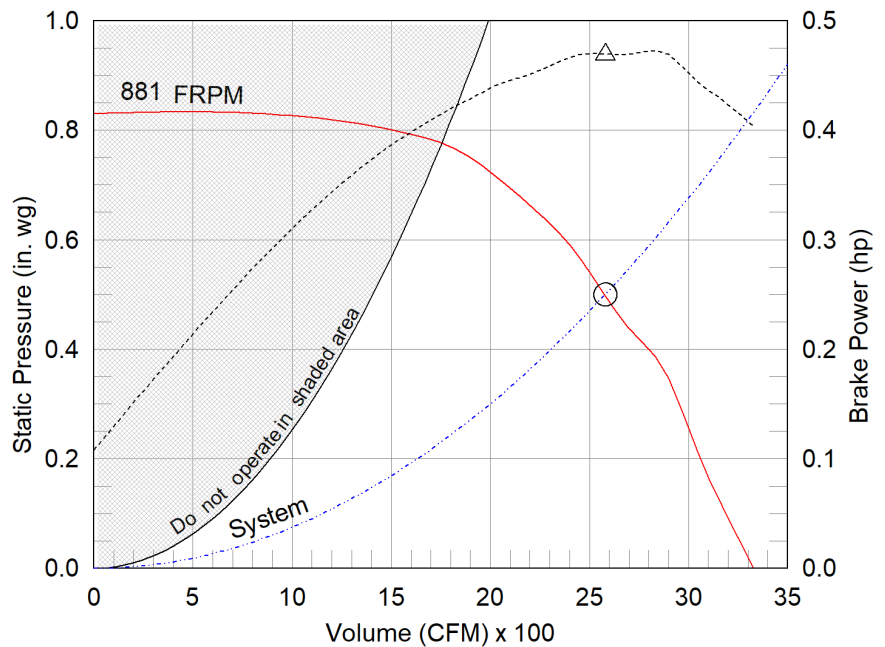
Motor	
Motor Mounted	Yes
Size (hp)	1/2
Voltage/Cycle/Phase	115/60/1
Enclosure	EXP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	9.8
Min. Circuit Ampacity (MCA)	12.25
Max. Overcurrent Protection (MOP)	20
Short Circuit Current Rtg (SCCR)	5 kA

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	72	80	77	68	63	63	56	50	73	61	11.0



OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using ANSI/AMCA 301 at 5 ft



Model: CUBE-180-5

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Drain trough - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan - Static resistant belts - Corrosion resistant fasteners - Internal lifting lugs

Selected Options & Accessories:

Standard Curb Cap Size - 30 Square
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-7 and 9, Toggle, Shipped with Unit, Division1 Wiring
Junction Box Mounted & Wired
High Wind Rated (+/- 150 PSF Rating)
Florida Product Approval #FL13225.1 & Miami-Dade NOA #21-0318.05
Seismic Rated per IBC 2018, CBC 2019 & ASCE 7-16 Standards
OSHPD Seismic Certified, #OSP-0148-10
Hinge, Factory Installed
Foam Curb Seal (Factory Applied)
Coated with Macropoxy with UV topcoat, Concrete Gray-RAL 7023, Fan And Attached Acc
Non-Stick Coated Wheel (Teflon)
Tie Down Points - Set of 4 (Attached)
Birdscreen: Aluminum, nom. 86% Free Area
Bearings with Grease Fittings, L10 life of 100,000 hrs (L50 avg. life 500,000 hrs)
Aluminum Rub Ring
Clean-out Port - Factory Installed
Unit Warranty: 1 Yr (Standard)
Damper Shipped Loose, BD-100-PB-18X18, Gravity Operated, Not Coated

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type A: Free inlet, Free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per ANSI/AMCA Standard 301. Values shown are for installation type A: free inlet hemispherical sone levels. dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal applies to sone ratings only.

Model: CUBE-140HP-3

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Previously: CUBE-141HP-3

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	79
Weight w/ Acc's (lb)	104
Max T Motor Frame Size	145
Standard Curb Cap Size (in.)	26 x 26
Optional Damper (in.)	16 x 16
Roof Opening (in.)	18.5 x 18.5

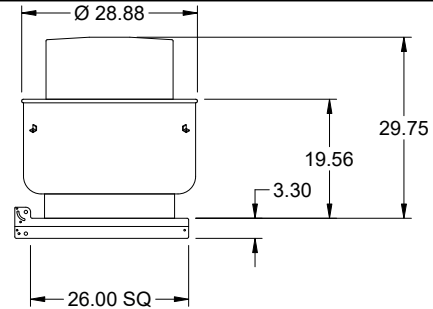
Performance	
Requested Volume (CFM)	1,060
Actual Volume (CFM)	1,060
Total External SP (in. wg)	0.5
Fan RPM	1512
Operating Power (hp)	0.3
Elevation (ft)	16
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Drive Loss (%)	11.1
Tip Speed (ft/min)	5,789
Static Eff. (%)	31

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	616

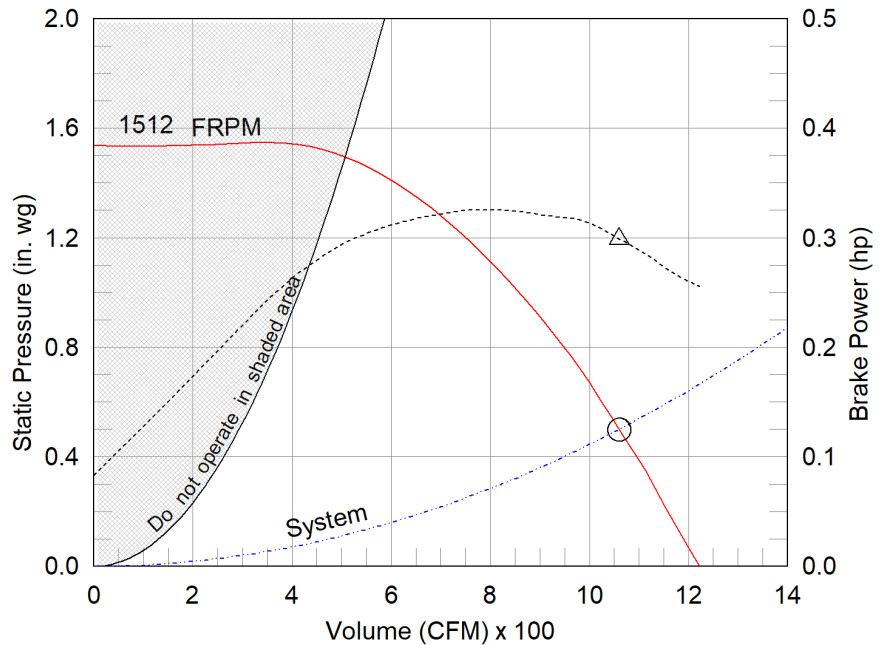
Motor	
Motor Mounted	Yes
Size (hp)	1/3
Voltage/Cycle/Phase	115/60/1
Enclosure	EXP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	7.2
Min. Circuit Ampacity (MCA)	9
Max. Overcurrent Protection (MOP)	15
Short Circuit Current Rtg (SCCR)	5 kA

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	82	80	79	73	70	69	66	60	77	65	14.6



OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using ANSI/AMCA 301 at 5 ft



Model: CUBE-140HP-3

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Drain trough - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan - Static resistant belts - Corrosion resistant fasteners - Internal lifting lugs

Selected Options & Accessories:

Larger Curb Cap Size - 26 Square
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-7 and 9, Toggle, Shipped with Unit, Division1 Wiring
Junction Box Mounted & Wired
High Wind Rated (+/- 150 PSF Rating)
Florida Product Approval #FL13225.1 & Miami-Dade NOA #21-0318.05
Seismic Rated per IBC 2018, CBC 2019 & ASCE 7-16 Standards
OSHPD Seismic Certified, #OSP-0148-10
Hinge, Factory Installed
Foam Curb Seal (Factory Applied)
Coated with Macropoxy with UV topcoat, Concrete Gray-RAL 7023, Fan And Attached Acc
Non-Stick Coated Wheel (Teflon)
Tie Down Points - Set of 4 (Attached)
Grease Trap (PN 475538)
Birdscreen: Aluminum, nom. 86% Free Area
Bearings with Grease Fittings, L10 life of 100,000 hrs (L50 avg. life 500,000 hrs)
Aluminum Rub Ring
Clean-out Port - Factory Installed
Unit Warranty: 1 Yr (Standard)
Damper Shipped Loose, BD-100-PB-16X16, Gravity Operated, Not Coated

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type A: Free inlet, Free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per ANSI/AMCA Standard 301. Values shown are for installation type A: free inlet hemispherical sone levels. dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal applies to sone ratings only.

Model: VEKTOR-H-10

Fume Exhaust System

Design Condition	
Number of Systems	1
Fans per System	1
Redundancy	None
System Type	Constant Volume
Lab Exh. Vol. (CFM)	640
Min Lab Exh. Vol. (CFM)	640
Add. BAP Air (CFM)	0
Wind Speed (MPH)	10.0

Selection Criteria - Normal [N] Oper.	
Volume (CFM)	640
Total External SP (in. wg)	1.028
Air Stream Temp (F)	70
Elevation (ft)	16
Drive Loss (%)	20.2

N Operating Fan Performance	
Fan RPM	2399
Max Fan RPM	3995
Operating Power (hp)	0.52
Required Power (hp)	0.52
Oper. Frequency (Hz)	60
Fan Energy Index (FEI)	-

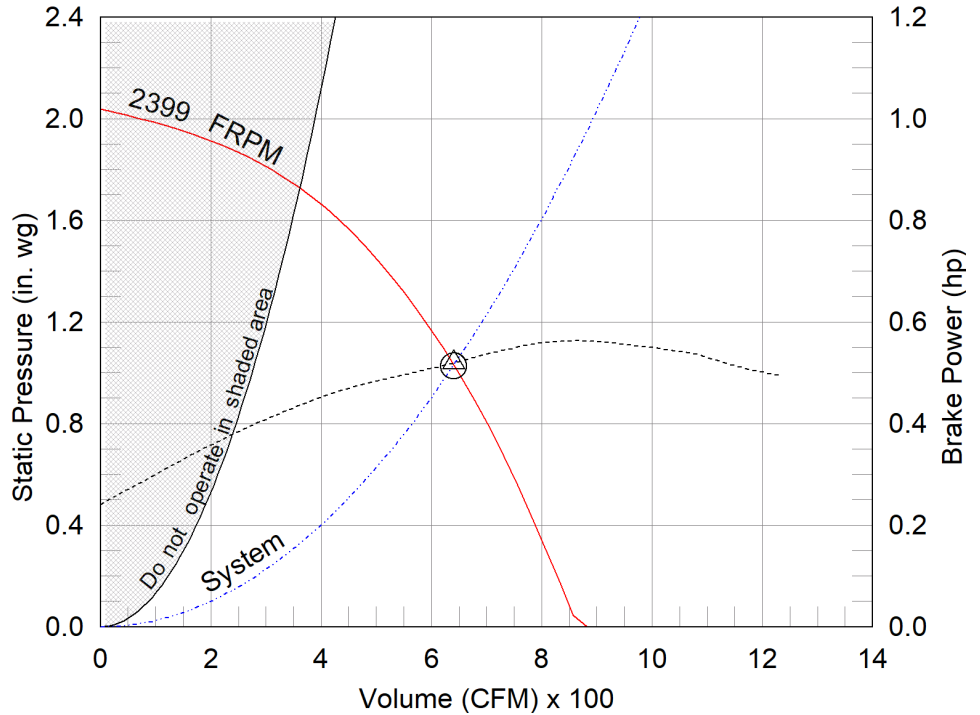
N Operating Discharge Performance	
Nozzle OV (ft/min)	3,200
Effective Plume Ht. (ft)	16.67
Calculation Method	Momentum Flux

Fan Construction	
Spark Resistance	Spark B
Drive Type	Belt
Arrangement	9
Nozzle Size (in.)	6

Plenum Configuration	
Bypass Air Plenum	Yes
Plenum Arrangement	Inline

Motor Specs	
Motor Size (hp)	3/4
RPM	1725
V/C/P	115/60/1
Enclosure	EXP
Drives	Standard
Drive Service Factor	2

Weight Totals	
Fan Assembly (lb)	248
Plenum Assembly (lb)	176
Roof Curb (lb)	47
System Total (lb)	471



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1 in. wg
Isolation Damper	0.028 in. wg
Total External SP	1.028 in. wg

AMCA tested and certified performance data includes pressure losses from discharge nozzles. Additional losses internal to the system are for selected optional accessories.



