

Jacobs Heating and Air Conditioning Inc

Submittal Data
PDX Deicing # 0902



Phone 503-234-5071
2220 SE Ninth Ave , Portland, OR 97214
Fax 503-233-0451
800-848-5199

SUBMITTAL

PROJECT Portland International Airport Deicing
LOCATION Portland, OR
ARCHITECT _____
ENGINEER _____
CONTRACTOR Jacobs Heating & A/C
DATE SUBMITTED 10 2 09
CONTRACTOR P O _____
JAirP CONTACT Mike Leavens/Hal Jacklin
MATERIAL SUBMITTED Control Dampers
SPECIFICATIONS 233300 2 2

WE ARE PLEASED TO SUBMIT THE FOLLOWING LIST OF EQUIPMENT FOR APPROVAL BASED UPON INFORMATION RECEIVED
WE BELIEVE THIS MATERIAL CONFORMS TO THE SPECIFICATIONS IT SHALL REMAIN THE CONTRACTOR'S RESPONSIBILITY
TO VERIFY SIZES AND QUANTITIES PRIOR TO ORDER RELEASE MATERIAL WILL BE RELEASED TO PRODUCTION UPON
RETURN OF APPROVED SUBMITTALS TO JOHNSON AIR PRODUCTS AT 2220 S E 9TH AVE , PORTLAND OREGON 97214

MANUFACTURER Greenheck

(please see attached literature)

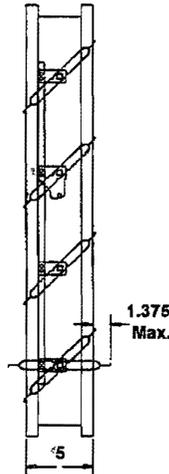
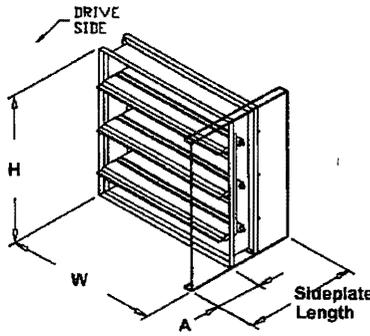
VCD-33

Ultra Low Leakage Control Damper

Application & Design

The model VCD-33 is a ruggedly built low leakage control damper for application as an automatic control or manual balancing damper. A wide range of electric and pneumatic actuators are available. Non-jackshafed dampers will be supplied with a blade drive lever for internal actuator mounting unless 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. The VCD-33 is intended for applications in low to medium pressure and velocity systems.

- FRAME Galvanized, 5 in x 1 in hat channel, reinforced corners, low profile head and sill on dampers 17 in high and smaller (When 304 SS material is selected the frame, blades and all damper components will be provided in 304 SS except the actuator, mounting hardware and jackshaft)
- BLADES Airfoil shape, double skin construction, 14 ga equivalent thickness
- LINKAGE Side linkage out of air stream
- AXLES 0.5 in dia



Notes: All dimensions shown are in units of inches.

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

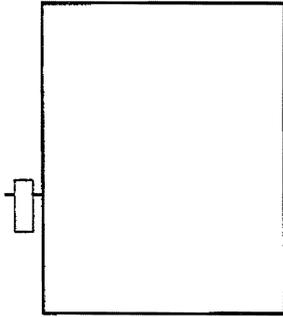
Electrical accessory wiring terminates at the accessory. Field wiring is required to individual components.

CONSTRUCTION FEATURES

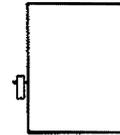
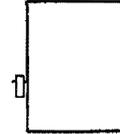
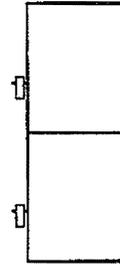
Blade Action	Parallel	Linkage Material	Steel
Frame Type	Channel	Blade Seal	TPE
Material	Galvanized	Jamb Seal Mat.	304 SS
Axle Material	Steel	Sizing	Nominal
Axle Bearings	Bronze	Frame Thickness (ga)	16

ID #	Tag	Qty	W (in)	H (in)	Drive Arr	Sideplate Length	A-Dim (in)
2-1		1	48.000	30.000	11-1CEL-0	8	1.5
2-2		4	48.000	96.000	12-2CEL-0	8	1.5

Damper & Louver Drive Arrangements



11 1FEL-0 or 11CEL-0



12 2FEL-0 or 12 2CEL 0



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JAirP CONTACT Mike Leavens/Hal Jacklin
MATERIAL SUBMITTED Electric Unit Heaters
SPECIFICATIONS 238200 2 1

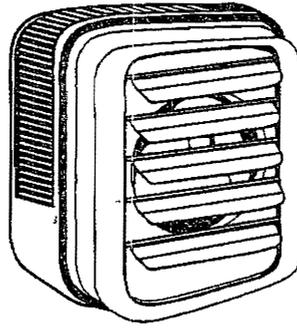
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MANUFACTURER Qmark

(please see attached literature)



**SUBMITTAL SHEET
MUH SERIES
HORIZONTAL/VERTICAL
UNIT HEATERS**



MUH SERIES - HORIZONTAL/VERTICAL UNIT HEATERS

JOB NAME PORTLAND INTERNATIONAL AIRPORT DEICING
 LOCATION PORTLAND, OR
 ARCHITECT _____
 ENGINEER _____
 CONTRACTOR JACOBS HEATING & A/C
 SUBMITTED BY _____
 DATE 10/2/09

ITEM	QTY	CATALOG NUMBER	TAG	WATTS	VOLTS	Ø	AMPS	GRILLE FINISH	CILING MOUNT
	3	MUH074	UH-PS	7500	480	3	9		

ACCESSORIES
AND
CONTROLS

ITEM	QTY	CAT NO	TAG	DESCRIPTION
	3	MT1	UH-PS	THERMOSTAT
	3	MMB10	UH-PS	MOUNTING BRACKET
	3	MPDS25	UH-PS	DISCONNECT

SUBMITTED BY	DATE	APPROVED BY	DATE

ZSS-QMUHO

(12-04)



TYPE MUH UNIT HEATER

UL US
FILE #E21609

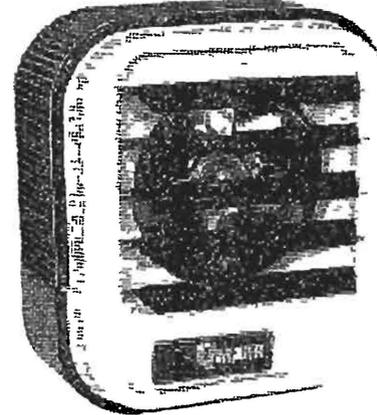
Unit mounts either horizontally or vertically. Totally versatile. For factories, warehouses, garages, stores, shipping rooms, power stations, aircraft hangers. Can be used for primary, supplementary, spot, or dual-system heating.

- Wide range of optional control kits are field installable, increasing the MUH adaptability to the specification market.
- Forced air unit heater with 10 power ratings from 3KW to 50 KW heating output. 208, 240, 277 and 480V, 10/230 to 170/500 BTU/hr.
- 32 compatible models (no need to try to assemble a heating system from 70 or 80 models).
- Heavy gauge die-formed steel housing. Two-toned, smartly styled.
- Advanced pull-through air flow design draws air across heating element for more even air distribution and cooler element operation.
- Specially designed venturi outlet to meet that added throw as required in vertical position.
- Branch circuit fusing (when required).
- Completely enclosed fan motor.
- 1- or 3-phase wiring on 5 through 10 KW 208/240V and 15 KW 208V units (field interchangeable).

Aluminum-finned copper clad steel sheath heating element has longer useful life because of cooler sheath temperature and faster heat dissipation.

24V control transformer standard on most models providing a safer and more accurate means of temperature control. 3KW and 5KW 208-277V have line voltage controls as standard (24V control available on made-to-order basis).

- Automatic reset linear thermal cut-out, capillary type, provides protection over entire length of element areas (Manual reset protection available on made-to-order basis).
- 2-speed fan selector switch (25 to 50 KW models).
- Fan delay feature eliminates cold drafts. Element heats up before fan cuts in, then fan continues to distribute heat after element shuts off.
- Ruggedly built, yet lighter weight for easier installation. No piping, flues, valves, or traps.
- Individually adjustable discharge louvers to control air flow.
- Choice of optional diffusers for variety of air patterns, maximizing heat concentration and coverage in the vertical position.
- Meets all UL, NEC, and OSHA requirements.