Sound Power by Octave Band (Individual Fan Normal [N] Operating Condition)

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA
Inlet Sound	84	81	78	74	71	67	65	61	77	66

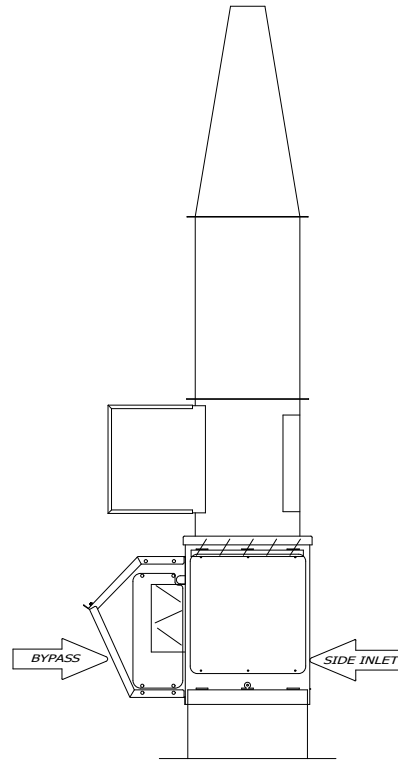
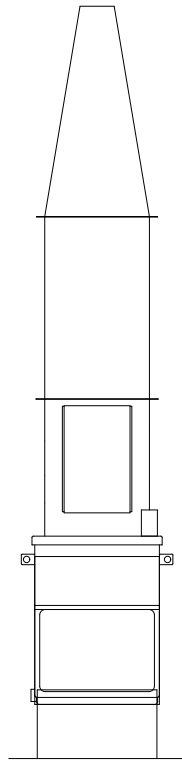
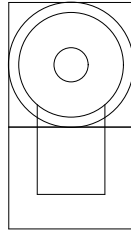
LwA - A weighted sound power level, based on ANSI S1.4. The AMCA Certified Ratings Seal applies to LwA values only.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International

Selected Options & Accessories:

Motor with Class B or Greater Insulation
Standard Drives
Bypass Air Plenum - Single Wall, Steel, Side Exhaust Intake
Coated with LabCoat, RAL7023, Entire Unit
Switch - NEMA-7 and 9, Toggle, Ship Separate
UL/cUL-705 - "Power Ventilators"
Shaft Material - Turned and Polished Steel with Protective Coating
Bypass Damper - VCD-23, Galvaneal, Coated, 6 in. x 6 in., Qty: 1
Isolation Damper - EMV-11, Extruded Aluminum, Coated, 15 in. x 15 in., Parallel Blades, mounted in BAP, one per fan
Sure-Aire Flow Station (No Electronics), Qty 1
Factory Vibration Test, 0.15 in/sec, peak, filter-in as measured at the fan RPM
Extended Lube Lines - Nylon
Motor Cover
Weatherhood over bypass damper with inlet screen
Unit Warranty: 1 Yr (Standard)

Model: VEKTOR-H-10

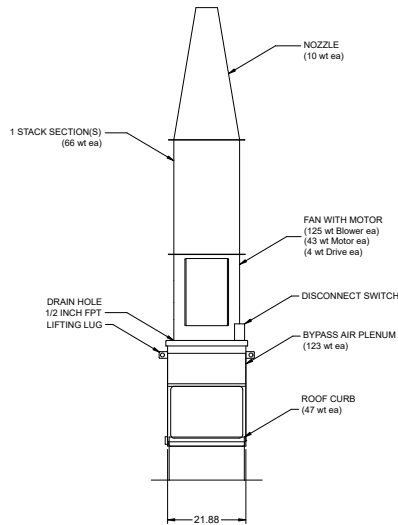
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

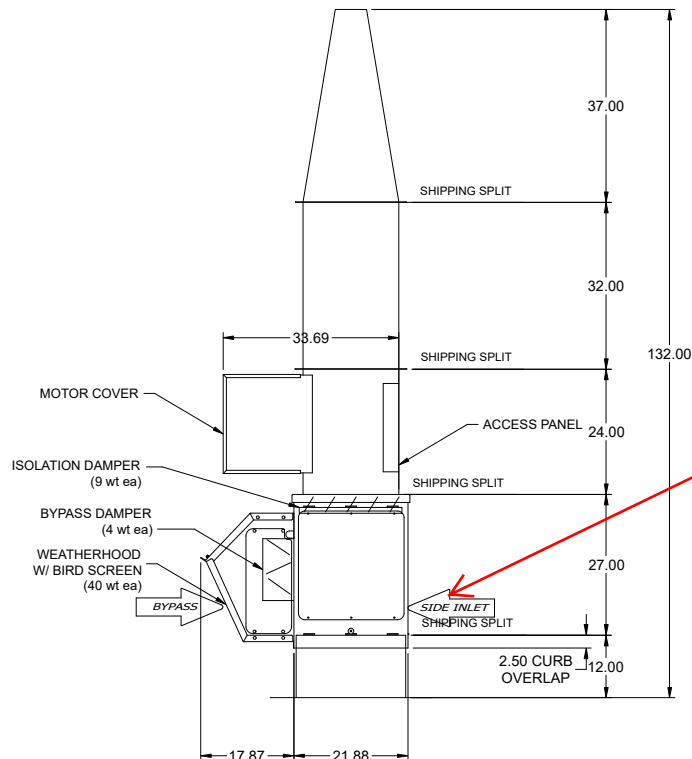
Model: VEKTOR-H-10

Fume Exhaust System



WEIGHT TOTALS	
FAN ASSEMBLY	248
FAN QTY	x1
PLENUM ASSEMBLY	176
ROOF CURB	47
SYSTEM TOTAL	471

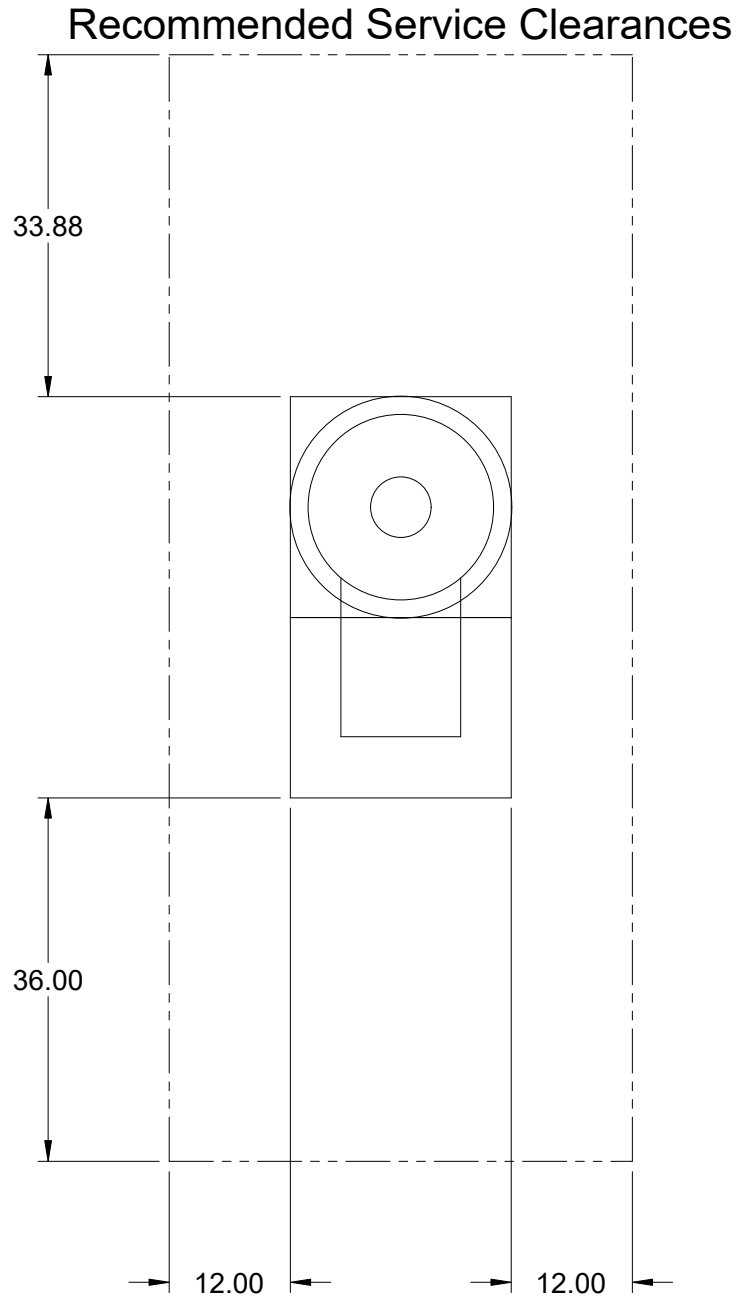
WEIGHTS REFERENCED FROM
ALL VIEWS



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

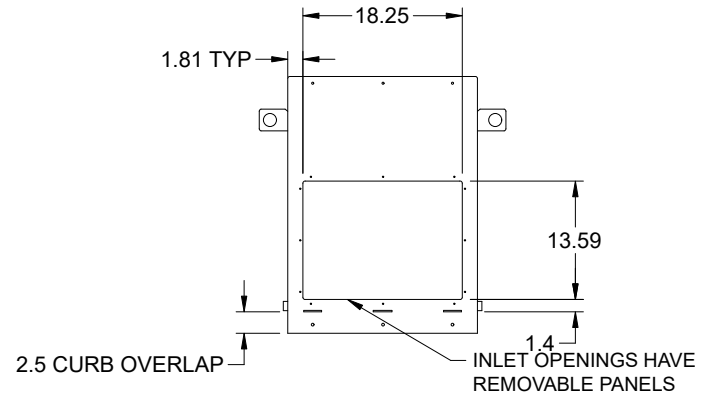
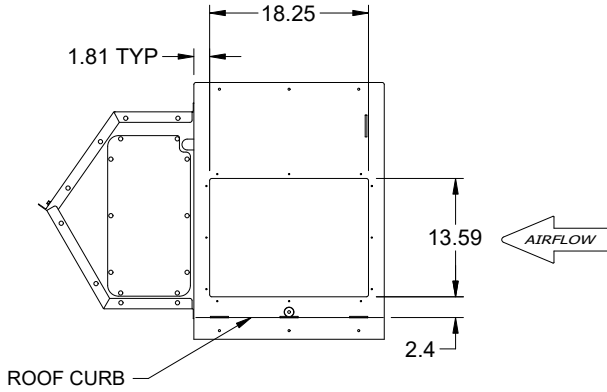
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

Fume Exhaust System



A MAXIMUM INLET VELOCITY OF 1500 FPM IS RECOMMENDED

Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Sure-Aire Probes Only

Sure-Aire utilizes differential pressure across the inlet cone of the fan to allow accurate measuring of volumetric flow through the fan. The fan has connection points for attaching an user supplied pressure measuring device.

Flow equation from differential pressure:

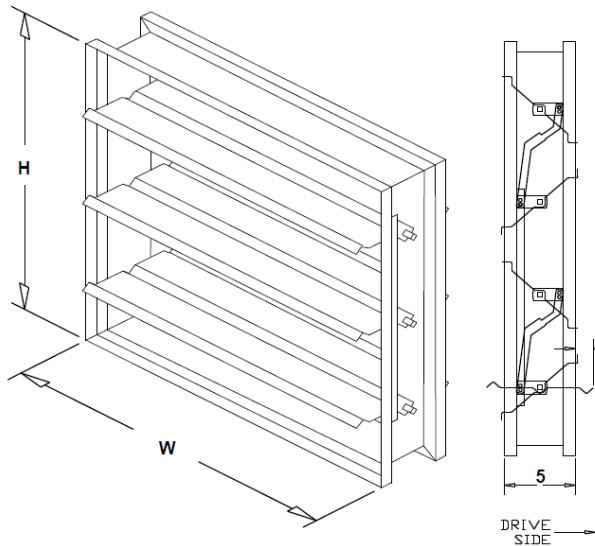
$$CFM = K \sqrt{\frac{\Delta P}{\rho}}$$

ΔP = Measured differential pressure

P = Air density (0ft elevation and 70F, $p = 0.075 \text{ lbm/ft}^3$)

Model	VEKTOR-H
Size	10
K Value	202
Fan tubing Connections*	1/4

*Recommended tube size is 0.25 in for runs 25 ft or less. For runs up to max 100 ft use 0.375 in or larger tubing.



VCD-23 Low Leakage Control Damper-Bypass

Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided. Note: The extension pin with clip kit includes the extension pin and clip.

RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at www.greenheck.com

Notes: All dimensions shown are in units of in..

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.
Field wiring is required to individual components.

Construction Features

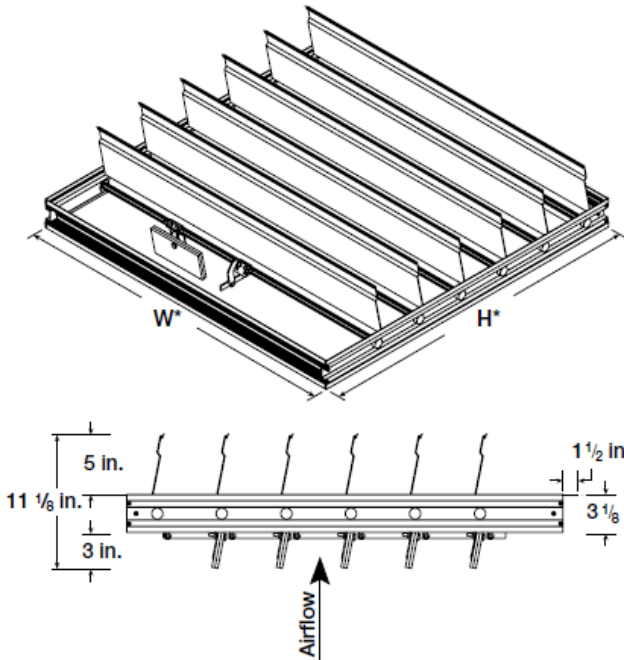
Temperature:	180	Frame Thickness (ga):	16	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	Vinyl		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	6	6

EMV-11 Horizontal Mount Exhaust Damper-Isolation

Application and Design

The EMV-11 is a horizontally mounted backdraft damper that is designed to allow vertical airflow up and prevent reverse airflow. This damper is opened by air pressure differential and closed by gravity. Standard models include adjustable counterbalance to assist opening.



Notes: All dimensions shown are in units of in.

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Construction Features

Temperature:	180 F	Frame Thickness (in.):	0.125	Coating Type:	Hi-Pro Polyester
Frame Material:	Extruded Aluminum	Blade Thickness (in.):	0.07	Coating Thickness:	2-3 mils
Blade Action:	Parallel	Blade Seal:	Vinyl		
Axle Material:	Stainless				
Axle Bearings:	SS Sleeve				
Linkage Material:	Stainless				
Counterbalance					
Weight Material:	Stainless Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	15	15

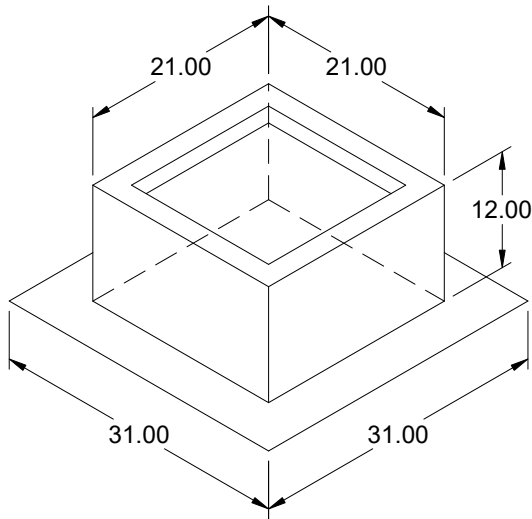
Counterbalance weights may require field adjustment. Instructions are available at www.greenheck.com.

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to sound and air performance ratings only. Performance certified is for installation type A: Free inlet, free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). Sound ratings do not include the effects of duct end correction. dBA levels are not licensed by AMCA International. The sound power level ratings shown are in decibels, referred to 10-12 watts, calculated per AMCA Standard 301. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. The AMCA Certified Ratings Seal applies to LwA values only. The sound pressure shown in fan dBA are loudness values at 5 ft. in a hemispherical free field calculated per AMCA Standard 301.



Model: GPFHL

Heavy Load Roof Curb

Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of galvanized steel (14 ga) - Straight Sided - Single roof flashing flange (5 in. width) - Insulated (1 in. thick, 3 lb density).
NOTES: - Curb actual dimension is 0.5 in. smaller than cap dimension. - The maximum allowable roof opening dimension is actual minus 4 in.. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension.

General

Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPFHL-21.5 x 21.5	Nominal	0.5	47	Yes	No Preference

Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	21.5	21.5	21	21	31	31

*May not be applicable

Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvaneal	No	No	1	R4.3

Coatings

Coating Type	Coating Color	Match Color Name	Match Color Code	Coating Area
Hi-Pro Polyester	Concrete Gray-RAL 7023			Entire Unit

Model: VEKTOR-H-10

Fume Exhaust System

Design Condition	
Number of Systems	1
Fans per System	1
Redundancy	None
System Type	Constant Volume
Lab Exh. Vol. (CFM)	640
Min Lab Exh. Vol. (CFM)	640
Add. BAP Air (CFM)	0
Wind Speed (MPH)	10.0

Selection Criteria - Normal [N] Oper.	
Volume (CFM)	640
Total External SP (in. wg)	1.028
Air Stream Temp (F)	70
Elevation (ft)	16
Drive Loss (%)	20.2

N Operating Fan Performance	
Fan RPM	2399
Max Fan RPM	3995
Operating Power (hp)	0.52
Required Power (hp)	0.52
Oper. Frequency (Hz)	60
Fan Energy Index (FEI)	-

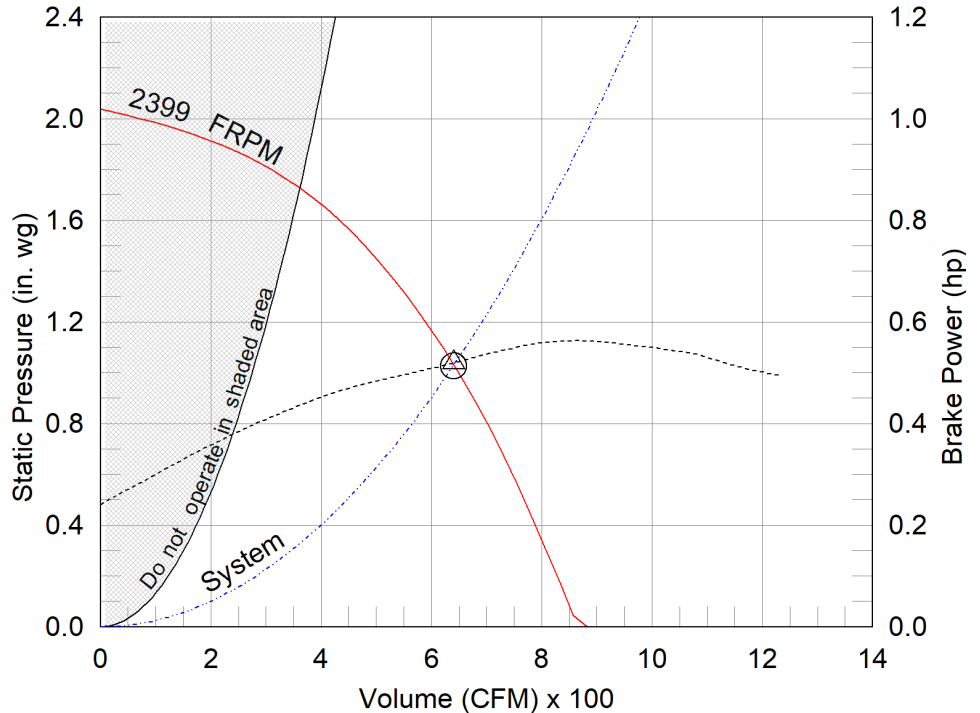
N Operating Discharge Performance	
Nozzle OV (ft/min)	3,200
Effective Plume Ht. (ft)	16.67
Calculation Method	Momentum Flux

Fan Construction	
Spark Resistance	Spark B
Drive Type	Belt
Arrangement	9
Nozzle Size (in.)	6

Plenum Configuration	
Bypass Air Plenum	Yes
Plenum Arrangement	Inline

Motor Specs	
Motor Size (hp)	3/4
RPM	1725
V/C/P	115/60/1
Enclosure	EXP
Drives	Standard
Drive Service Factor	2

Weight Totals	
Fan Assembly (lb)	248
Plenum Assembly (lb)	176
Roof Curb (lb)	47
System Total (lb)	471



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1 in. wg
Isolation Damper	0.028 in. wg
Total External SP	1.028 in. wg

AMCA tested and certified performance data includes pressure losses from discharge nozzles. Additional losses internal to the system are for selected optional accessories.



Sound Power by Octave Band (Individual Fan Normal [N] Operating Condition)

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA
Inlet Sound	84	81	78	74	71	67	65	61	77	66

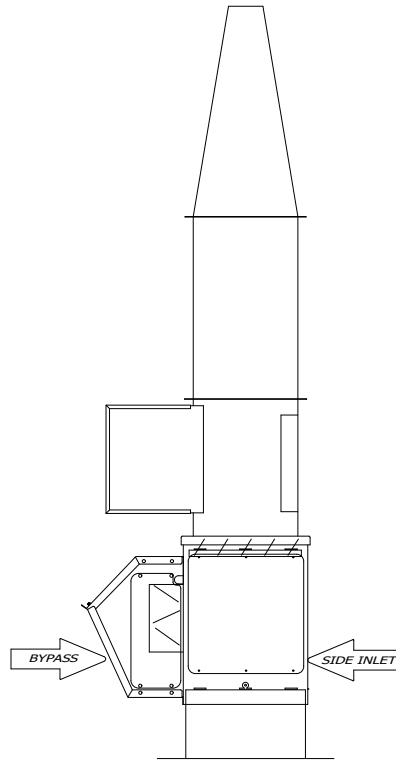
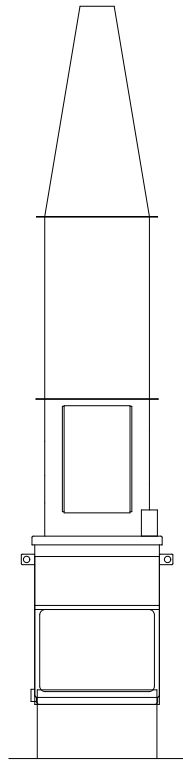
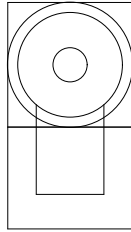
LwA - A weighted sound power level, based on ANSI S1.4. The AMCA Certified Ratings Seal applies to LwA values only.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International

Selected Options & Accessories:

Motor with Class B or Greater Insulation
Standard Drives
Bypass Air Plenum - Single Wall, Steel, Side Exhaust Intake
Coated with LabCoat, RAL7023, Entire Unit
Switch - NEMA-7 and 9, Toggle, Ship Separate
UL/cUL-705 - "Power Ventilators"
Shaft Material - Turned and Polished Steel with Protective Coating
Bypass Damper - VCD-23, Galvaneal, Coated, 6 in. x 6 in., Qty: 1
Isolation Damper - EMV-11, Extruded Aluminum, Coated, 15 in. x 15 in., Parallel Blades, mounted in BAP, one per fan
Sure-Aire Flow Station (No Electronics), Qty 1
Factory Vibration Test, 0.15 in/sec, peak, filter-in as measured at the fan RPM
Extended Lube Lines - Nylon
Motor Cover
Weatherhood over bypass damper with inlet screen
Unit Warranty: 1 Yr (Standard)

Model: VEKTOR-H-10

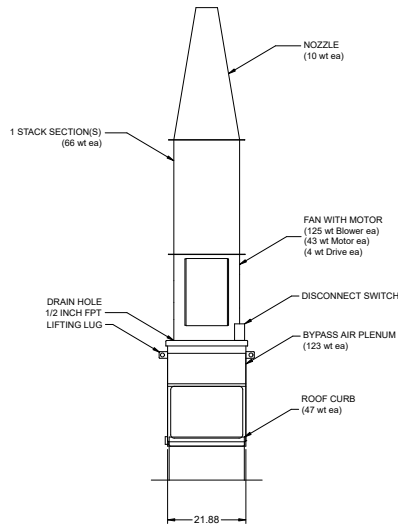
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

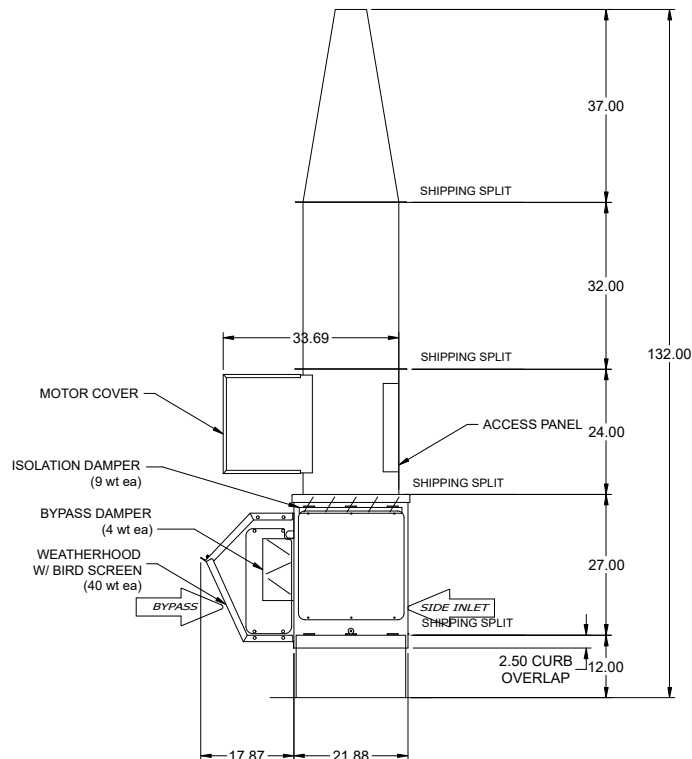
Model: VEKTOR-H-10

Fume Exhaust System



WEIGHT TOTALS	
FAN ASSEMBLY	248
FAN QTY	x1
PLENUM ASSEMBLY	176
ROOF CURB	47
SYSTEM TOTAL	471

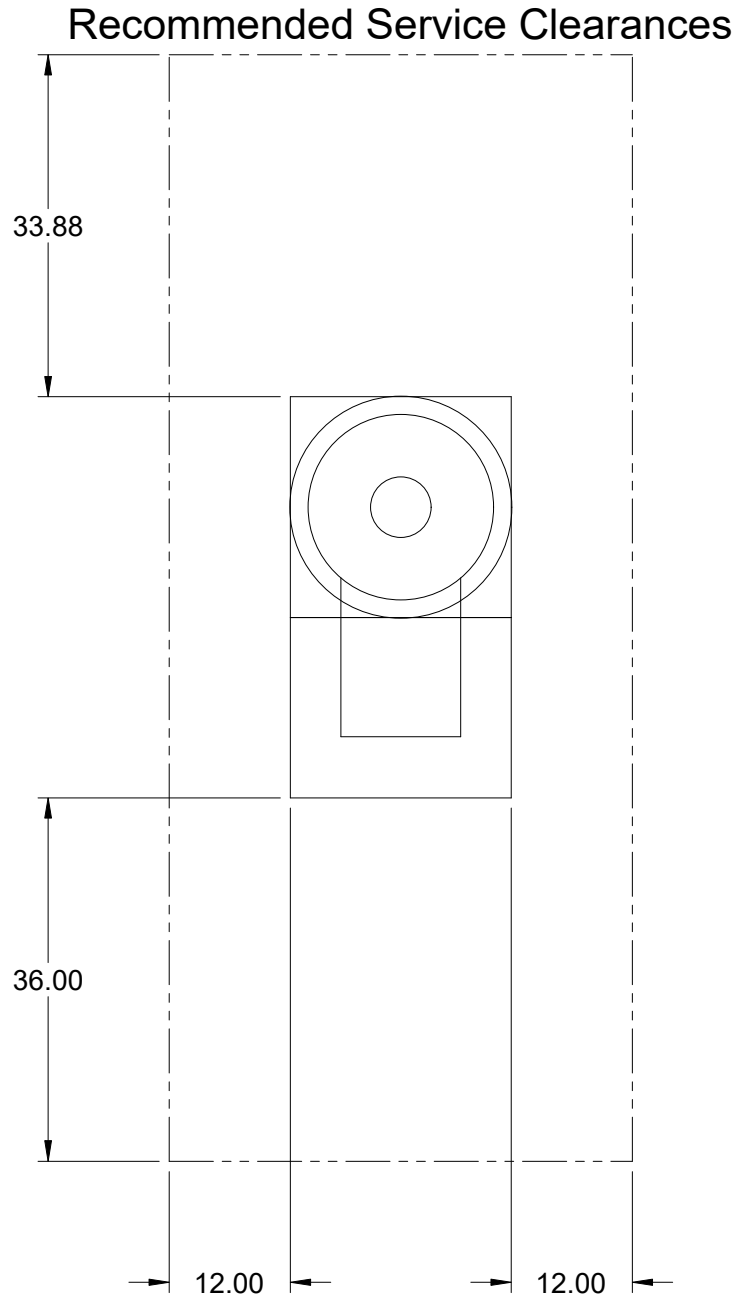
WEIGHTS REFERENCED FROM ALL VIEWS



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

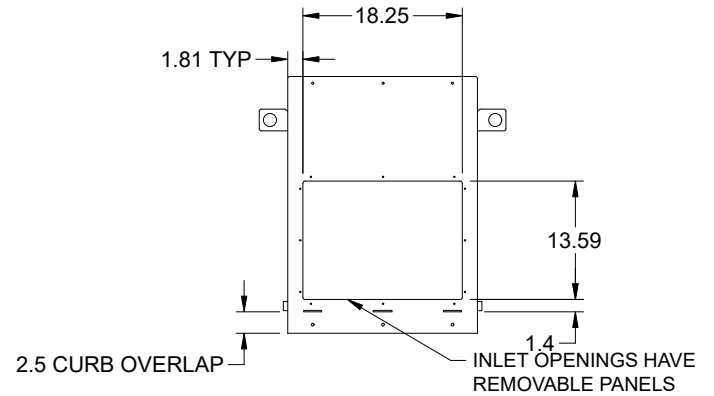
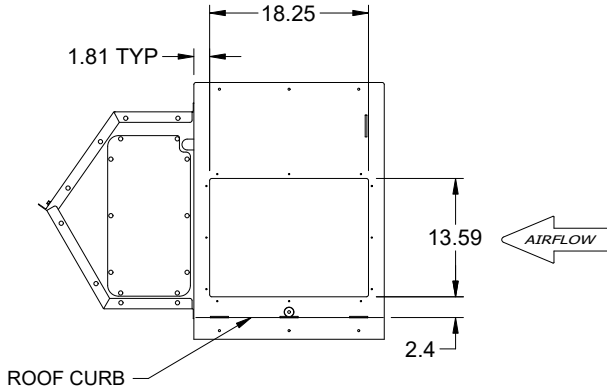
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

Fume Exhaust System



A MAXIMUM INLET VELOCITY OF 1500 FPM IS RECOMMENDED

Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Sure-Aire Probes Only

Sure-Aire utilizes differential pressure across the inlet cone of the fan to allow accurate measuring of volumetric flow through the fan. The fan has connection points for attaching an user supplied pressure measuring device.