SELECTION CHART

CAT. NO.	VOLTS	PHASE	HEATING DATA			CONTROL VOLTAGE	STAGE ELEMENT CODE	AIR DELIVERY DATA			FAN MOTOR DATA				MAXIMUM EFFECTIVE WORKING HEIGHT		HSA AIR THROW	WIRE SIZE	INSTALLER WEIGHT (LBS.) (MOTOR)
			HP	BTU	CFM @ 100' F			CFM	CFM	RPM	HP	HP	HP	HORIZ.	VERT.				
MUH-03-01	208	1Ø	3.0	10.2	14.6	208	N/A	350	800	27	208	1500	1/100	8	9	12	AWG 12	27	
MUH-03-21	208/240	1-3Ø	2.2/3.0	7.5/10.2	11.0/12.5	208/240	N/A	350	800	27	208/240	1500	1/100	8	9	12	AWG 12	27	
MUH-03-31	277	1Ø	3.0	10.2	11.0	277	N/A	350	800	27	277	1500	1/100	8	9	12	AWG 14	27	
MUH-03-31	347	1Ø	3.0	10.2	8.5	347	N/A	350	800	27	347	1500	1/100	8	9	12	AWG 14	27	
MUH-03-41	480	3Ø	3.0	10.2	3.6	24	N/A	350	800	27	480	1500	1/100	8	9	12	AWG 14	27	
MUH-03-81	600	3Ø	3.0	10.2	2.9	600	N/A	350	800	27	600	1500	1/100	8	9	12	AWG 14	27	
MUH-05-01	208	1-3Ø	5.0	17.0	24.0	208	5A	350	800	45	208	1500	1/100	8	9	12	AWG 10	27	
MUH-05-21	208/240	1-3Ø	3.7/5.0	12.6/17.0	18.0/21.0	208/240	5A	350	800	45	208/240	1500	1/100	8	9	12	AWG 10	27	
MUH-05-31	277	1Ø	5.0	17.0	18.0	277	N/A	350	800	45	277	1500	1/100	8	9	12	AWG 10	27	
MUH-05-31	347	1Ø	5.0	17.0	14.4	347	N/A	350	800	45	347	1500	1/100	8	9	12	AWG 10	27	
MUH-05-41	480	3Ø	5.0	17.0	6.0	24	N/A	350	800	45	480	1500	1/100	8	9	12	AWG 14	27	
MUH-05-81	600	3Ø	5.0	17.0	4.6	600	N/A	350	800	45	600	1500	1/100	8	9	12	AWG 10	27	
MUH-07-0	208	1-3Ø	7.5	25.6	38.0	24	5B	650	970	37	208	1500	1/30	9	14	18	AWG 6	38	
MUH-07-2	208/240	1-3Ø	5.6/7.5	19.1/25.6	27.0/31.3	24	5B	650	970	37	208/240	1500	1/30	9	14	18	AWG 8	38	
MUH-07-7	277	1Ø	7.5	25.6	27.0	24	5B	650	970	37	277	1500	1/30	9	14	18	AWG 8	38	
MUH-07-3	347	1Ø	7.5	25.6	21.6	24	5B	650	970	37	347	1500	1/30	9	14	18	AWG 14	38	
MUH-07-4	480	3Ø	7.5	25.6	9.0	24	5B	650	970	37	480	1500	1/30	9	14	18	AWG 14	38	
MUH-07-6	600	3Ø	7.5	25.6	7.3	24	5B	650	970	37	600	1500	1/30	9	14	18	AWG 14	38	
MUH-10-0	208	1-3Ø	10.0	34.1	48.0	24	5B	650	970	49	208	1500	1/30	9	14	18	AWG 4	38	
MUH-10-2	208/240	1-3Ø	7.5/10.0	25.6/34.1	36.0/42.0	24	5B	650	970	49	208/240	1500	1/30	9	14	18	AWG 6	36	
MUH-10-7	277	1Ø	10.0	34.1	36.0	24	5B	650	970	49	277	1500	1/30	6	14	18	AWG 6	36	
MUH-10-3	347	1Ø	10.0	34.1	28.8	24	5B	650	970	49	347	1500	1/30	9	14	18	AWG 14	38	
MUH-10-4	480	3Ø	10.0	34.1	12.0	24	5B	650	970	49	480	1500	1/30	9	14	18	AWG 14	38	
MUH-10-6	600	3Ø	10.0	34.1	9.7	24	5B	650	970	49	600	1500	1/30	9	14	18	AWG 14	38	
MUH-15-0	208	1-3Ø	15.0	51.2	72.0	24	5A	910	1640	52	208	1530	1/20	11	20	35	AWG 2	55	
MUH-15-2	208/240	1-3Ø	11.2/15.0	38.2/51.2	51.2/68.1	24	5C	910	1640	52	208/240	1530	1/20	11	20	35	AWG 6	53	
MUH-15-4	480	3Ø	15.0	51.2	18.0	24	5C	910	1640	52	480	1530	1/20	1	20	35	AWG 10	53	
MUH-15-6	600	3Ø	15.0	51.2	14.5	24	5C	910	1640	52	600	1530	1/20	11	20	35	AWG 12	53	
MUH-20-0	208	3Ø	20.0	68.2	96.0	24	5C	1320	2060	48	208	1500	1/10	12	23	41	AWG 4	60	
MUH-20-2	208/240	3Ø	15.0/20.0	51.2/68.2	72.0/96.0	24	5C	1320	2060	48	208/240	1500	1/10	12	23	41	AWG 4	60	
MUH-20-4	480	3Ø	20.0	68.2	24.0	24	5C	1320	2060	48	480	1500	1/10	12	23	41	AWG 10	60	
MUH-20-6	600	3Ø	20.0	68.2	19.3	24	5C	1320	2060	48	600	1500	1/10	12	23	41	AWG 12	60	
MUH-25-2	208/240	3Ø	18.7/25.0	63.8/85.2	82.0/108.0	24	5A	2100/1800	2100/2030	38/44	208/240	1500/1375	1/4	13	23	50	AWG 3	93	
MUH-25-4	480	3Ø	25.0	85.2	30.0	24	5C	2100/1800	2100/2030	38/44	480	1500/1375	1/4	13	23	50	AWG 8	93	
MUH-25-6	600	3Ø	25.0	85.2	24.2	24	5C	2100/1800	2100/2030	38/44	600	1500/1375	1/4	13	23	50	AWG 10	93	
MUH-30-0	208	3Ø	30.0	102.3	144.0	24	5A	2100/1800	2100/2030	45/53	208	1500/1375	1/4	12	20	50	AWG 1	93	
MUH-30-2	208/240	3Ø	22.5/30.0	76.7/102.3	102.3/136.4	24	5A	2100/1800	2100/2030	45/53	208/240	1500/1375	1/4	12	20	60	AWG 2	93	
MUH-30-4	480	3Ø	30.0	102.3	38.0	24	5C	2100/1800	2100/2030	45/53	480	1500/1375	1/4	12	20	60	AWG 6	93	
MUH-30-6	600	3Ø	30.0	102.3	29.0	24	5C	2100/1800	2100/2030	45/53	600	1500/1375	1/4	12	20	60	AWG 8	93	
MUH-40-2	208/240	3Ø	30.0/40.0	102.3/136.4	136.4/181.8	24	5A	3000/2500	3260/2900	42/48	208/240	1525/1420	1/2	15	28	60	AWG 1/0	114	
MUH-40-4	480	3Ø	40.0	136.4	48.0	24	5A	3000/2500	3260/2900	42/48	480	1525/1420	1/2	15	28	60	AWG 4	114	
MUH-40-6	600	3Ø	40.0	136.4	36.7	24	5A	3000/2500	3260/2900	42/48	600	1525/1420	1/2	15	28	60	AWG 6	114	
MUH-50-0	208	3Ø	50.0	170.5	239.0	24	5A	3000/2500	3260/2900	53/61	208	1525/1420	1/2	15	25	60	AWG 4/0	114	
MUH-50-2	208/240	3Ø	37.5/50.0	127.3/170.5	181.2/239.0	24	5A	3000/2500	3260/2900	53/61	208/240	1525/1420	1/2	15	25	60	AWG 3/0	114	
MUH-50-4	480	3Ø	50.0	170.5	60.2	24	5A	3000/2500	3260/2900	53/61	480	1525/1420	1/2	15	25	60	AWG 4	114	
MUH-50-6	600	3Ø	50.0	170.5	48.3	24	5A	3000/2500	3260/2900	53/61	600	1525/1420	1/2	15	25	60	AWG 3	114	

Note

- All standard units are supplied with a low voltage control transformer and contactor (24V) except MUH-03 & 05. 208, 240 & 277 volt models. Low voltage control on these units are available on made to order. All units are also available on special order for 120 volt control. Internal and transformer or external without transformer.
- On dual voltage units, CFM, FPM, and RPM are shown at high voltage.
- On dual phase units, maximum amp draw is listed for respective voltage.
- 25 thru 50 KW models have two speed motors and dual CFM ratings.
- 5A Standard
- 5B Optional, made to order, amp load unbalanced on 3 Phase
- 5C Optional, made to order, amp load balanced on 3 Phase

ACCESSORIES

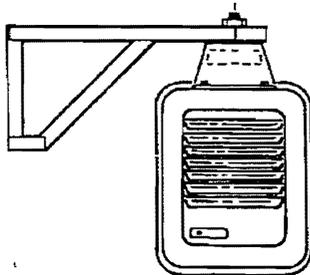
CATALOG #	DESCRIPTION	ELECTRICAL RATING	USE WITH HEATER NO
MT-1	Single Pole Internal Thermostat Temp Range 40°F - 85°F	25A 120 240V A C Res 22A 277V A C Res	All MUH Series Heaters (except MUH05-21 3Ø and MUH025-81 3Ø which use MT 2)
MT-2	Two Stage Internal Thermostat Temp Range 40°F - 85°F	25A, 120 240V A C Res 22A 277V A C Res 125VA Pilot Duty	MUH05-21 3Ø MUH05-81 3Ø MUH-15-8 MUH-20-8 MUH 25-2 MUH-30-2 MUH-30-8 MUH-40-2 MUH-50-2 MUH-50-4 MUH-50-8
MCFS	Internal Summer Fan Switch	6A, 600VA C Res 2 HP 250 480 600V A C 1 2 or 3Ø	All MUH Series Heaters
MRFS-1	Remote Summer Fan Switch (Line Voltage)	2 HP 250-480V A C	All MUH Series Heaters
NRFS-2	Remote Summer Fan Switch with Relay (24V Coil-Single Pole Normally Open)	6 AFL 35 ALR, 250V A C 60 Hz 3 AFL 18 ALR, 480V A C 60 Hz	All MUH Series Heaters (except MUH03-21 MUH03-71 MUH03-81 MUH05-21 MUH05-71 MUH05-81 Units unless optional control transformer is supplied)
MHRT	Heater Recovery Thermostat with Relay (24V Coil-Single Pole Normally Open) Hi — 120°F, Low — 60°F	6 AFL, 35 ALR 250V A C 60 Hz 3 AFL 18 ALR, 480V A C 60 Hz	All MUH Series Heaters (except MUH03-21 MUH03-71 MUH03-81 MUH05-21 MUH05-71 MUH05-81 Units unless optional control transformer is supplied)
MPDS-25	Power Disconnect Switch (3 Pole)	25A 600V A C Res	MUH03-21 MUH03-41 MUH03-71 MUH03-81 MUH05-21 MUH05-41 MUH05-71 MUH05-81 MUH-07-4 MUH-10-4 MUH 15-4 MUH-20-4
MPDS-60	Power Disconnect Switch (3 Pole)	63A 600V A C Res.	MUH-07-02 MUH-07-7 MUH-07-8 MUH-10-2 MUH-10-7 MUH-10-8 MUH-15-2 MUH-15-8 3Ø only MUH-20-2 MUH-20-8 MUH-25-2 MUH-25-4 MUH-30-4 MUH-40-4 MUH 50-4

UNIVERSAL WALL & CEILING BRACKET

CATALOG NO.	USED ON
MMB 10	MUH-03 05 07 & 10
MMB-20	MUH-15 & 20
MMB 30	MUH-25 & 30
MMB 50	MUH-40 & 50

CEILING BRACKET

CATALOG NO.	USED ON
MCMB-10	MUH 03 05 07 & 10
MCMB-20	MUH 15 & 20
MCMB-30	MUH-25 & 30
MCMB-50	MUH-40 & 50

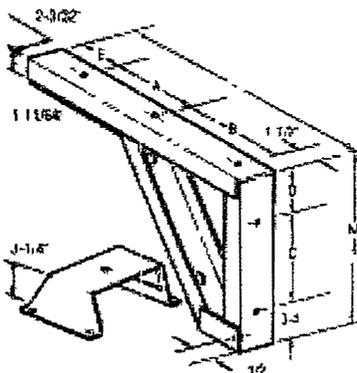


BRACKET SIZE

DIMENSION	3 - 20Kw	25 - 50Kw
A	7 1/4	9 7/8
B	9 1/2	14 3/8
C	7 1/4	12 1/8
D	11 1/4	2 1/16
E	2 1/4	3
L	20 1/2	28 15/16
N	9 15/16	14 15/16
N	3 1/4	4 1/2

OPTIONAL VERTICAL CEILING MOUNTING BRACKET

CATALOG NUMBER	USED ON	STANDARD CAPACITY	WGT. LBS.
MVDMB6	MUH03-20	1	5
MVDMB20	MUH07-20	1	7
MVDMB50	MUH25-50	1	9



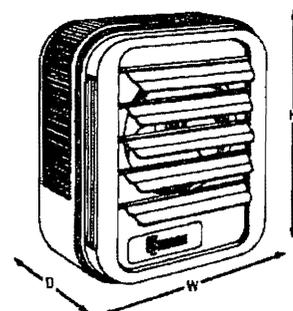
OPTIONAL BUILT-IN CONTROLS AND ACCESSORIES ON MUH HEATERS

FACTORY INSTALLED ONLY††	DESCRIPTION
	MUH-03 & 05 (208 208/240 277V Supp 24 or 120V Control Transformer and Power Contactor 24 or 120V H C Power Contactor)
	MUH-03 & 05 (480V Supply) & MUH-07 thru MUH-50 Optional 120V Control Transformer
	2 Stage Control Elements (See Note 5)
	Manual Reset.
	Protect Mesh (Brd Screen) For all MUH Heaters

††Optional built-in controls and accessories factory installed only Not to be field installed

DIMENSIONS

CAT. NO.	HEIGHT	WIDTH	DEPTH
MUH-03 & 05	16	14	7 1/2"
MUH-07 & 10	21 3/4	18"	7 1/2"
MUH-15 & 20	21 3/4	19	12 3/4
MUH-25 & 30	30	26 3/8	11 3/4
MUH-40 & 50	30"	26 3/8"	17 1/8



MOUNTING LIMITATIONS

Unit heaters should not be used in potentially explosive atmospheres. The finish is not intended for direct salt spray exposure in marine applications or the highly corrosive atmospheres of swimming pools, chemical storage bins, etc. Do not install unit heaters above recommended maximum mounting height. Obstructions must not block unit heater air inlet or discharge. Heaters must be mounted at least 7' above the floor to prevent accidental contact with the heating element or fan blade which could cause injury.