Flow equation from differential pressure:

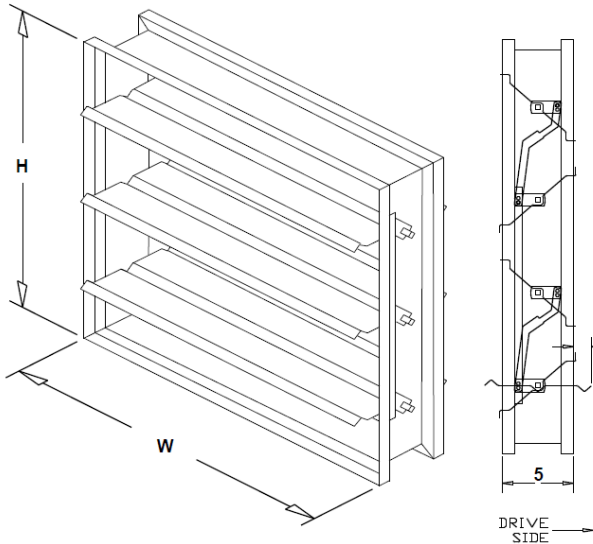
$$CFM = K \sqrt{\frac{\Delta P}{\rho}}$$

ΔP = Measured differential pressure

P = Air density (0ft elevation and 70F, $p = 0.075 \text{ lbm/ft}^3$)

Model	VEKTOR-H
Size	10
K Value	202
Fan tubing Connections*	1/4

*Recommended tube size is 0.25 in for runs 25 ft or less. For runs up to max 100 ft use 0.375 in or larger tubing.



VCD-23 Low Leakage Control Damper-Bypass

Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided. Note: The extension pin with clip kit includes the extension pin and clip.

RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at www.greenheck.com

Notes: All dimensions shown are in units of in..

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.
Field wiring is required to individual components.

Construction Features

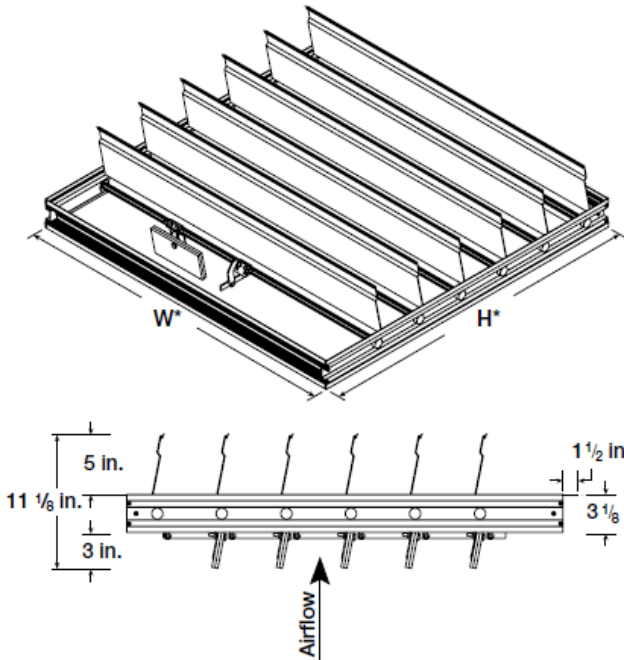
Temperature:	180	Frame Thickness (ga):	16	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	Vinyl		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	6	6

EMV-11 Horizontal Mount Exhaust Damper-Isolation

Application and Design

The EMV-11 is a horizontally mounted backdraft damper that is designed to allow vertical airflow up and prevent reverse airflow. This damper is opened by air pressure differential and closed by gravity. Standard models include adjustable counterbalance to assist opening.



Notes: All dimensions shown are in units of in.

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Construction Features

Temperature:	180 F	Frame Thickness (in.):	0.125	Coating Type:	Hi-Pro Polyester
Frame Material:	Extruded Aluminum	Blade Thickness (in.):	0.07	Coating Thickness:	2-3 mils
Blade Action:	Parallel	Blade Seal:	Vinyl		
Axle Material:	Stainless				
Axle Bearings:	SS Sleeve				
Linkage Material:	Stainless				
Counterbalance					
Weight Material:	Stainless Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	15	15

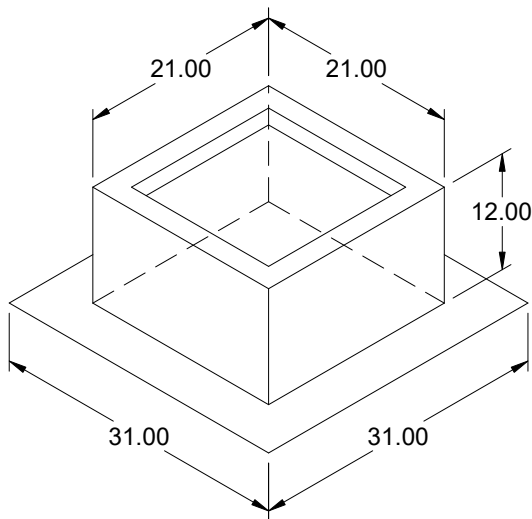
Counterbalance weights may require field adjustment. Instructions are available at www.greenheck.com.

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to sound and air performance ratings only. Performance certified is for installation type A: Free inlet, free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). Sound ratings do not include the effects of duct end correction. dBA levels are not licensed by AMCA International. The sound power level ratings shown are in decibels, referred to 10-12 watts, calculated per AMCA Standard 301. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. The AMCA Certified Ratings Seal applies to LwA values only. The sound pressure shown in fan dBA are loudness values at 5 ft. in a hemispherical free field calculated per AMCA Standard 301.



Model: GPFHL

Heavy Load Roof Curb

Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of galvanized steel (14 ga) - Straight Sided - Single roof flashing flange (5 in. width) - Insulated (1 in. thick, 3 lb density).
NOTES: - Curb actual dimension is 0.5 in. smaller than cap dimension. - The maximum allowable roof opening dimension is actual minus 4 in.. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension.

General

Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPFHL-21.5 x 21.5	Nominal	0.5	47	Yes	No Preference

Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	21.5	21.5	21	21	31	31

*May not be applicable

Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvaneal	No	No	1	R4.3

Coatings

Coating Type	Coating Color	Match Color Name	Match Color Code	Coating Area
Hi-Pro Polyester	Concrete Gray-RAL 7023			Entire Unit

Model: VEKTOR-H-10

Fume Exhaust System

Design Condition	
Number of Systems	1
Fans per System	1
Redundancy	None
System Type	Constant Volume
Lab Exh. Vol. (CFM)	640
Min Lab Exh. Vol. (CFM)	640
Add. BAP Air (CFM)	0
Wind Speed (MPH)	10.0

Selection Criteria - Normal [N] Oper.	
Volume (CFM)	640
Total External SP (in. wg)	1.028
Air Stream Temp (F)	70
Elevation (ft)	16
Drive Loss (%)	20.2

N Operating Fan Performance	
Fan RPM	2399
Max Fan RPM	3995
Operating Power (hp)	0.52
Required Power (hp)	0.52
Oper. Frequency (Hz)	60
Fan Energy Index (FEI)	-

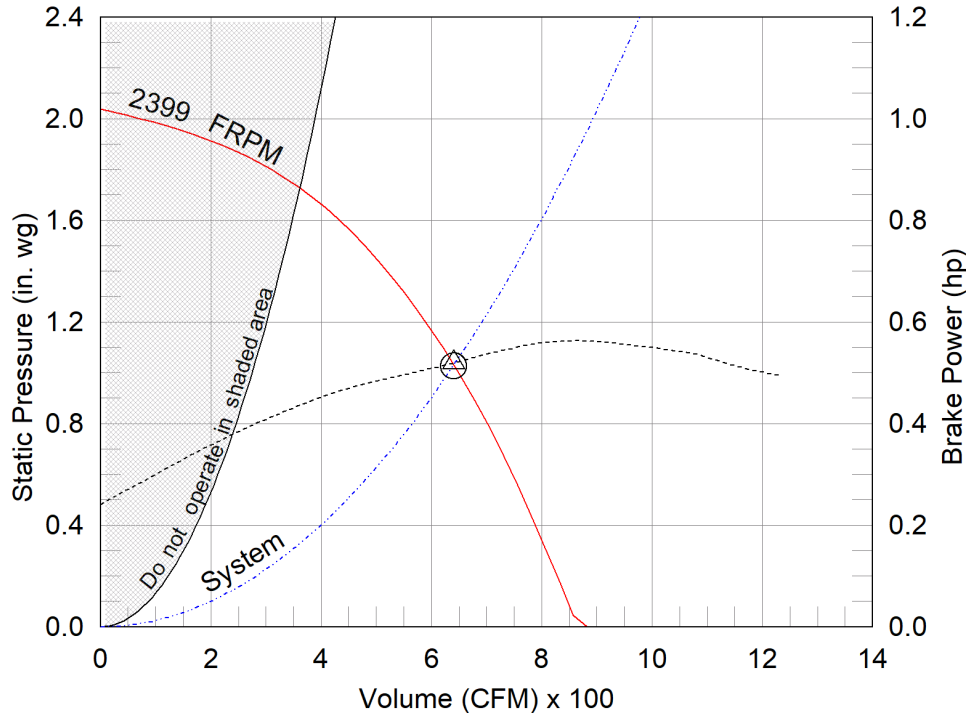
N Operating Discharge Performance	
Nozzle OV (ft/min)	3,200
Effective Plume Ht. (ft)	16.67
Calculation Method	Momentum Flux

Fan Construction	
Spark Resistance	Spark B
Drive Type	Belt
Arrangement	9
Nozzle Size (in.)	6

Plenum Configuration	
Bypass Air Plenum	Yes
Plenum Arrangement	Inline

Motor Specs	
Motor Size (hp)	3/4
RPM	1725
V/C/P	115/60/1
Enclosure	EXP
Drives	Standard
Drive Service Factor	2

Weight Totals	
Fan Assembly (lb)	248
Plenum Assembly (lb)	176
Roof Curb (lb)	47
System Total (lb)	471



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1 in. wg
Isolation Damper	0.028 in. wg
Total External SP	1.028 in. wg

AMCA tested and certified performance data includes pressure losses from discharge nozzles. Additional losses internal to the system are for selected optional accessories.



Sound Power by Octave Band (Individual Fan Normal [N] Operating Condition)

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA
Inlet Sound	84	81	78	74	71	67	65	61	77	66

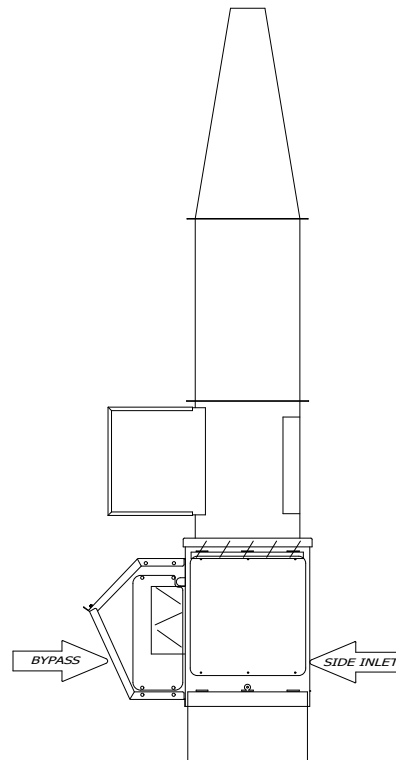
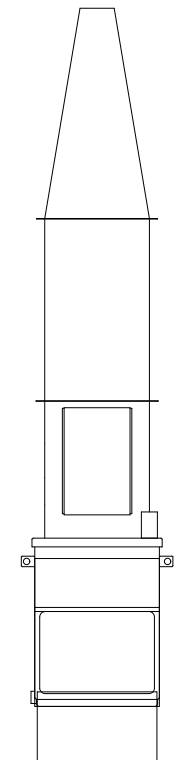
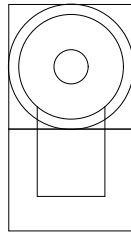
LwA - A weighted sound power level, based on ANSI S1.4. The AMCA Certified Ratings Seal applies to LwA values only.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International

Selected Options & Accessories:

Motor with Class B or Greater Insulation
Standard Drives
Bypass Air Plenum - Single Wall, Steel, Side Exhaust Intake
Coated with LabCoat, RAL7023, Entire Unit
Switch - NEMA-7 and 9, Toggle, Ship Separate
UL/cUL-705 - "Power Ventilators"
Shaft Material - Turned and Polished Steel with Protective Coating
Bypass Damper - VCD-23, Galvaneal, Coated, 6 in. x 6 in., Qty: 1
Isolation Damper - EMV-11, Extruded Aluminum, Coated, 15 in. x 15 in., Parallel Blades, mounted in BAP, one per fan
Sure-Aire Flow Station (No Electronics), Qty 1
Factory Vibration Test, 0.15 in/sec, peak, filter-in as measured at the fan RPM
Extended Lube Lines - Nylon
Motor Cover
Weatherhood over bypass damper with inlet screen
Unit Warranty: 1 Yr (Standard)

Model: VEKTOR-H-10

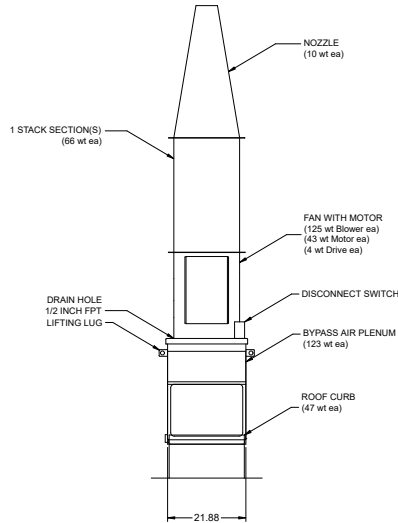
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

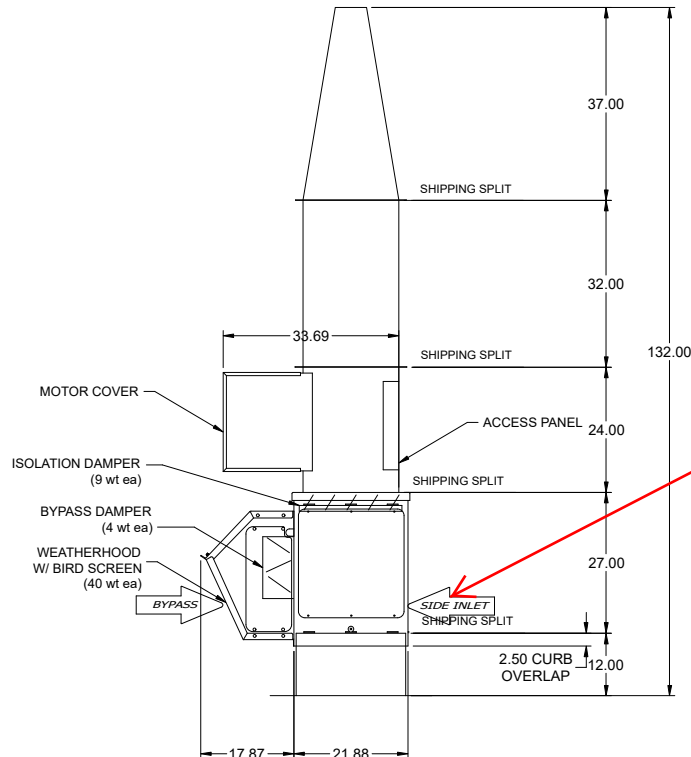
Model: VEKTOR-H-10

Fume Exhaust System



WEIGHT TOTALS	
FAN ASSEMBLY	248
FAN QTY	x1
PLENUM ASSEMBLY	176
ROOF CURB	47
SYSTEM TOTAL	471

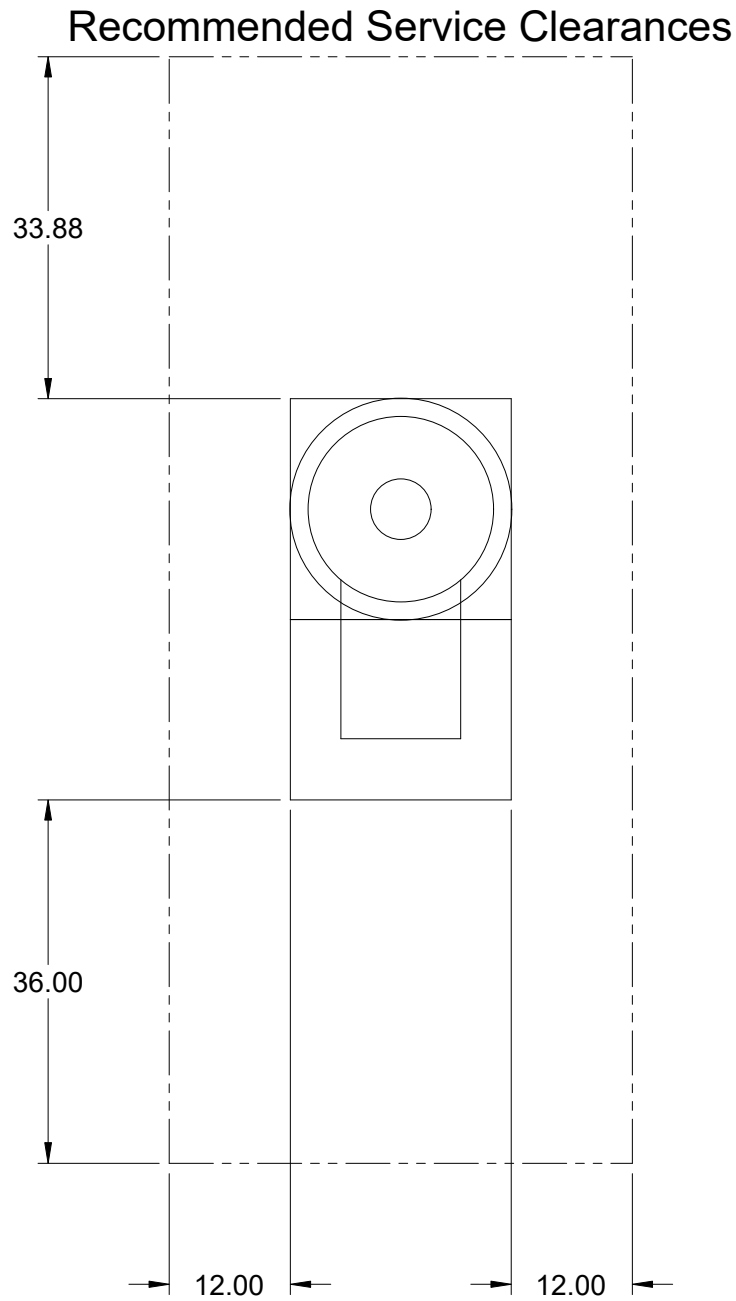
WEIGHTS REFERENCED FROM ALL VIEWS



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

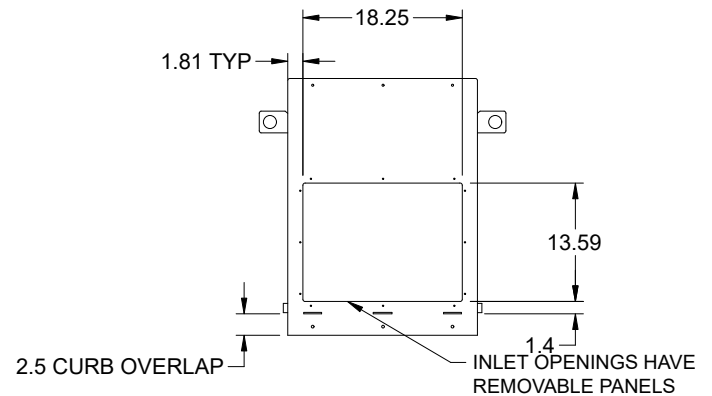
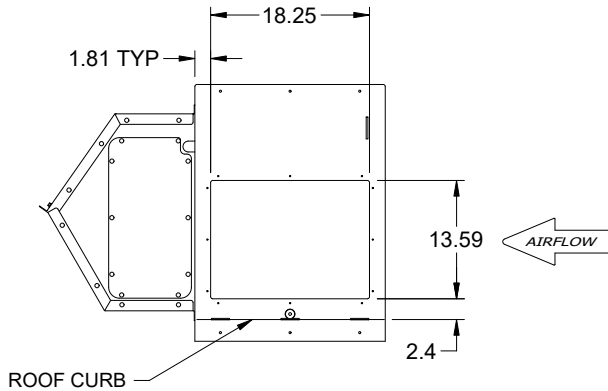
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

Fume Exhaust System



A MAXIMUM INLET VELOCITY OF 1500 FPM IS RECOMMENDED

Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Sure-Aire Probes Only

Sure-Aire utilizes differential pressure across the inlet cone of the fan to allow accurate measuring of volumetric flow through the fan. The fan has connection points for attaching an user supplied pressure measuring device.

Flow equation from differential pressure:

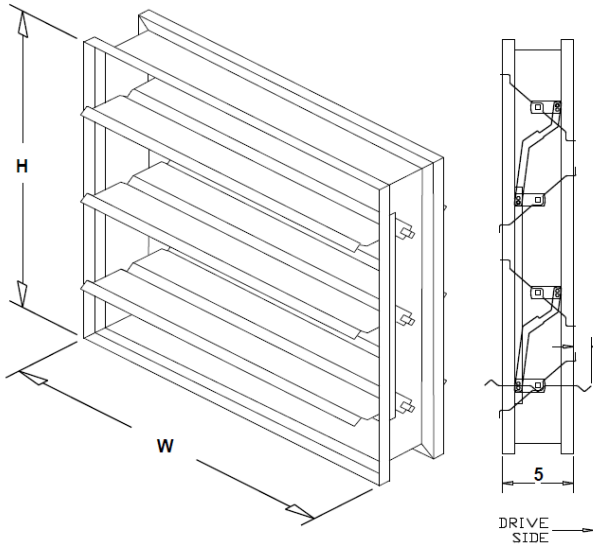
$$CFM = K \sqrt{\frac{\Delta P}{\rho}}$$

ΔP = Measured differential pressure

P = Air density (0ft elevation and 70F, $p = 0.075 \text{ lbm/ft}^3$)

Model	VEKTOR-H
Size	10
K Value	202
Fan tubing Connections*	1/4

*Recommended tube size is 0.25 in for runs 25 ft or less. For runs up to max 100 ft use 0.375 in or larger tubing.



VCD-23 Low Leakage Control Damper-Bypass

Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided. Note: The extension pin with clip kit includes the extension pin and clip.

RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at www.greenheck.com

Notes: All dimensions shown are in units of in..

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.
Field wiring is required to individual components.

Construction Features

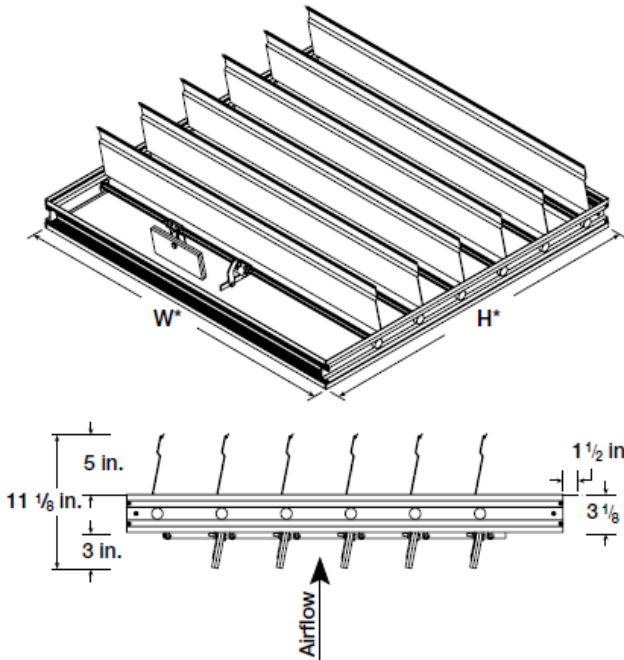
Temperature:	180	Frame Thickness (ga):	16	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	Vinyl		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	6	6

EMV-11 Horizontal Mount Exhaust Damper-Isolation

Application and Design

The EMV-11 is a horizontally mounted backdraft damper that is designed to allow vertical airflow up and prevent reverse airflow. This damper is opened by air pressure differential and closed by gravity. Standard models include adjustable counterbalance to assist opening.



Notes: All dimensions shown are in units of in.

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Construction Features

Temperature:	180 F	Frame Thickness (in.):	0.125	Coating Type:	Hi-Pro Polyester
Frame Material:	Extruded Aluminum	Blade Thickness (in.):	0.07	Coating Thickness:	2-3 mils
Blade Action:	Parallel	Blade Seal:	Vinyl		
Axle Material:	Stainless				
Axle Bearings:	SS Sleeve				
Linkage Material:	Stainless				
Counterbalance					
Weight Material:	Stainless Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	15	15

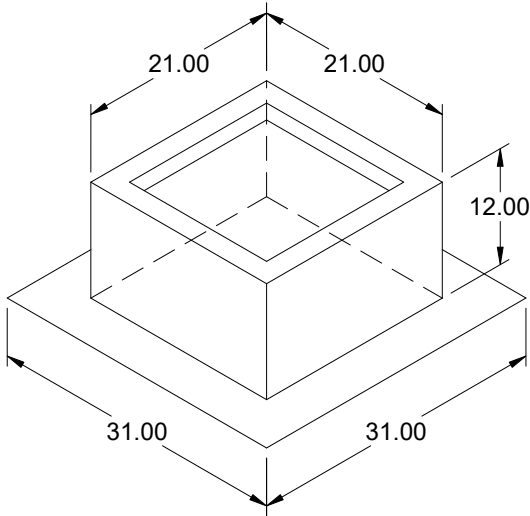
Counterbalance weights may require field adjustment. Instructions are available at www.greenheck.com.

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to sound and air performance ratings only. Performance certified is for installation type A: Free inlet, free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). Sound ratings do not include the effects of duct end correction. dBA levels are not licensed by AMCA International. The sound power level ratings shown are in decibels, referred to 10-12 watts, calculated per AMCA Standard 301. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. The AMCA Certified Ratings Seal applies to LwA values only. The sound pressure shown in fan dBA are loudness values at 5 ft. in a hemispherical free field calculated per AMCA Standard 301.



Model: GPFHL

Heavy Load Roof Curb

Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of galvanized steel (14 ga) - Straight Sided - Single roof flashing flange (5 in. width) - Insulated (1 in. thick, 3 lb density).
NOTES: - Curb actual dimension is 0.5 in. smaller than cap dimension. - The maximum allowable roof opening dimension is actual minus 4 in.. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension.