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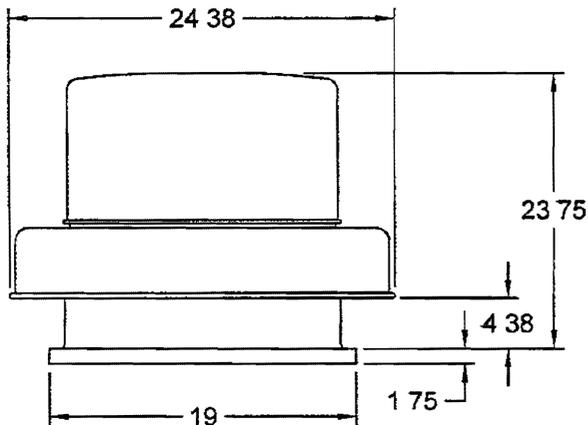
SUBMITTAL

PROJECT Portland International Airport Deicing
LOCATION Portland, OR
ARCHITECT _____
ENGINEER _____
CONTRACTOR Jacobs Heating & A/C
DATE SUBMITTED 10 2 09
CONTRACTOR P O _____
JAirP CONTACT Mike Leavens/Hal Jacklin
MATERIAL SUBMITTED Exhaust Fans/Vents
SPECIFICATIONS 233400

WE ARE PLEASED TO SUBMIT THE FOLLOWING LIST OF EQUIPMENT FOR APPROVAL BASED UPON INFORMATION RECEIVED
WE BELIEVE THIS MATERIAL CONFORMS TO THE SPECIFICATIONS IT SHALL REMAIN THE CONTRACTOR'S RESPONSIBILITY
TO VERIFY SIZES AND QUANTITIES PRIOR TO ORDER RELEASE MATERIAL WILL BE RELEASED TO PRODUCTION UPON
RETURN OF APPROVED SUBMITTALS TO JOHNSON AIR PRODUCTS AT 2220 S E 9TH AVE , PORTLAND OREGON 97214

MANUFACTURER Greenheck

(please see attached literature)



Model: GB-081-6

Belt Drive Centrifugal Roof Exhaust Fan

Tag EF-1

Standard Construction Features.

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Birdscreen - 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

Options & Accessories

Motor with Thermal Overload
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
Roof Curb, GPI-19-G12, Under Sized 1 5 in Total
Damper, WD-100-PB-12X12 Gravity Actuated (Shipped Loose)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	55	77	14 5 x 14 5	12 x 12

Performance

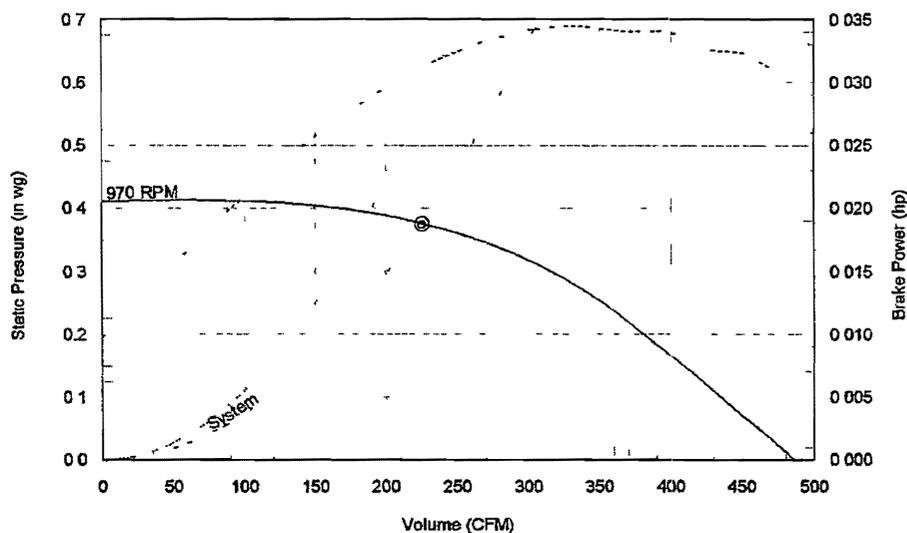
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
225	225	0 375	0 375	970	0 03	0	70

Motor

Motor Mounted	Size (hp)	V/C/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/6	115 / 60 / 1	ODP	1725	1	4 4

Sound Power by Octave Band

Sound Data	62 5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	66	64	61	54	50	45	38	36	57	46	4 2



— RPM Curve
--- System Curve
... Brake Power Curve
Do not select to the left of this surge curve
○ Desired operating point
○ Actual operating point



Notes

All dimensions shown are in units of in.
*FLA based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload, consult factory
LwA - A weighted sound power level, based on ANSI S1 4
dBA - A weighted sound pressure level, based on 11 5 BA attenuation per Octave band at 5 0 ft
Sones - calculated using AMCA 301 at 5 0 ft

Disconnect Switch

Enclosure Rating NEMA-1

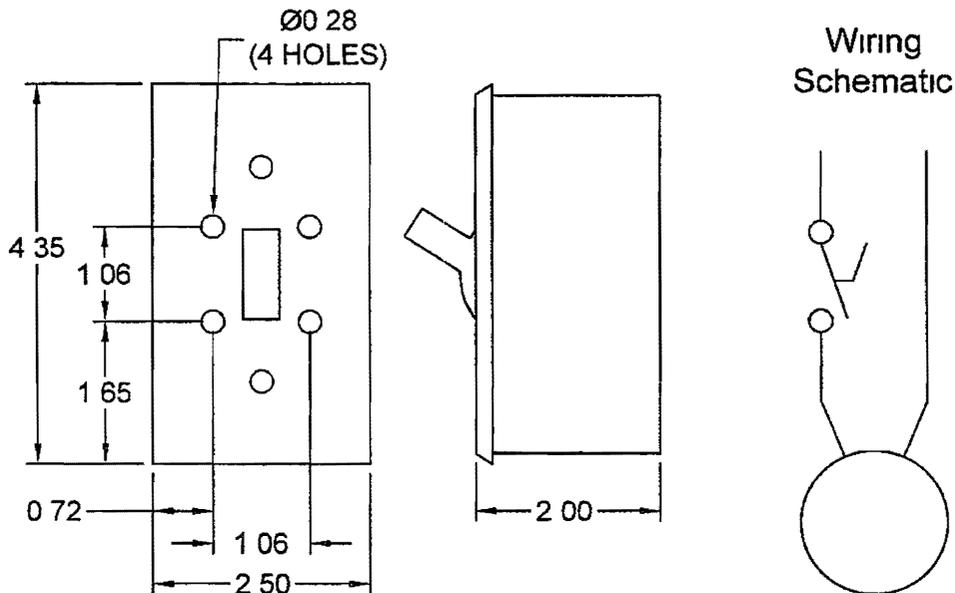
Standard Construction Features

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/6 hp	Voltage	115	UL Listed	Yes
Manufacturer	Pass and Seymour	Cycle	60	Amperage	15	CSA Approved	Yes
Overload Protection	None	Phase	1	Poles	1	Rating	1/2 hp
Mounting	Mounted and Wired	RPM	1725	Wiring (Exp Resist)	None		

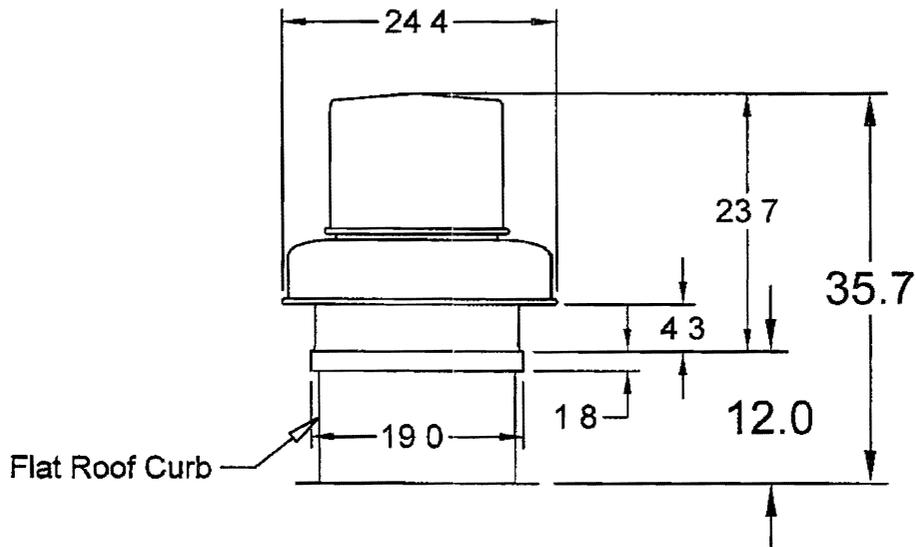
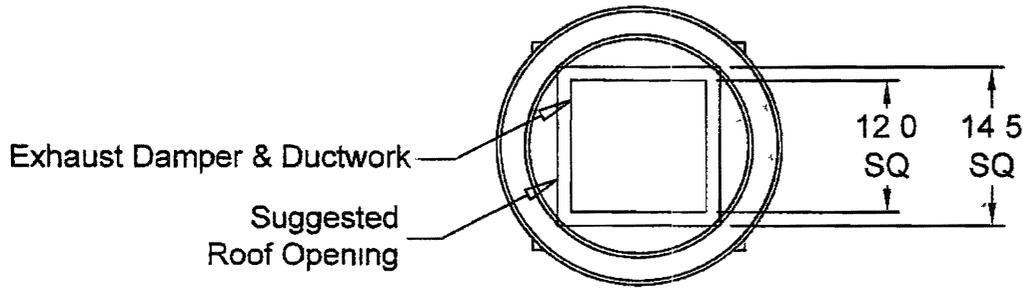
Electrical Drawing Details



Notes: All dimensions shown are in units of in

Assembly Drawing

Type Belt Drive Centrifugal Roof Exhaust Fan



Notes: All dimensions shown are in units of in.
The following accessories ship loose unless otherwise specified: Roof Curb, Curb Extensions, Curb Cap Adaptors, Windband Extensions, Dampers.

Roof Curb

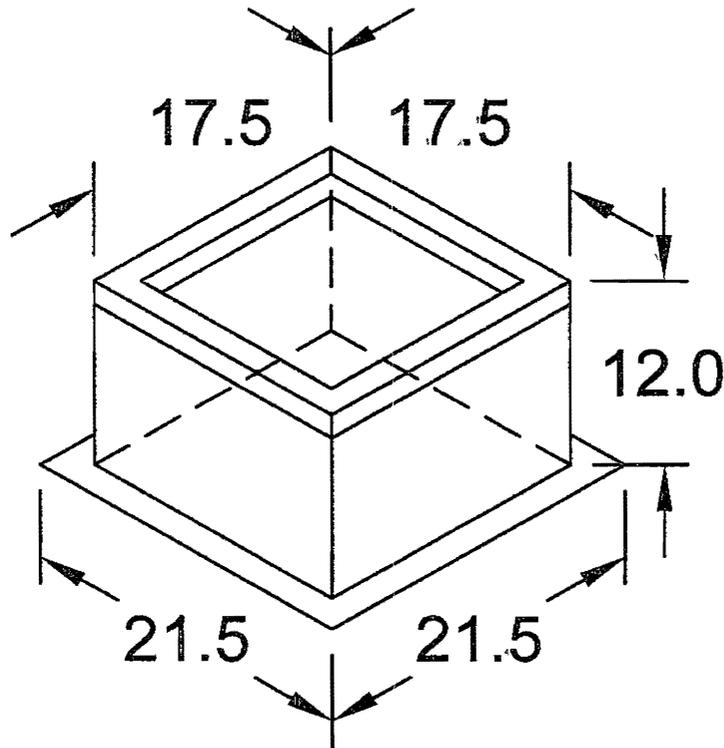
Model GPI

Standard Construction Features.

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Straight Sided without a cant - 2 in mounting flange - 1 in thick 3 lb density insulation - Height - Available from 8 in to 24 in as specified in 0.5 in increments

Notes

- The Maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Tray is optional and must be specified Tray size is same as damper size
- Security Bars are optional and must be specified They are 0.5 in thick steel rods welded 6 in on center and welded to the roof curb when coated with Permatector



ISOMETRIC VIEW

Notes All dimensions shown are in units of in

Horizontal Mount Exhaust Damper

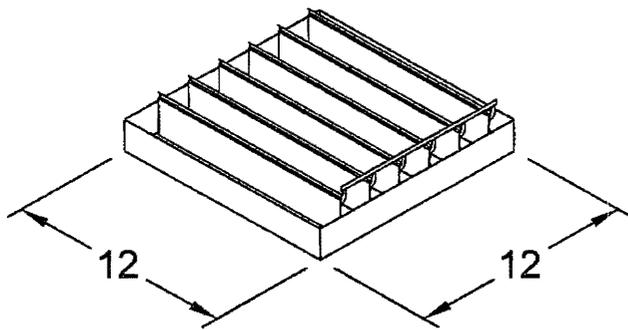
Model WD-100

Standard Construction Features

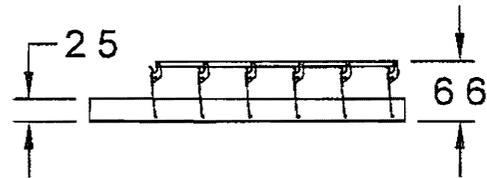
- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge, and spring assisted for ease of opening - Steel axles are 0.188 in diameter zinc plated mounted in acetal bushings
- Synthetic axle bearings

Accessory Configuration

Actuator Type	Gravity
End Switch	No



DAMPER



TYP SECTION VIEW

Notes All dimensions shown are in units of in
Width And height furnished approximately 0.125 in undersize

AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance. Power (BHP/kW) excludes drives.

- 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 - Performance ratings do not include the effects of appurtenances (accessories) in the airstream - The sound ratings shown are loudness values in fan sones at 5 ft (1.5 m) in a hemispherical free field calculated per AMCA Standard 301 - Values shown are for installation type A free inlet fan sone levels - The AMCA Certified Ratings Seal applies to sone ratings only



TAUB

Tube Axial Upblast Belt Drive

Tag EF-2

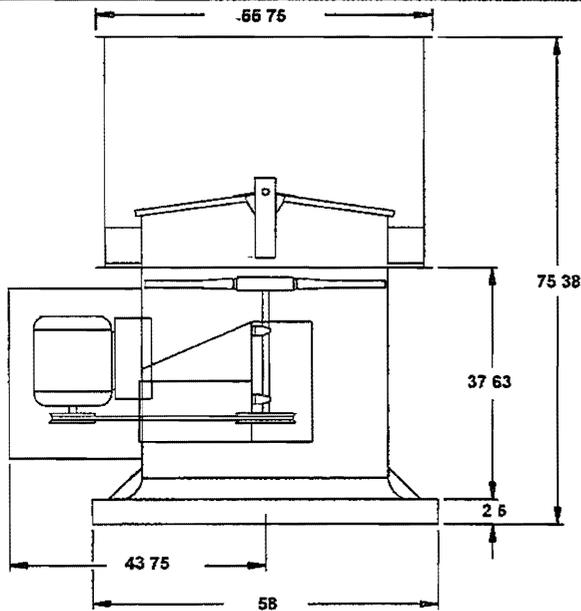
STANDARD CONSTRUCTION FEATURES

HOUSING Curb cap, windband motor cover and fan tube are heavy gauge coated steel • Butterfly dampers • Adjustable motor plate • Ball bearing motor • Corrosion resistant fasteners
BEARINGS, SHAFT, AND PROPELLER Heavy duty, self-aligning pillow block bearings • Extended lube lines • Polished, solid steel shaft • Welded and painted steel propeller
DRIVES Variable pitch motor pulley on sizes 24-42, fixed pitch motor pulley on sizes 48-60, fixed pitch fan shaft pulley and static free belts

SELECTED OPTIONS & ACCESSORIES

Curb GPI-58-G12
 Aluminum Butterfly Dampers
 UL/cUL-705 - "Power Ventilators"
 Inlet Guard

Non-Standard Motor



NOTES All dimensions shown are in units of inches
 Fan weight is without motors and accessories

DIMENSIONS

Approx Fan Weight (lb)	Recommended Roof/Wall Opening (in)
920	50 5 x 50 5

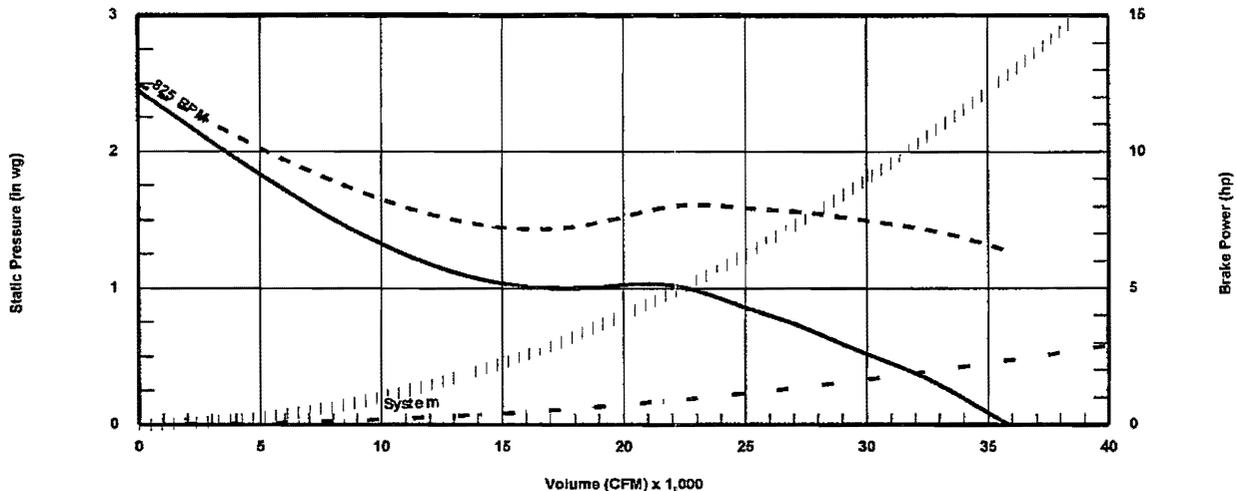
PERFORMANCE (Elevation ft = 0 Airstream Temperature F = 70)

Qty	Model	Volume (CFM)	SP (in wg)	FRPM	Operating Power (hp)	Motor Information				
						Size (hp)	VIC/P	Encl	Motor RPM	Windings
2	TAUB-48H-75	32,000	0 375	825	7 23	7 1/2	460/60/3	ODP	1725/860	2

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62 5	125	250	500	1000	2000	4000	8000			
102	103	101	95	91	87	83	79	98	87	54

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 0 ft. Sones calculated using AMCA 301 at 5 0 ft.



— RPM Curve
 - - - System Curve
 - - - Brake Power Curve
 | | | | | Do not select to the left of this surge curve



AMCA



AMCA Licensed for Sound and Air Performance Power (BHP/kW) excludes drives

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) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories) in the airstream. The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type A. free inlet fan sone levels. The AMCA Certified Ratings Seal applies to some ratings only.

GPI Roof Curb

STANDARD CONSTRUCTION FEATURES

- Welded Aluminum (0.064 in) or galvanized (18 ga) construction
- Straight sided
- 2 in roof mounting flange
- 1 in 3# density insulation
- Wood nailer

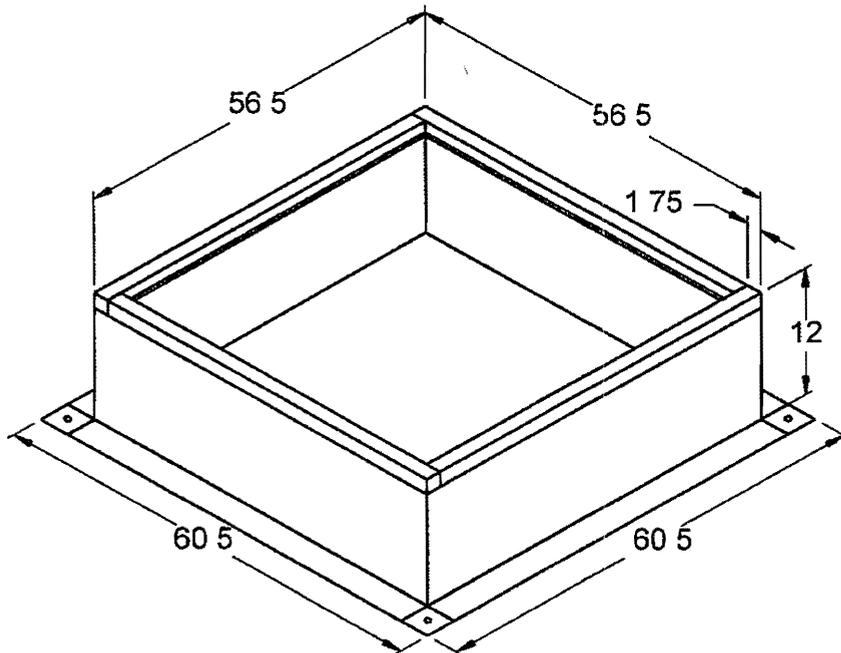
Roof Opening - The Maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in. With dampers, the Minimum roof opening dimension should be at least 2.5 in more than the damper dimension.