General

Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPFHL-21.5 x 21.5	Nominal	0.5	47	Yes	No Preference

Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	21.5	21.5	21	21	31	31

*May not be applicable

Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvaneal	No	No	1	R4.3

Coatings

Coating Type	Coating Color	Match Color Name	Match Color Code	Coating Area
Hi-Pro Polyester	Concrete Gray-RAL 7023			Entire Unit

Model: VEKTOR-H-10

Fume Exhaust System

Design Condition	
Number of Systems	1
Fans per System	1
Redundancy	None
System Type	Constant Volume
Lab Exh. Vol. (CFM)	640
Min Lab Exh. Vol. (CFM)	640
Add. BAP Air (CFM)	0
Wind Speed (MPH)	10.0

Selection Criteria - Normal [N] Oper.	
Volume (CFM)	640
Total External SP (in. wg)	1.028
Air Stream Temp (F)	70
Elevation (ft)	16
Drive Loss (%)	20.2

N Operating Fan Performance	
Fan RPM	2399
Max Fan RPM	3995
Operating Power (hp)	0.52
Required Power (hp)	0.52
Oper. Frequency (Hz)	60
Fan Energy Index (FEI)	-

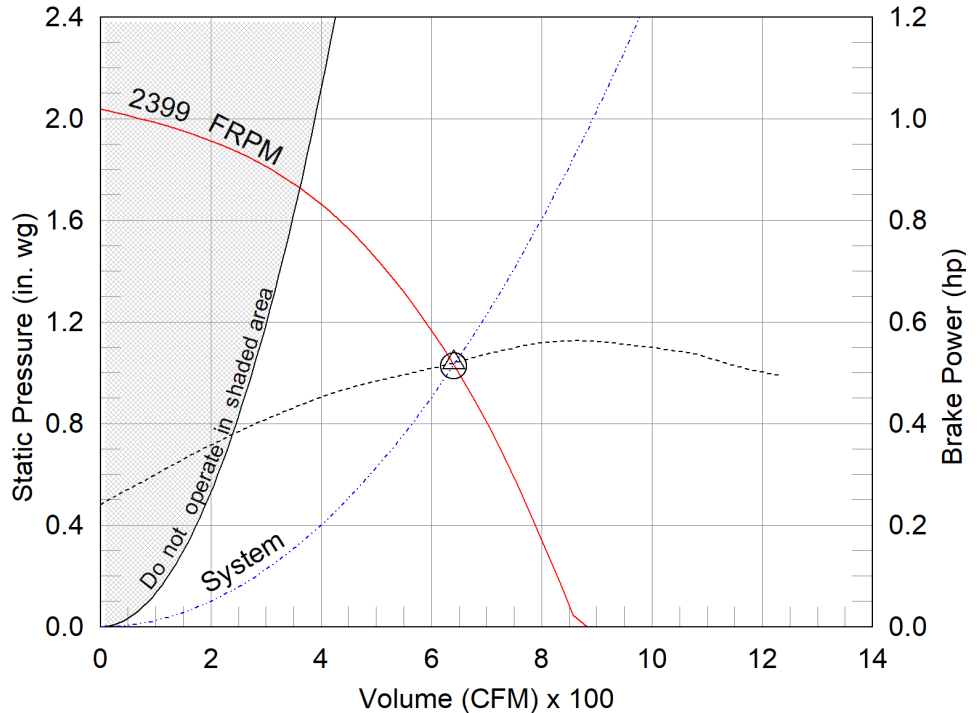
N Operating Discharge Performance	
Nozzle OV (ft/min)	3,200
Effective Plume Ht. (ft)	16.67
Calculation Method	Momentum Flux

Fan Construction	
Spark Resistance	Spark B
Drive Type	Belt
Arrangement	9
Nozzle Size (in.)	6

Plenum Configuration	
Bypass Air Plenum	Yes
Plenum Arrangement	Inline

Motor Specs	
Motor Size (hp)	3/4
RPM	1725
V/C/P	115/60/1
Enclosure	EXP
Drives	Standard
Drive Service Factor	2

Weight Totals	
Fan Assembly (lb)	248
Plenum Assembly (lb)	176
Roof Curb (lb)	47
System Total (lb)	471



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1 in. wg
Isolation Damper	0.028 in. wg
Total External SP	1.028 in. wg

AMCA tested and certified performance data includes pressure losses from discharge nozzles. Additional losses internal to the system are for selected optional accessories.



Sound Power by Octave Band (Individual Fan Normal [N] Operating Condition)

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA
Inlet Sound	84	81	78	74	71	67	65	61	77	66

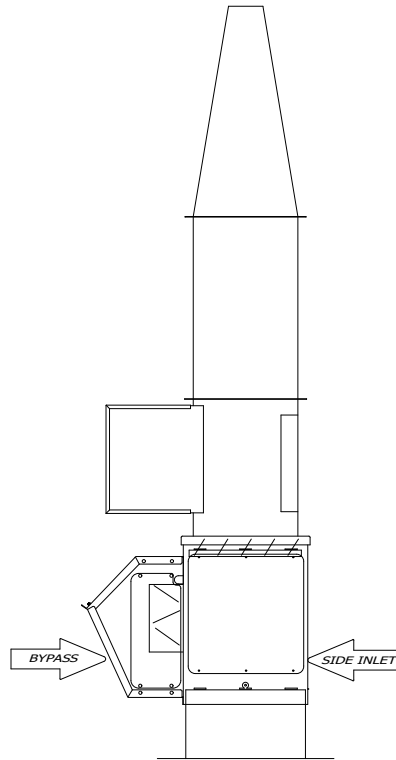
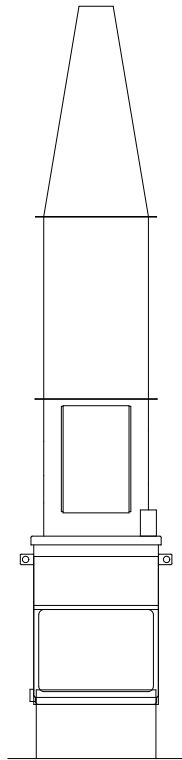
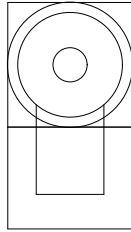
LwA - A weighted sound power level, based on ANSI S1.4. The AMCA Certified Ratings Seal applies to LwA values only.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International

Selected Options & Accessories:

Motor with Class B or Greater Insulation
Standard Drives
Bypass Air Plenum - Single Wall, Steel, Side Exhaust Intake
Coated with LabCoat, RAL7023, Entire Unit
Switch - NEMA-7 and 9, Toggle, Ship Separate
UL/cUL-705 - "Power Ventilators"
Shaft Material - Turned and Polished Steel with Protective Coating
Bypass Damper - VCD-23, Galvaneal, Coated, 6 in. x 6 in., Qty: 1
Isolation Damper - EMV-11, Extruded Aluminum, Coated, 15 in. x 15 in., Parallel Blades, mounted in BAP, one per fan
Sure-Aire Flow Station (No Electronics), Qty 1
Factory Vibration Test, 0.15 in/sec, peak, filter-in as measured at the fan RPM
Extended Lube Lines - Nylon
Motor Cover
Weatherhood over bypass damper with inlet screen
Unit Warranty: 1 Yr (Standard)

Model: VEKTOR-H-10

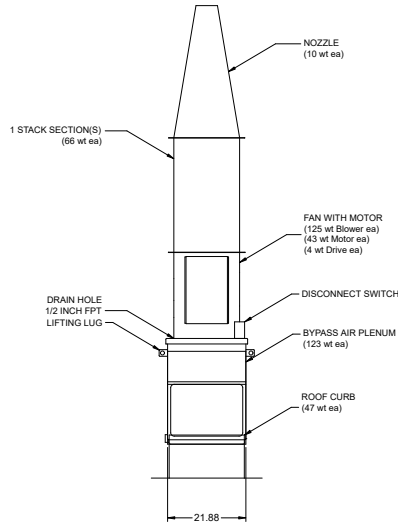
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

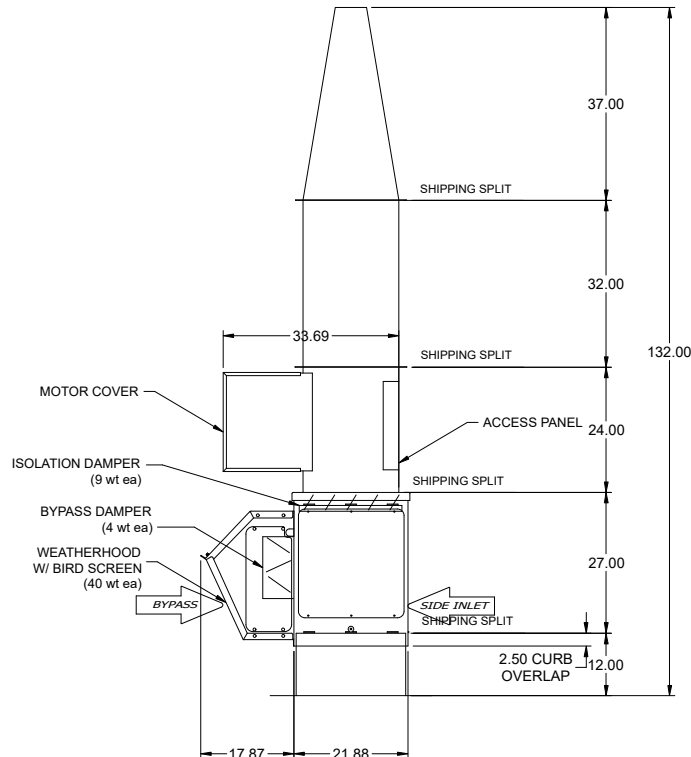
Model: VEKTOR-H-10

Fume Exhaust System



WEIGHT TOTALS	
FAN ASSEMBLY	248
FAN QTY	x1
PLENUM ASSEMBLY	176
ROOF CURB	47
SYSTEM TOTAL	471

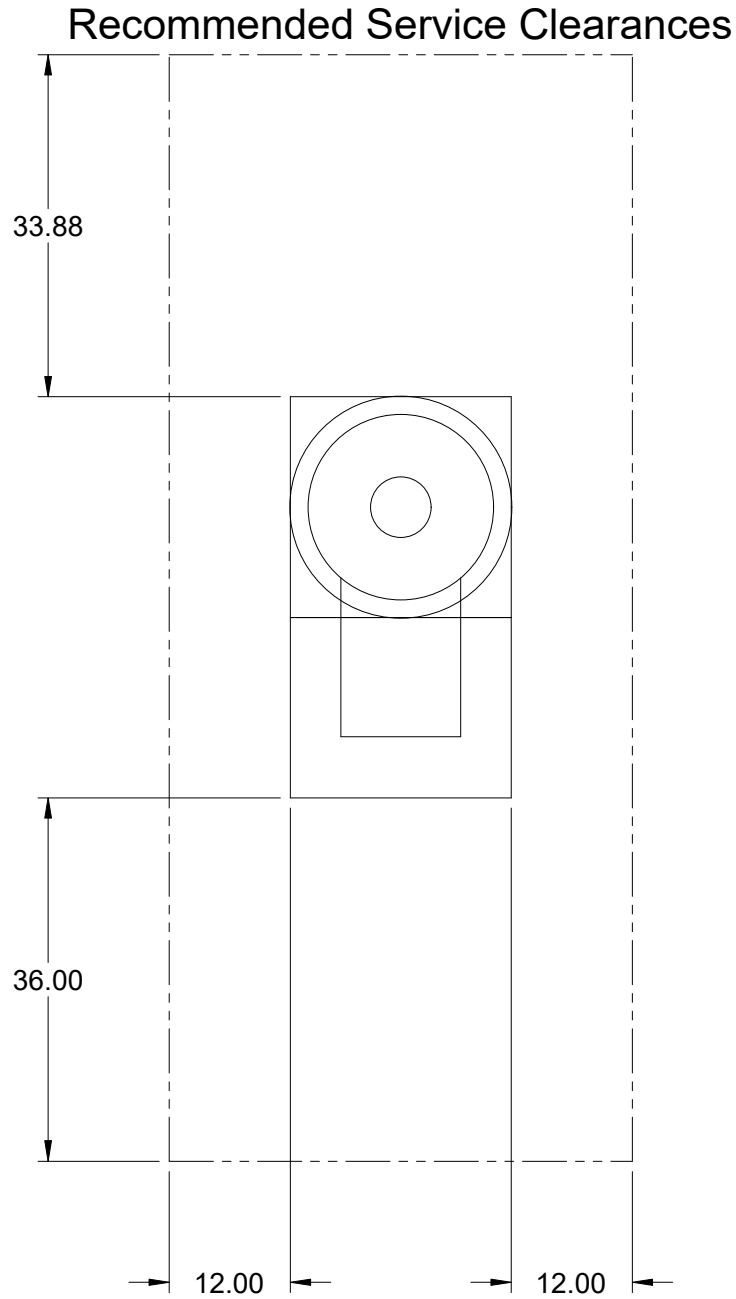
WEIGHTS REFERENCED FROM ALL VIEWS



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

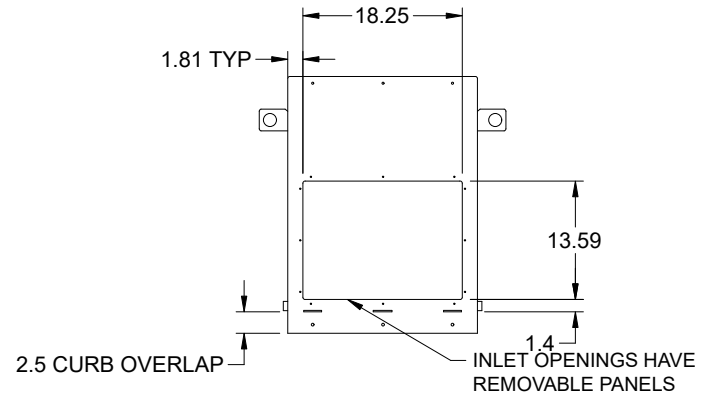
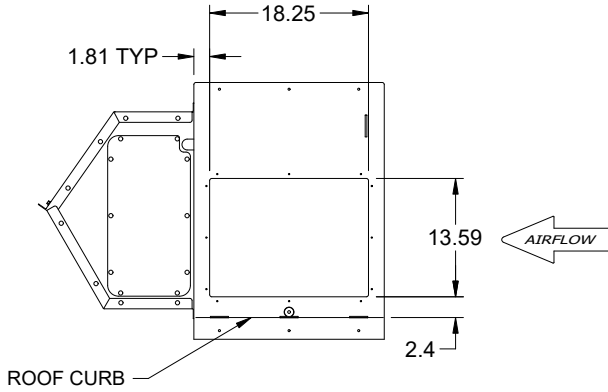
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

Fume Exhaust System



A MAXIMUM INLET VELOCITY OF 1500 FPM IS RECOMMENDED

Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Sure-Aire Probes Only

Sure-Aire utilizes differential pressure across the inlet cone of the fan to allow accurate measuring of volumetric flow through the fan. The fan has connection points for attaching an user supplied pressure measuring device.

Flow equation from differential pressure:

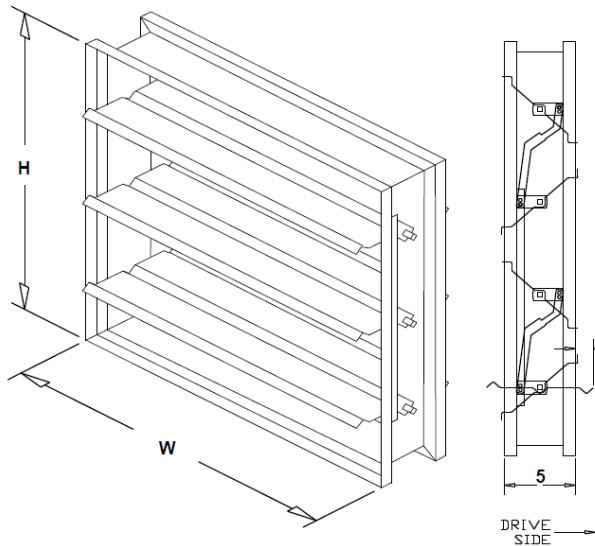
$$CFM = K \sqrt{\frac{\Delta P}{\rho}}$$

ΔP = Measured differential pressure

P = Air density (0ft elevation and 70F, $p = 0.075 \text{ lbm/ft}^3$)

Model	VEKTOR-H
Size	10
K Value	202
Fan tubing Connections*	1/4

*Recommended tube size is 0.25 in for runs 25 ft or less. For runs up to max 100 ft use 0.375 in or larger tubing.



VCD-23 Low Leakage Control Damper-Bypass

Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided. Note: The extension pin with clip kit includes the extension pin and clip.

RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at www.greenheck.com

Notes: All dimensions shown are in units of in..

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.
Field wiring is required to individual components.

Construction Features

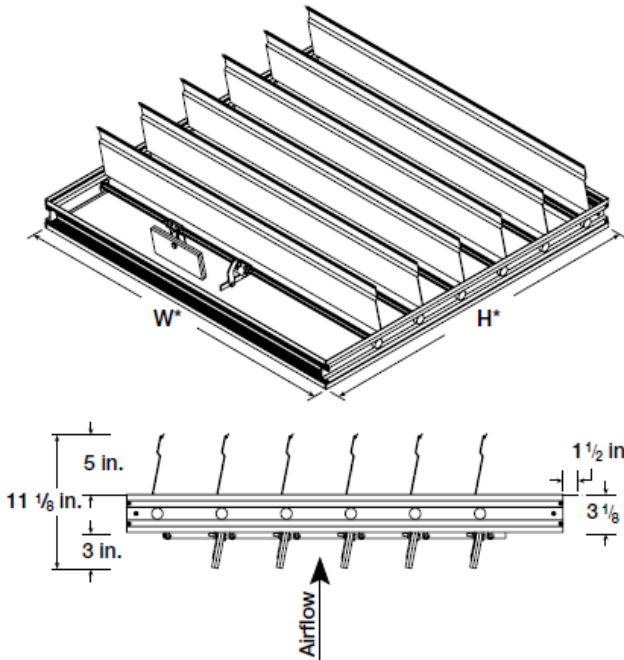
Temperature:	180	Frame Thickness (ga):	16	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	Vinyl		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	6	6

EMV-11 Horizontal Mount Exhaust Damper-Isolation

Application and Design

The EMV-11 is a horizontally mounted backdraft damper that is designed to allow vertical airflow up and prevent reverse airflow. This damper is opened by air pressure differential and closed by gravity. Standard models include adjustable counterbalance to assist opening.



Notes: All dimensions shown are in units of in.

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Construction Features

Temperature:	180 F	Frame Thickness (in.):	0.125	Coating Type:	Hi-Pro Polyester
Frame Material:	Extruded Aluminum	Blade Thickness (in.):	0.07	Coating Thickness:	2-3 mils
Blade Action:	Parallel	Blade Seal:	Vinyl		
Axle Material:	Stainless				
Axle Bearings:	SS Sleeve				
Linkage Material:	Stainless				
Counterbalance					
Weight Material:	Stainless Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	15	15

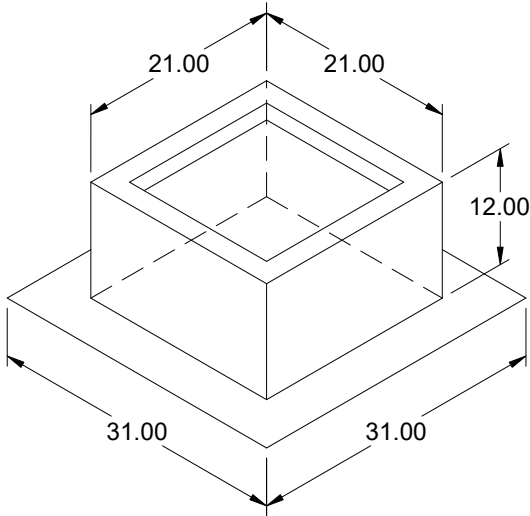
Counterbalance weights may require field adjustment. Instructions are available at www.greenheck.com.

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to sound and air performance ratings only. Performance certified is for installation type A: Free inlet, free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). Sound ratings do not include the effects of duct end correction. dBA levels are not licensed by AMCA International. The sound power level ratings shown are in decibels, referred to 10-12 watts, calculated per AMCA Standard 301. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. The AMCA Certified Ratings Seal applies to LwA values only. The sound pressure shown in fan dBA are loudness values at 5 ft. in a hemispherical free field calculated per AMCA Standard 301.



Model: GPFHL

Heavy Load Roof Curb

Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of galvanized steel (14 ga) - Straight Sided - Single roof flashing flange (5 in. width) - Insulated (1 in. thick, 3 lb density).
NOTES: - Curb actual dimension is 0.5 in. smaller than cap dimension. - The maximum allowable roof opening dimension is actual minus 4 in.. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension.

General

Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPFHL-21.5 x 21.5	Nominal	0.5	47	Yes	No Preference

Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	21.5	21.5	21	21	31	31

*May not be applicable

Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvaneal	No	No	1	R4.3

Coatings

Coating Type	Coating Color	Match Color Name	Match Color Code	Coating Area
Hi-Pro Polyester	Concrete Gray-RAL 7023			Entire Unit

Model: VEKTOR-H-10

Fume Exhaust System

Design Condition	
Number of Systems	1
Fans per System	1
Redundancy	None
System Type	Constant Volume
Lab Exh. Vol. (CFM)	640
Min Lab Exh. Vol. (CFM)	640
Add. BAP Air (CFM)	0
Wind Speed (MPH)	10.0

Selection Criteria - Normal [N] Oper.	
Volume (CFM)	640
Total External SP (in. wg)	1.028
Air Stream Temp (F)	70
Elevation (ft)	16
Drive Loss (%)	20.2

N Operating Fan Performance	
Fan RPM	2399
Max Fan RPM	3995
Operating Power (hp)	0.52
Required Power (hp)	0.52
Oper. Frequency (Hz)	60
Fan Energy Index (FEI)	-

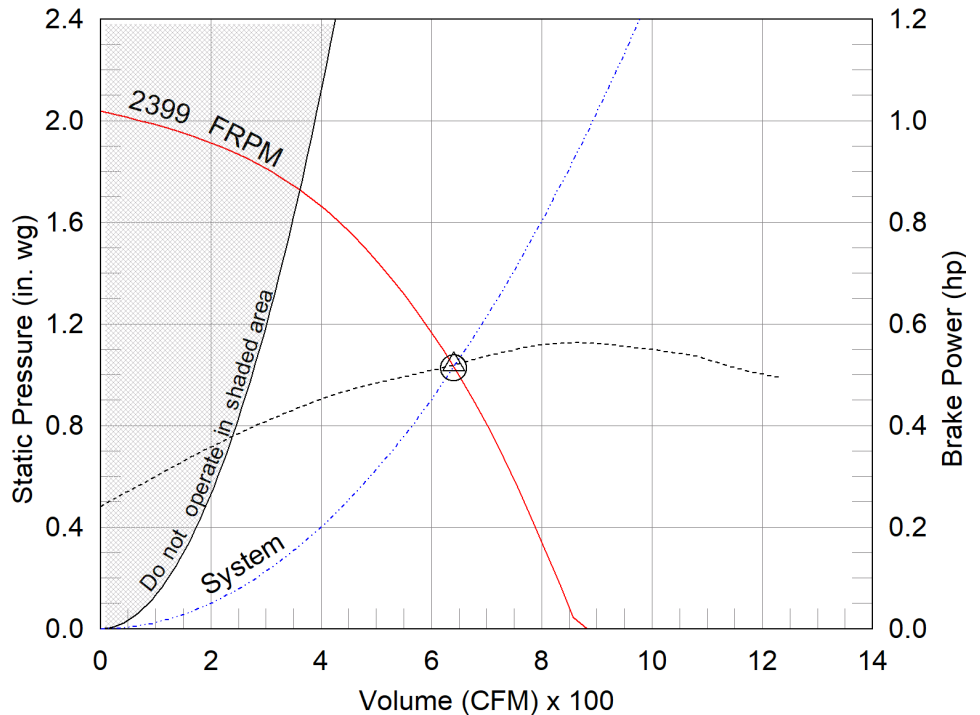
N Operating Discharge Performance	
Nozzle OV (ft/min)	3,200
Effective Plume Ht. (ft)	16.67
Calculation Method	Momentum Flux

Fan Construction	
Spark Resistance	Spark B
Drive Type	Belt
Arrangement	9
Nozzle Size (in.)	6

Plenum Configuration	
Bypass Air Plenum	Yes
Plenum Arrangement	Inline

Motor Specs	
Motor Size (hp)	3/4
RPM	1725
V/C/P	115/60/1
Enclosure	EXP
Drives	Standard
Drive Service Factor	2

Weight Totals	
Fan Assembly (lb)	248
Plenum Assembly (lb)	176
Roof Curb (lb)	47
System Total (lb)	471



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1 in. wg
Isolation Damper	0.028 in. wg
Total External SP	1.028 in. wg

AMCA tested and certified performance data includes pressure losses from discharge nozzles. Additional losses internal to the system are for selected optional accessories.



Sound Power by Octave Band (Individual Fan Normal [N] Operating Condition)

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA
Inlet Sound	84	81	78	74	71	67	65	61	77	66

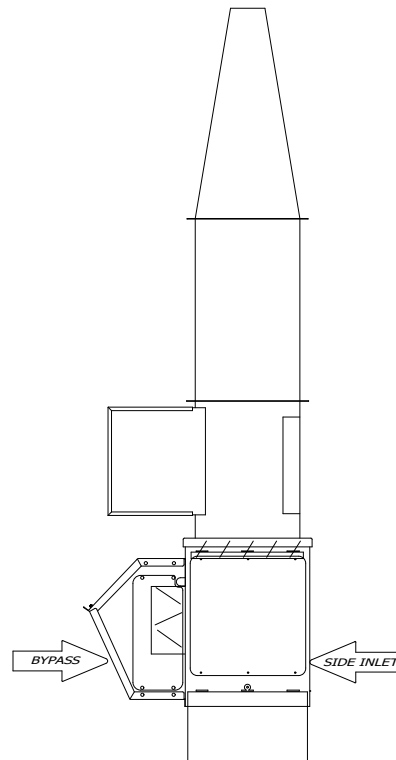
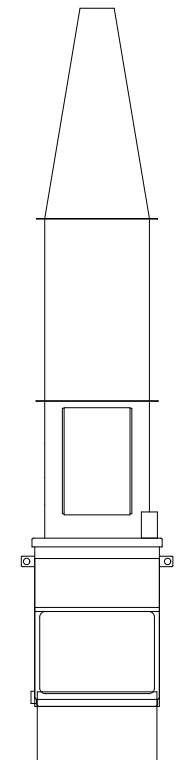
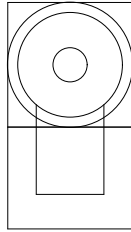
LwA - A weighted sound power level, based on ANSI S1.4. The AMCA Certified Ratings Seal applies to LwA values only.
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International

Selected Options & Accessories:

Motor with Class B or Greater Insulation
Standard Drives
Bypass Air Plenum - Single Wall, Steel, Side Exhaust Intake
Coated with LabCoat, RAL7023, Entire Unit
Switch - NEMA-7 and 9, Toggle, Ship Separate
UL/cUL-705 - "Power Ventilators"
Shaft Material - Turned and Polished Steel with Protective Coating
Bypass Damper - VCD-23, Galvaneal, Coated, 6 in. x 6 in., Qty: 1
Isolation Damper - EMV-11, Extruded Aluminum, Coated, 15 in. x 15 in., Parallel Blades, mounted in BAP, one per fan
Sure-Aire Flow Station (No Electronics), Qty 1
Factory Vibration Test, 0.15 in/sec, peak, filter-in as measured at the fan RPM
Extended Lube Lines - Nylon
Motor Cover
Weatherhood over bypass damper with inlet screen
Unit Warranty: 1 Yr (Standard)

Model: VEKTOR-H-10

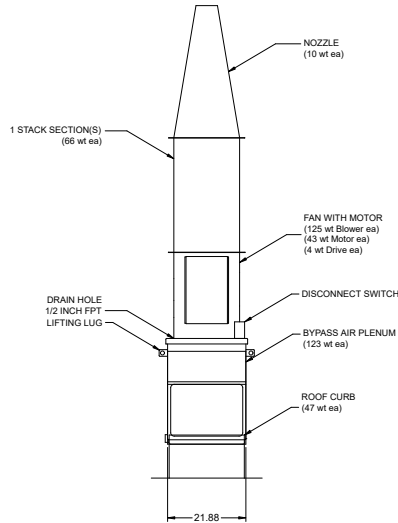
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