NOTES

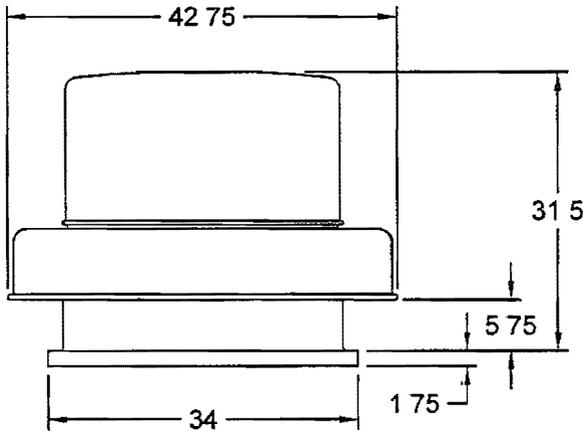
* The Roof Opening Dimension may NOT be the Structural Opening Dimension

* Maximum single piece shipping length is 76"

* Security Bars are optional and must be specified. They are 0.5 in steel, and will be placed 6 in on center. These bars are welded to the frame, and the frame is welded to the curb. To prevent corrosion, they are coated with Greenheck's high performance Permatector coating. Security Bars are in lieu of damper and damper tray.



NOTES: All dimensions shown are in units of inches



Model: GB-220-5

Belt Drive Centrifugal Roof Exhaust Fan
Tag EF-3

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Birdscreen - 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

Options & Accessories*

- Premium/NEMA Premium Efficiency Motor
- Motor with Thermal Overload
- UL/cUL 705 Listed - "Power Ventilators"
- Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
- Roof Curb, GPI-34-G12, Under Sized 1 5 in Total
- Damper, WD-100-PB-24X24, Gravity Actuated (Shipped Loose)
- Bearings w/Grease Fittings, L10 life of 100,000hrs (L50 Ave Life 500,000hrs)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	114	157	26 5 x 26 5	24 x 24

Performance

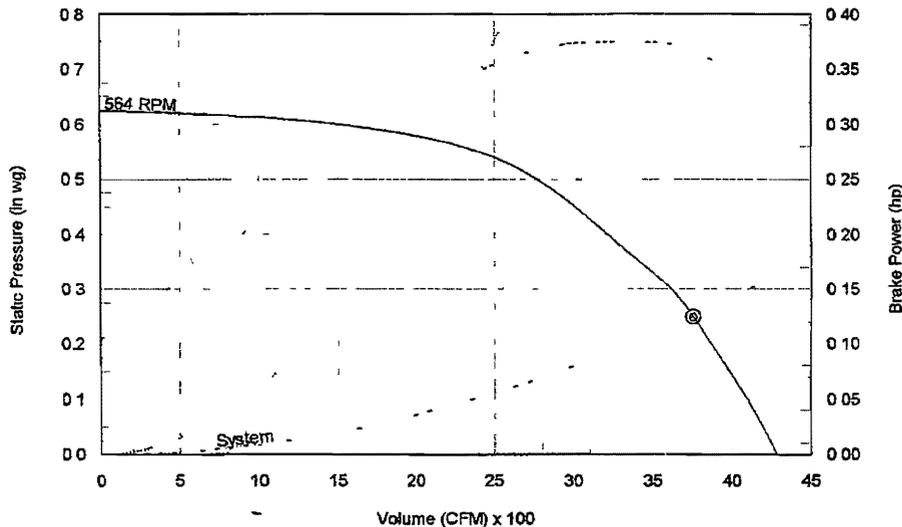
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
3 750	3,750	0 25	0 25	564	0 37	0	70

Motor

Motor Mounted	Size (hp)	VIC/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/2	460 / 60 / 3	ODP	1725	1	1 1

Sound Power by Octave Band

Sound Data	62 5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	74	81	71	64	62	59	52	46	70	58	10 0



Notes

All dimensions shown are in units of in
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload consult factory
LwA - A weighted sound power level based on ANSI S1 4 dBA A weighed sound pressure level based on 11 5 BA attenuation per Octave band at 5 0 ft
Sones - calculated using AMCA 301 at 5 0 ft

— RPM Curve
— System Curve
— Brake Power Curve
--- Do not select to the left of this surge curve
○ Desired operating point
⊙ Actual operating point

Disconnect Switch

Enclosure Rating NEMA-1

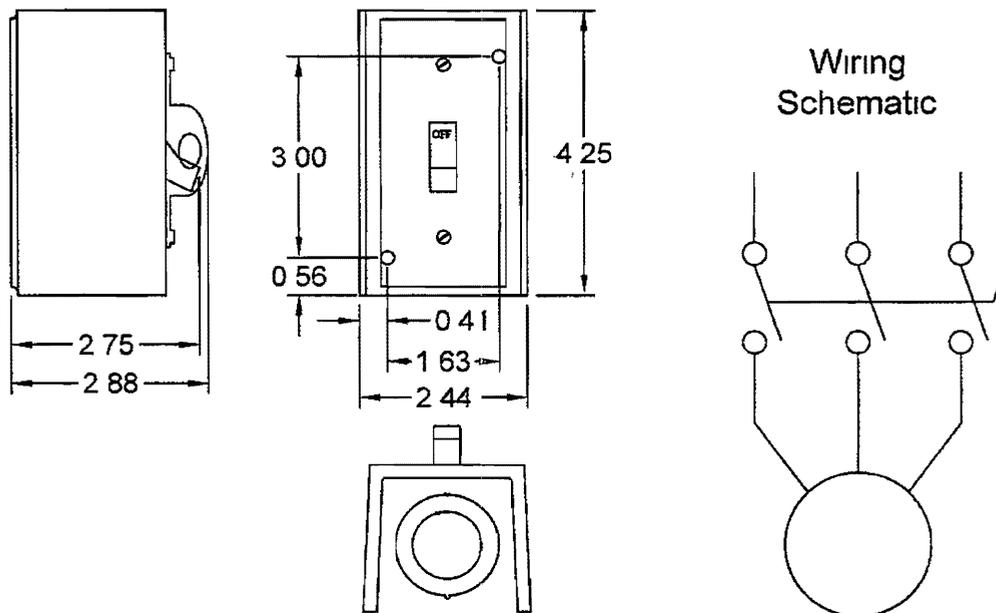
Standard Construction Features:

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/2 hp	Voltage	460	UL Listed	Yes
Manufacturer	Square D	Cycle	60	Amperage	30	CSA Approved	No
Overload Protection	None	Phase	3	Poles	3	Rating	10 hp
Mounting	Mounted and Wired	RPM	1725	Wiring (Exp Resist)	None		

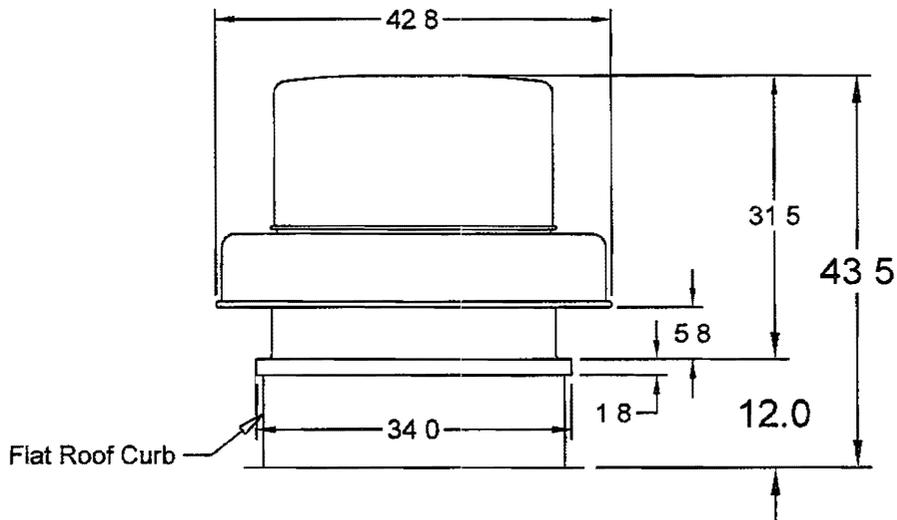
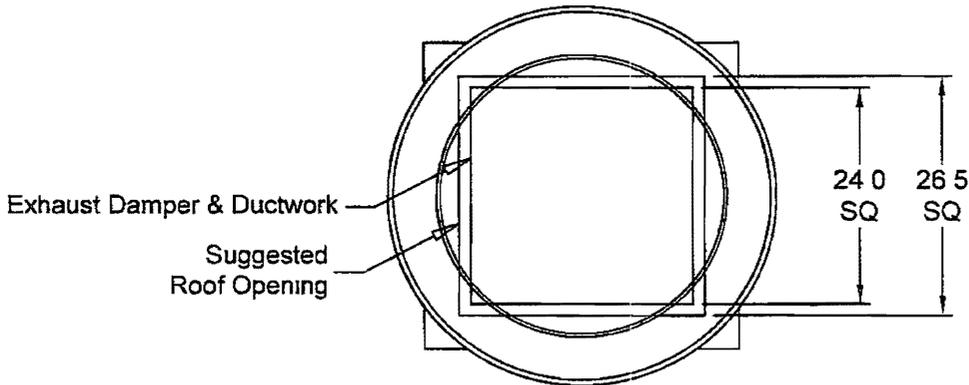
Electrical Drawing Details



Notes: All dimensions shown are in units of in

Assembly Drawing

Type Belt Drive Centrifugal Roof Exhaust Fan



Notes: All dimensions shown are in units of in.
The following accessories ship loose unless otherwise specified, Roof Curb, Curb Extensions, Curb Cap Adaptors, Windband Extensions, Dampers

Roof Curb

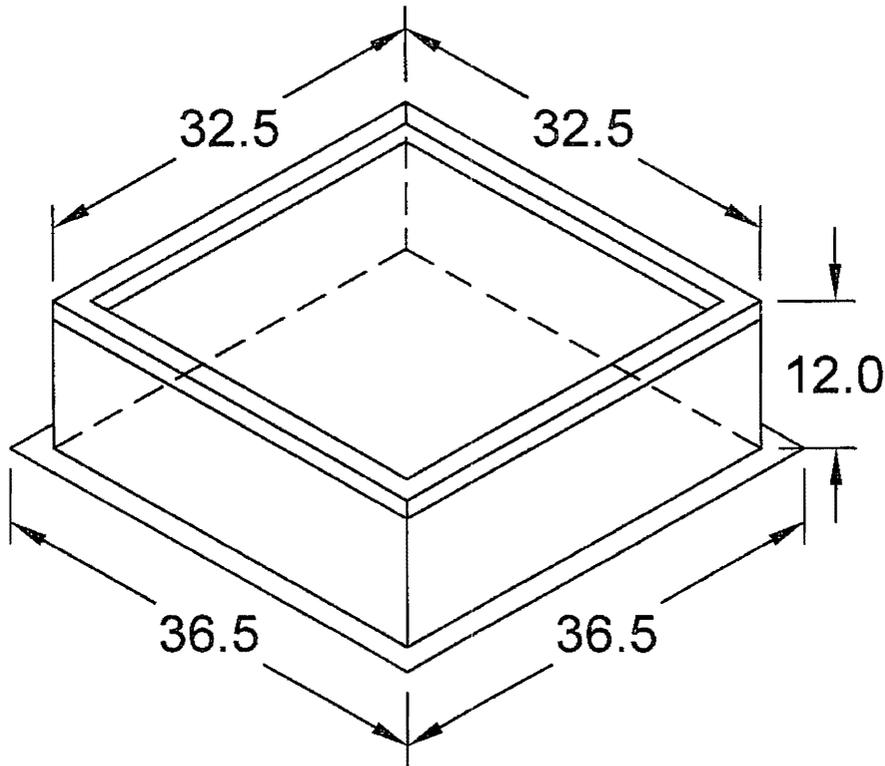
Model GPI

Standard Construction Features

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Straight Sided without a cant - 2 in mounting flange - 1 in thick 3 lb density insulation - Height - Available from 8 in to 24 in as specified in 0.5 in increments

Notes

- The Maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Tray is optional and must be specified Tray size is same as damper size
- Security Bars are optional and must be specified They are 0.5 in thick steel rods welded 6 in on center and welded to the roof curb when coated with Permatector



ISOMETRIC VIEW

Notes All dimensions shown are in units of in

Horizontal Mount Exhaust Damper

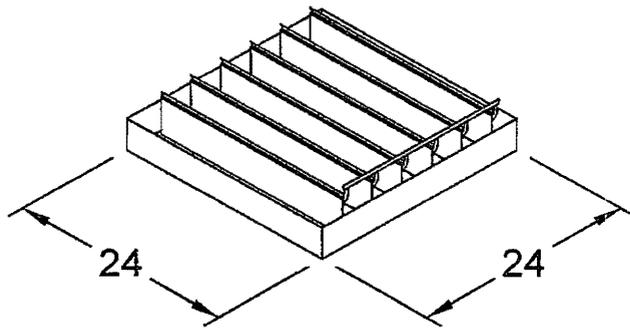
Model WD-100

Standard Construction Features.

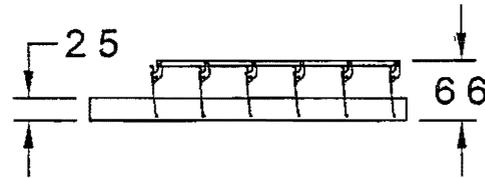
- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge, and spring assisted for ease of opening - Steel axles are 0.188 in diameter zinc plated mounted in acetal bushings
- Synthetic axle bearings

Accessory Configuration

Actuator Type	Gravity
End Switch	No



DAMPER



TYP SECTION VIEW

Notes All dimensions shown are in units of in
Width And height furnished approximately 0.125 in undersize

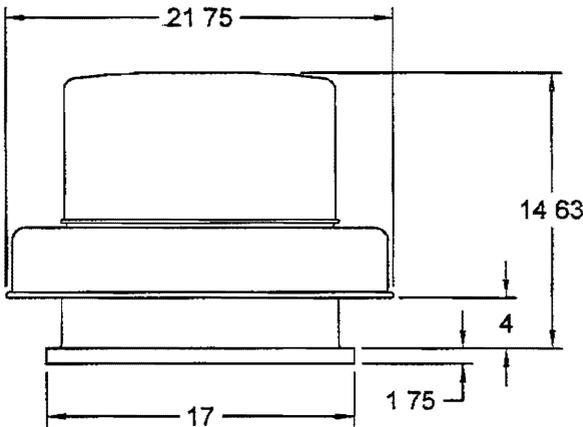
AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance. Power (BHP/kW) excludes drives.

- 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 - Performance ratings do not include the effects of appurtenances (accessories) in the airstream - The sound ratings shown are loudness values in fan sones at 5 ft (1.5 m) in a hemispherical free field calculated per AMCA Standard 301 - Values shown are for installation type A free inlet fan sone levels - The AMCA Certified Ratings Seal applies to sone ratings only





Model: G-080-G

Direct Drive Centrifugal Roof Exhaust Fan

Tag EF-4

Standard Construction Features

- Aluminum housing - Backward inclined wheel - Aluminum curb cap with prepunched mounting holes - Birdscreen - Ball bearing motors (sizes 100-180), sleeve bearing motors (sizes 60-95) - Motor isolated on shock mounts - Corrosion resistant fasteners

Options & Accessories

UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
Roof Curb, GPI-17-G12, Under Sized 1 5 in Total
Damper, WD-100-PB-10X10, Gravity Actuated (Shipped Loose)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	17	36	12.5 x 12.5	10 x 10

Performance

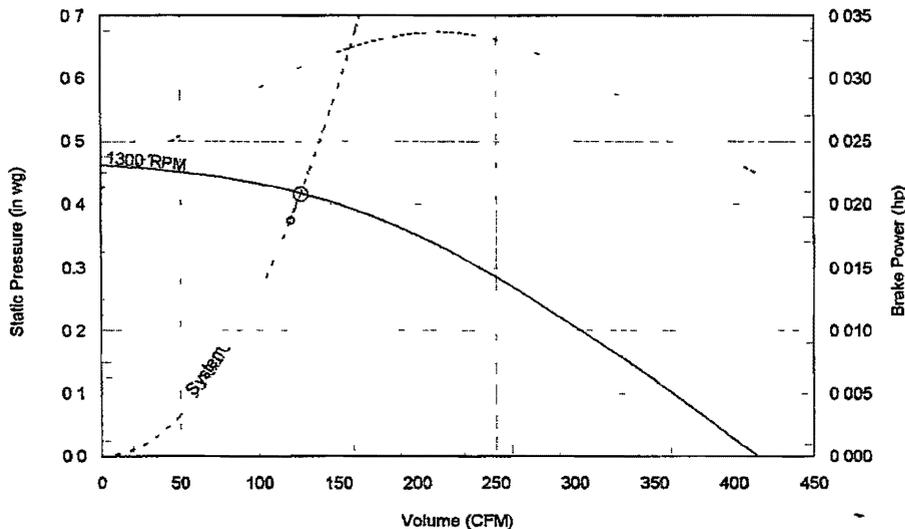
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
120	126	0.375	0.416	1,300	0.03	0	70

Motor

Motor Mounted	Size (hp)	V/C/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/30	115 / 60 / 1	ODP	1300	1	NA

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	71	74	64	58	53	50	40	40	62	51	6.1



Notes

All dimensions shown are in units of in.
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload consult factory.
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 BA attenuation per Octave band at 5.0 ft
Sones - calculated using AMCA 301 at 5.0 ft

Disconnect Switch

Enclosure Rating NEMA-1

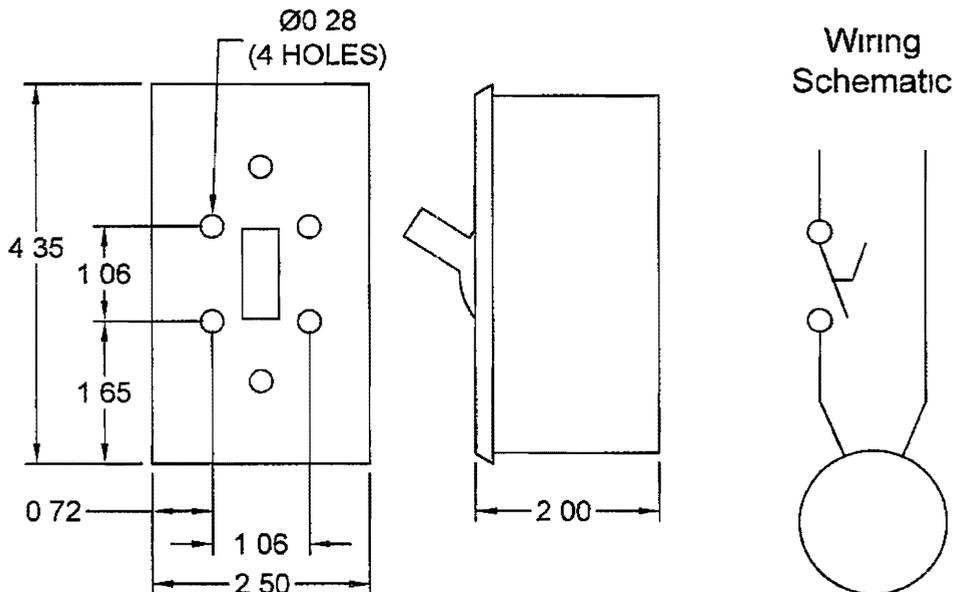
Standard Construction Features:

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/30 hp	Voltage	115	UL Listed	Yes
Manufacturer	Pass and Seymour	Cycle	60	Amperage	15	CSA Approved	Yes
Overload Protection	None	Phase	1	Poles	1	Rating	1/2 hp
Mounting	Mounted and Wired	RPM	1300	Wiring (Exp Resist)	None		

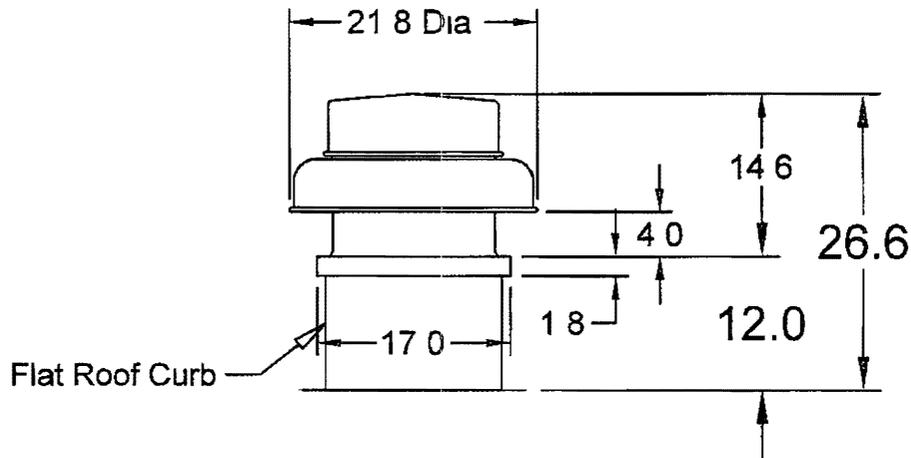
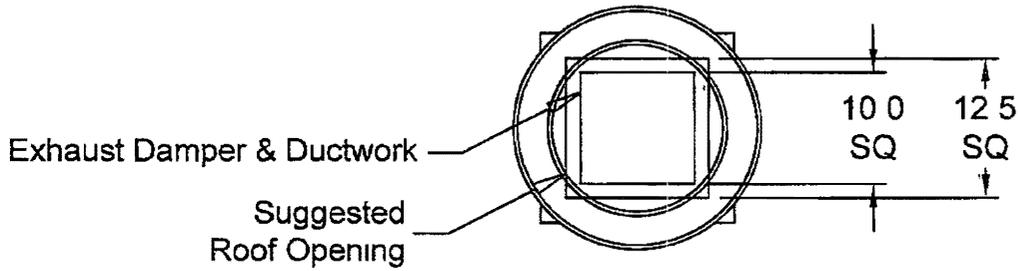
Electrical Drawing Details



Notes: All dimensions shown are in units of in

Assembly Drawing

Type Direct Drive Centrifugal Roof Exhaust Fan



Notes All dimensions shown are in units of in
The following accessories ship loose unless otherwise specified Roof Curb Curb
Extensions, Curb Cap Adaptors, Windband Extensions, Dampers