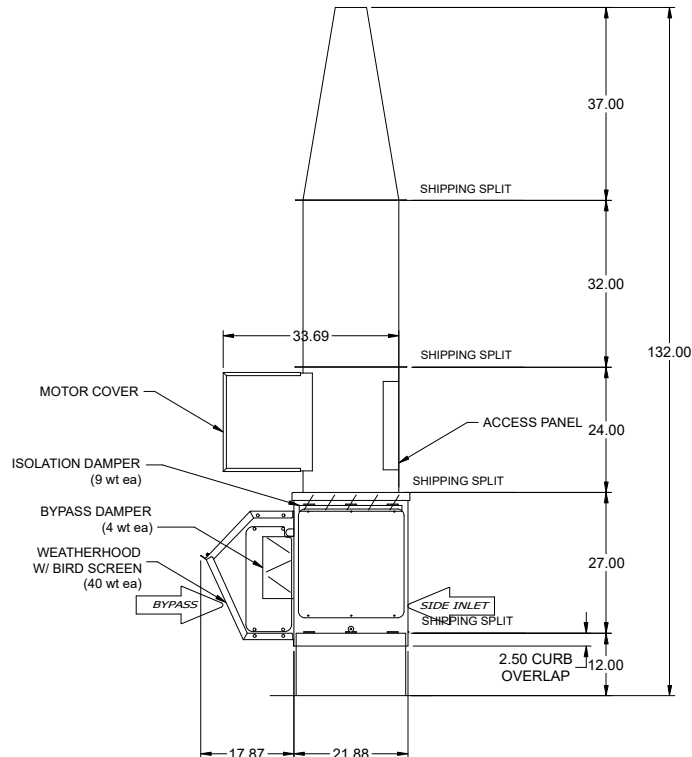
Model: VEKTOR-H-10

Fume Exhaust System



WEIGHT TOTALS	
FAN ASSEMBLY	248
FAN QTY	x1
PLENUM ASSEMBLY	176
ROOF CURB	47
SYSTEM TOTAL	471

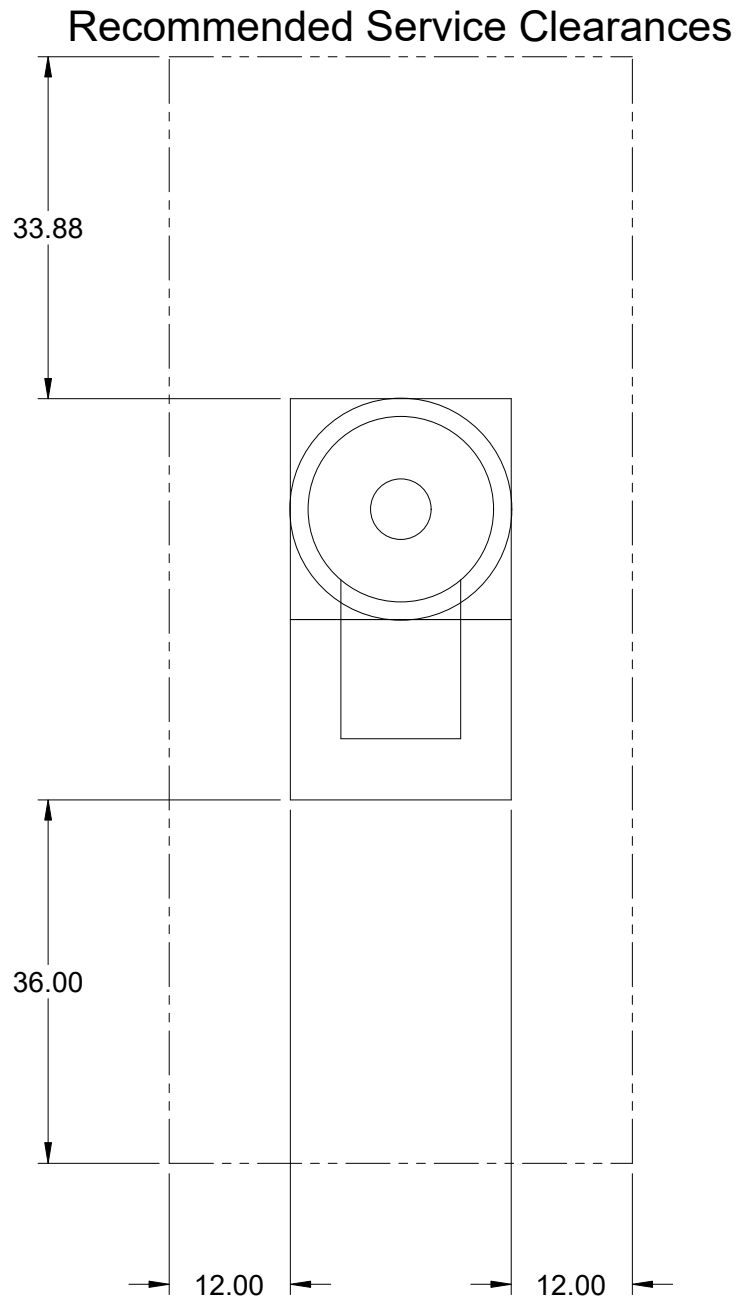
WEIGHTS REFERENCED FROM ALL VIEWS



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

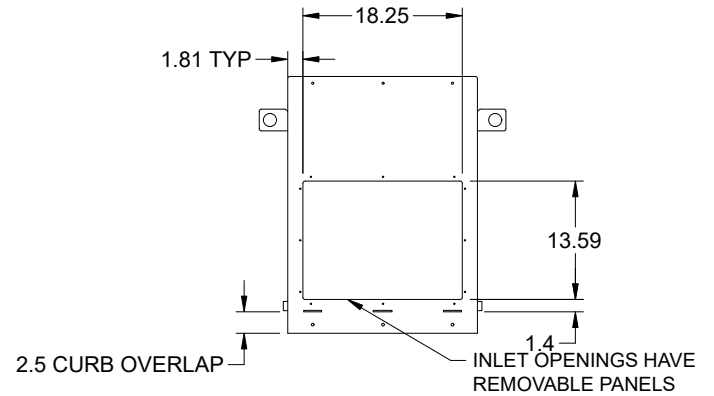
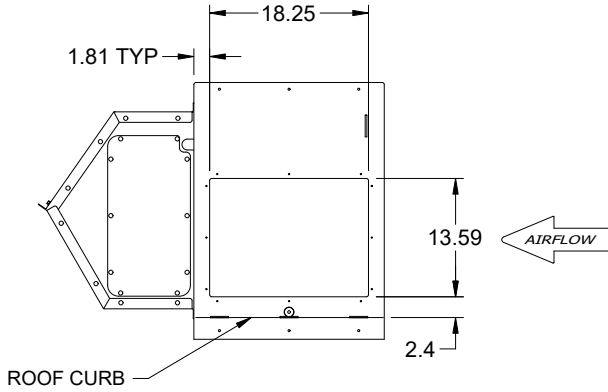
Fume Exhaust System



Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Model: VEKTOR-H-10

Fume Exhaust System



A MAXIMUM INLET VELOCITY OF 1500 FPM IS RECOMMENDED

Notes: All dimensions shown are in units of in. and weights are shown in units of lb.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

Sure-Aire Probes Only

Sure-Aire utilizes differential pressure across the inlet cone of the fan to allow accurate measuring of volumetric flow through the fan. The fan has connection points for attaching an user supplied pressure measuring device.

Flow equation from differential pressure:

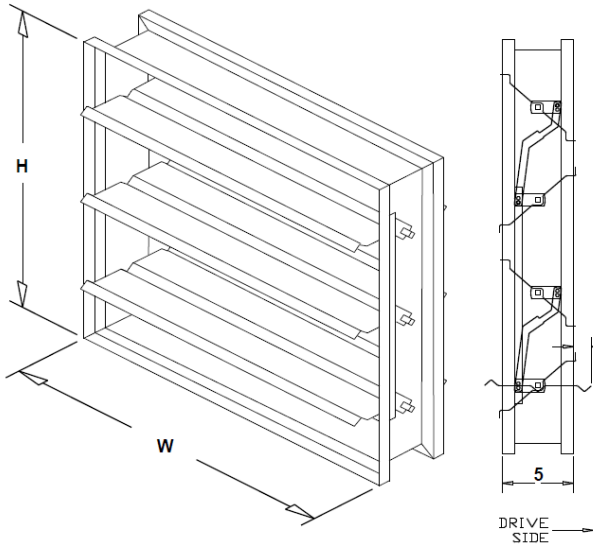
$$CFM = K \sqrt{\frac{\Delta P}{\rho}}$$

ΔP = Measured differential pressure

P = Air density (0ft elevation and 70F, $p = 0.075 \text{ lbm/ft}^3$)

Model	VEKTOR-H
Size	10
K Value	202
Fan tubing Connections*	1/4

*Recommended tube size is 0.25 in for runs 25 ft or less. For runs up to max 100 ft use 0.375 in or larger tubing.



VCD-23 Low Leakage Control Damper-Bypass

Application and Design

The model VCD-23 is a low leakage control for application as an automatic control or manual balancing damper. This model is intended for applications in low to medium pressure and velocity systems. A wide range of electric and pneumatic actuators are available.

Non-jackshafted dampers will be supplied with a blade drive lever for internal actuator mounting. When external actuator mounting is specified in which case an extension pin with clip kit will be provided. Note: The extension pin with clip kit includes the extension pin and clip.

RATINGS

Leakage: Class 1A @ 1 in. wg, Class 1 @ 4 in. wg

Temperature: 200.0 F - 250.0 F Consult factory for higher temperatures.

Installation instructions available at www.greenheck.com

Notes: All dimensions shown are in units of in..

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Electrical accessory wiring terminates at the accessory.
Field wiring is required to individual components.

Construction Features

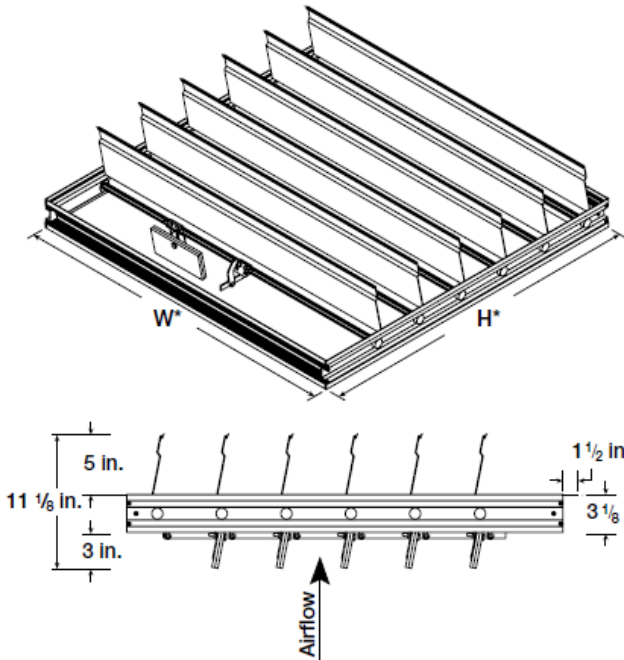
Temperature:	180	Frame Thickness (ga):	16	Coating Type:	Hi-Pro Polyester
Frame Material:	Galvaneal	Blade Thickness (ga):	16	Coating Thickness:	2-3 mils
Blade Action:	Opposed	Blade Seal:	Vinyl		
Jamb Seal Mat.:	304 SS	Actuator Mount:	External		
Axle Material:	Plated Steel				
Axle Bearings:	Synthetic				
Linkage Material:	Plated Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	6	6

EMV-11 Horizontal Mount Exhaust Damper-Isolation

Application and Design

The EMV-11 is a horizontally mounted backdraft damper that is designed to allow vertical airflow up and prevent reverse airflow. This damper is opened by air pressure differential and closed by gravity. Standard models include adjustable counterbalance to assist opening.



Notes: All dimensions shown are in units of in.

W and H furnished approximately 0.25 in. undersized and only refer to damper dimensions (sleeve thickness is not included).

Construction Features

Temperature:	180 F	Frame Thickness (in.):	0.125	Coating Type:	Hi-Pro Polyester
Frame Material:	Extruded Aluminum	Blade Thickness (in.):	0.07	Coating Thickness:	2-3 mils
Blade Action:	Parallel	Blade Seal:	Vinyl		
Axle Material:	Stainless				
Axle Bearings:	SS Sleeve				
Linkage Material:	Stainless				
Counterbalance					
Weight Material:	Stainless Steel				

Damper Qty	Damper Width in.	Damper Height in.
1	15	15

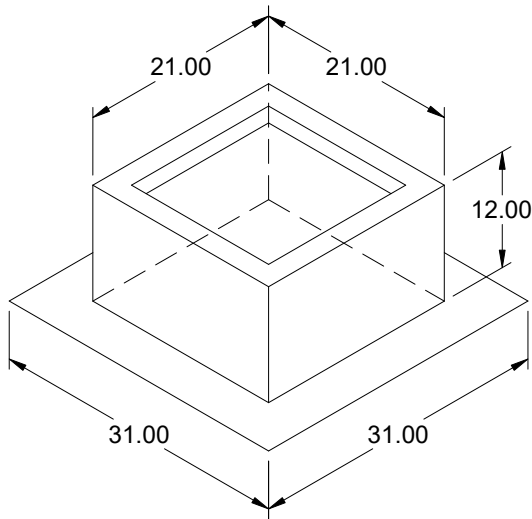
Counterbalance weights may require field adjustment. Instructions are available at www.greenheck.com.

AMCA



AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) includes transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to sound and air performance ratings only. Performance certified is for installation type A: Free inlet, free outlet. Power rating (BHP/kW) includes transmission losses. Performance ratings do not include the effects of appurtenances (accessories). Sound ratings do not include the effects of duct end correction. dBA levels are not licensed by AMCA International. The sound power level ratings shown are in decibels, referred to 10-12 watts, calculated per AMCA Standard 301. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. The AMCA Certified Ratings Seal applies to LwA values only. The sound pressure shown in fan dBA are loudness values at 5 ft. in a hemispherical free field calculated per AMCA Standard 301.



Model: GPFHL

Heavy Load Roof Curb

Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of galvanized steel (14 ga) - Straight Sided - Single roof flashing flange (5 in. width) - Insulated (1 in. thick, 3 lb density).
NOTES: - Curb actual dimension is 0.5 in. smaller than cap dimension. - The maximum allowable roof opening dimension is actual minus 4 in.. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension.

General

Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPFHL-21.5 x 21.5	Nominal	0.5	47	Yes	No Preference

Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	21.5	21.5	21	21	31	31

*May not be applicable

Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvaneal	No	No	1	R4.3

Coatings

Coating Type	Coating Color	Match Color Name	Match Color Code	Coating Area
Hi-Pro Polyester	Concrete Gray-RAL 7023			Entire Unit