Roof Curb

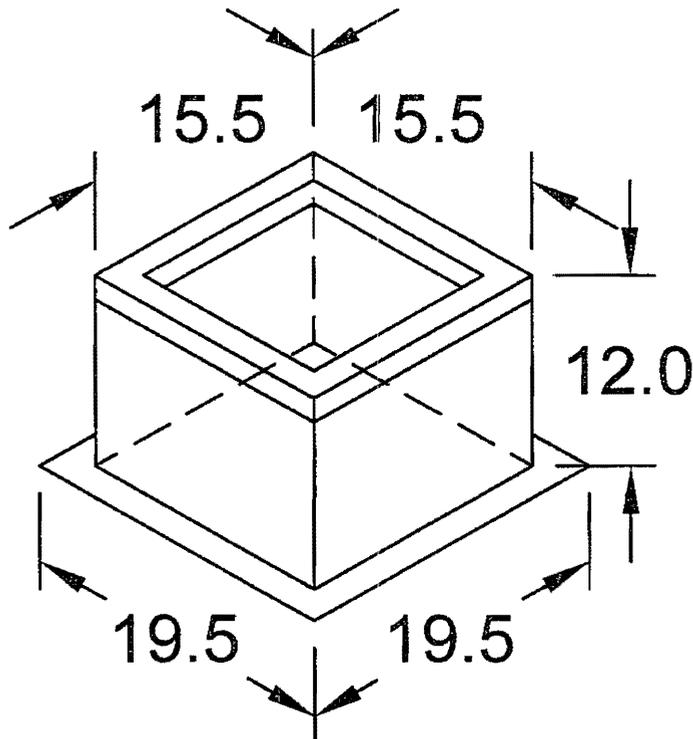
Model GPI

Standard Construction Features.

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Straight Sided without a cant - 2 in mounting flange - 1 in thick .3 lb density insulation - Height - Available from 8 in to 24 in as specified in 0.5 in increments

Notes

- The Maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Tray is optional and must be specified Tray size is same as damper size
- Security Bars are optional and must be specified They are 0.5 in thick steel rods welded 6 in on center and welded to the roof curb when coated with Permatector



ISOMETRIC VIEW

Notes All dimensions shown are in units of in

Horizontal Mount Exhaust Damper

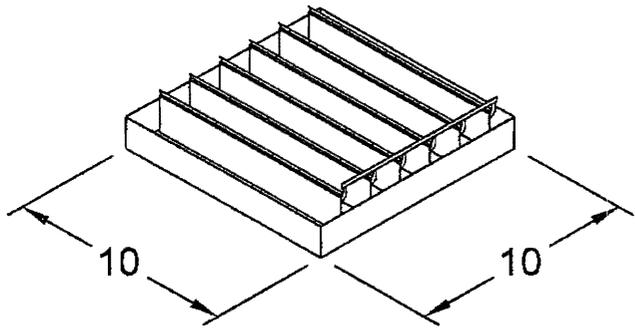
Model WD-100

Standard Construction Features

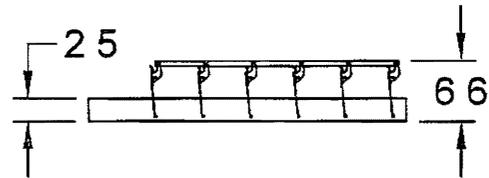
- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge, and spring assisted for ease of opening - Steel axles are 0.188 in diameter zinc plated mounted in acetal bushings - Synthetic axle bearings

Accessory Configuration

Actuator Type Gravity
End Switch No



DAMPER



TYP SECTION VIEW

Notes: All dimensions shown are in units of in
Width And height furnished approximately 0.125 in undersize

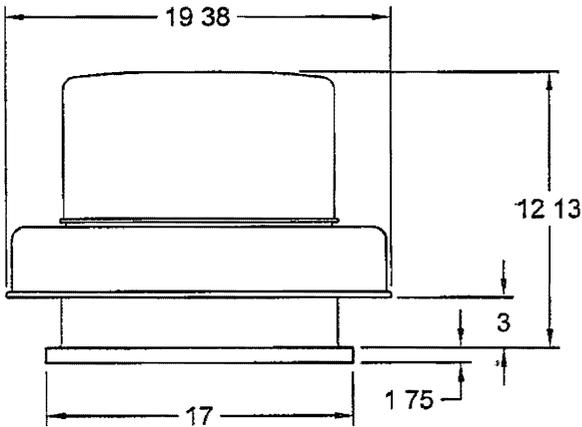
AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance. Power (BHP/kW) excludes drives.

- 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 - Performance ratings do not include the effects of appurtenances (accessories) in the airstream - The sound ratings shown are loudness values in fan sones at 5 ft (1.5 m) in a hemispherical free field calculated per AMCA Standard 301 - Values shown are for installation type A free inlet fan sone levels - The AMCA Certified Ratings Seal applies to sone ratings only





Model: G-060-G

Direct Drive Centrifugal Roof Exhaust Fan

Tag EF-5

Standard Construction Features

- Aluminum housing - Backward inclined wheel - Aluminum curb cap with prepunched mounting holes - Birdscreen - Ball bearing motors (sizes 100-180), sleeve bearing motors (sizes 60-95) - Motor isolated on shock mounts - Corrosion resistant fasteners

Options & Accessories

- Motor with Thermal Overload
- UL/cUL 705 Listed - "Power Ventilators"
- Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
- Roof Curb, GPI-17-G12, Under Sized 1 5 in Total
- Damper, WD-90-PB-8X8, Gravity Actuated (Shipped Loose)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	12	30	10 5 x 10 5	8 x 8

Performance

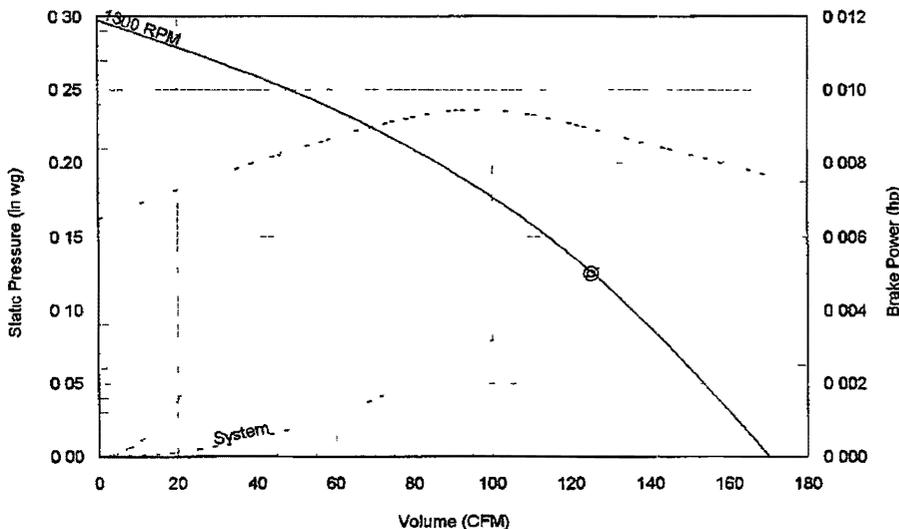
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
125	125	0 125	0 125	1 300	0 01	0	70

Motor

Motor Mounted	Size (hp)	VIC/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/100	115 / 60 / 1	ODP	1300	1	NA

Sound Power by Octave Band

Sound Data	62 5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	55	58	55	45	46	46	36	29	52	41	2 7



Notes

All dimensions shown are in units of in
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload, consult factory
LwA - A weighted sound power level based on ANSI S1 4
dBA - A weighted sound pressure level based off 11 5 BA attenuation per Octave band at 5 0 ft
Sones - calculated using AMCA 301 at 5 0 ft

— RPM Curve
- - - System Curve
· · · Brake Power Curve
Do not select to the left of this surge curve
○ Desired operating point
○ Actual operating point

Disconnect Switch

Enclosure Rating NEMA-1

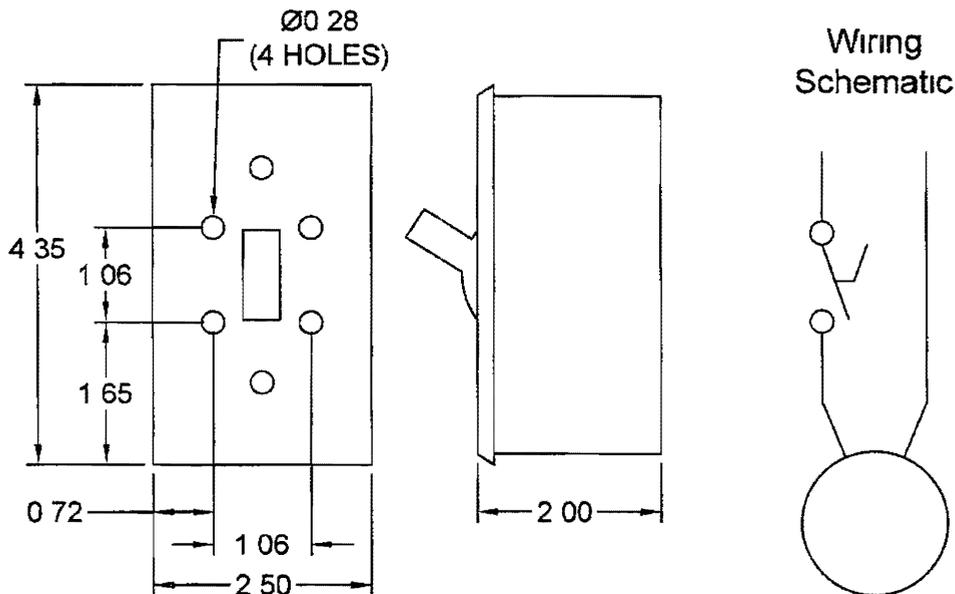
Standard Construction Features

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/100 hp	Voltage	115	UL Listed	Yes
Manufacturer	Pass and Seymour	Cycle	60	Amperage	15	CSA Approved	Yes
Overload Protection	None	Phase	1	Poles	1	Rating	1/2 hp
Mounting	Mounted and Wired	RPM	1300	Wiring (Exp Resist)	None		

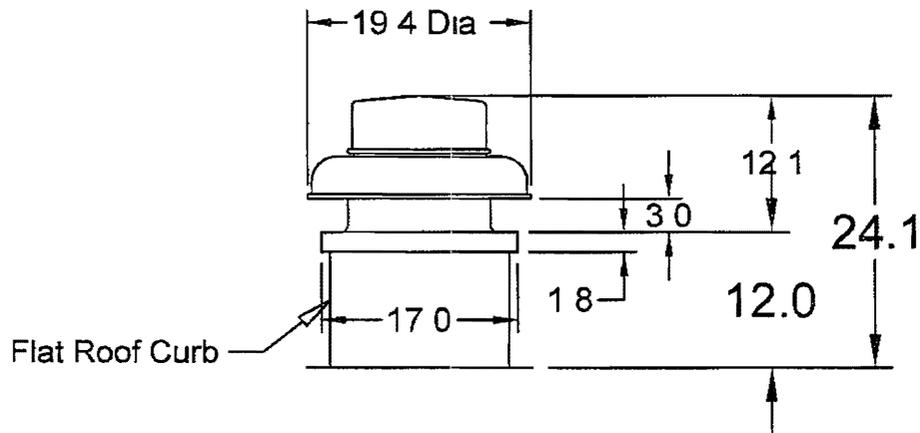
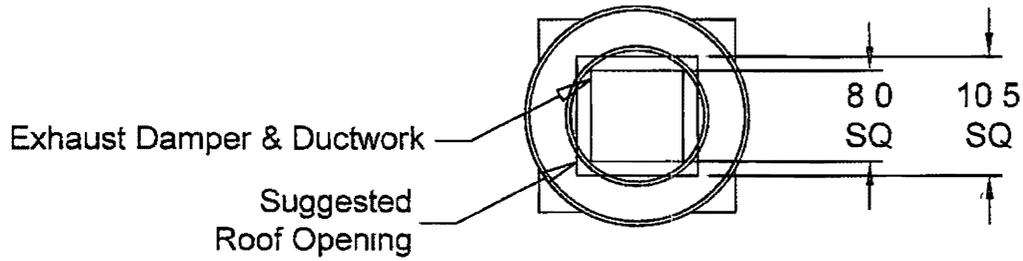
Electrical Drawing Details



Notes: All dimensions shown are in units of in

Assembly Drawing

Type Direct Drive Centrifugal Roof Exhaust Fan



Notes All dimensions shown are in units of in
The following accessories ship loose unless otherwise specified, Roof Curb, Curb
Extensions, Curb Cap Adaptors, Windband Extensions, Dampers

Roof Curb

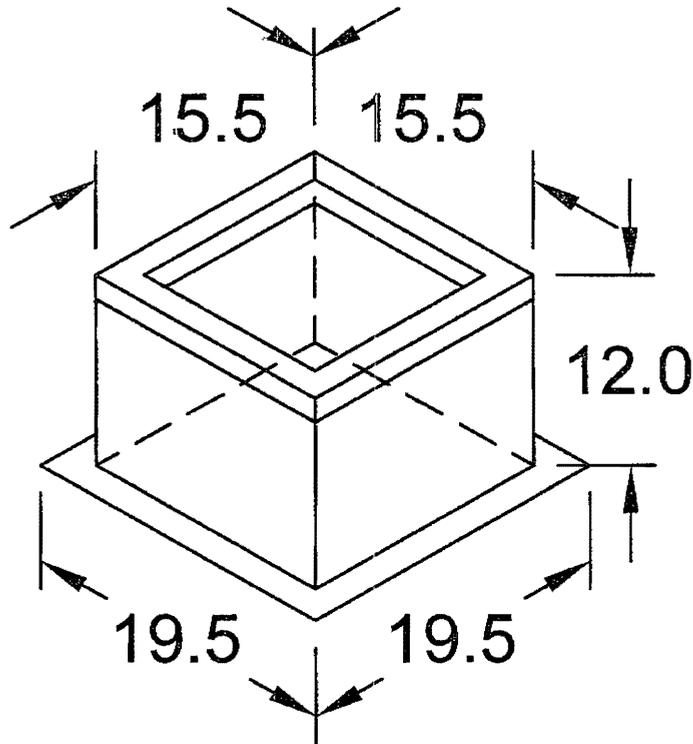
Model GPI

Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof-support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Straight Sided without a cant - 2 in mounting flange - 1 in thick 3 lb density insulation - Height - Available from 8 in to 24 in as specified in 0.5 in increments

Notes

- The Maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Tray is optional and must be specified Tray size is same as damper size
- Security Bars are optional and must be specified They are 0.5 in thick steel rods welded 6 in on center and welded to the roof curb when coated with Permatector



ISOMETRIC VIEW

Notes All dimensions shown are in units of in

Horizontal Mount Exhaust Damper

Model WD-90

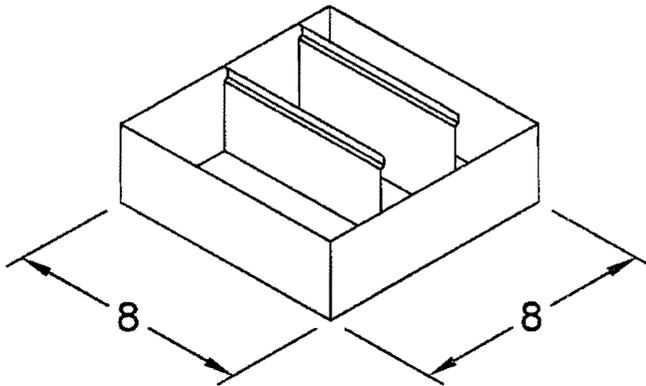
Standard Construction Features

- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge - Steel axles are 0.188 in diameter zinc plated steel - Synthetic axle bushings

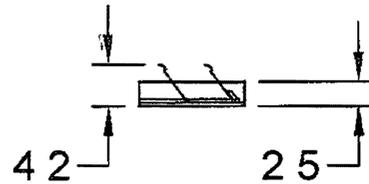
NOTE This damper is only available in an 8 in x 8 in size

Accessory Configuration

Actuator Type Gravity



DAMPER



TYP SECTION VIEW

Notes All dimensions shown are in units of in
Width And height furnished approximately 0.125 in undersize

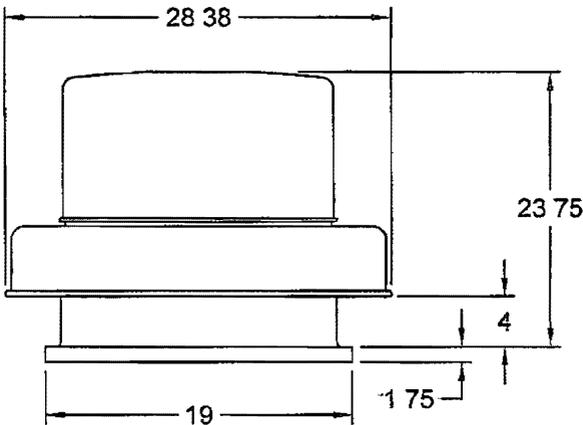
AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance. Power (BHP/kW) excludes drives.

- 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 - Performance ratings do not include the effects of appurtenances (accessories) in the airstream - The sound ratings shown are loudness values in fan sones at 5 ft (1.5 m) in a hemispherical free field calculated per AMCA Standard 301 - Values shown are for installation type A free inlet fan sone levels - The AMCA Certified Ratings Seal applies to sone ratings only





Model: GB-131-5

Belt Drive Centrifugal Roof Exhaust Fan

Tag EF-I

Standard Construction Features.

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Birdscreen - 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

Options & Accessories

Motor with Thermal Overload
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
Roof Curb, GPIP-19-G12, Under Sized 1 5 in Total, 4 12 Pitch
Damper, WD-100-PB-12X12, Gravity Actuated (Shipped Loose)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	65	90	14 5 x 14 5	12 x 12

Performance

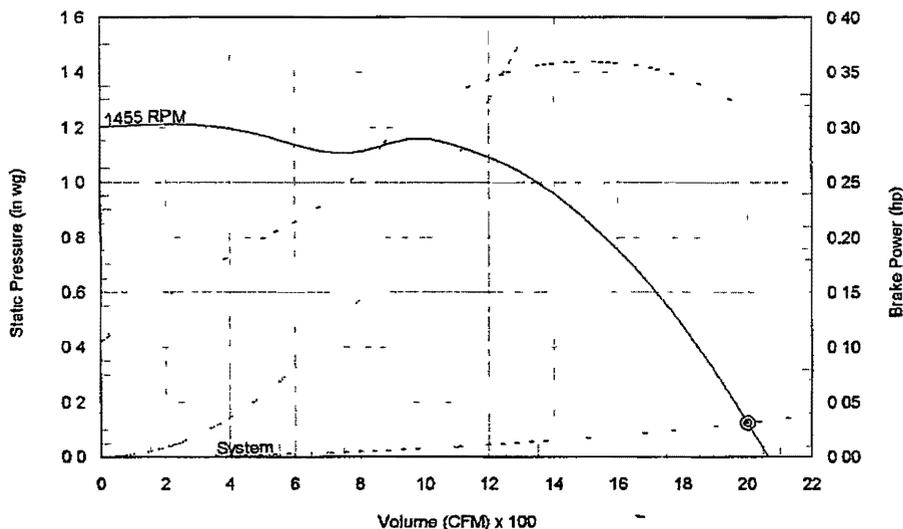
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
2,000	2 000	0 125	0 125	1,455	0 32	0	70

Motor

Motor Mounted	Size (hp)	V/C/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/2	115 / 60 / 1	ODP	1725	1	9 8

Sound Power by Octave Band

Sound Data	62 5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	76	78	83	74	69	68	64	59	78	66	15 2



Notes:

All dimensions shown are in units of in
*FLA based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload consult factory
LwA A weighted sound power level based on ANSI S1 4
dBA A weighted sound pressure level, based on 11 5 BA attenuation per Octave band at 5 0 ft
Sones - calculated using AMCA 301 at 5 0 ft

--- RPM Curve
--- System Curve
--- Brake Power Curve
--- Do not select to the left of this surge curve
○ Desired operating point
○ Actual operating point

Disconnect Switch

Enclosure Rating NEMA-1

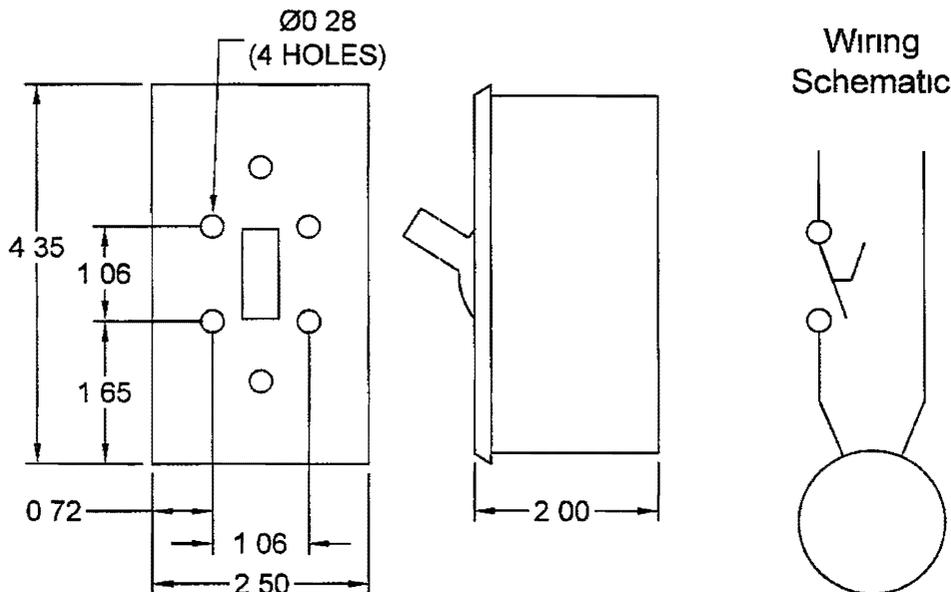
Standard Construction Features

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/2 hp	Voltage	115	UL Listed	Yes
Manufacturer	Pass and Seymour	Cycle	60	Amperage	15	CSA Approved	Yes
Overload Protection	None	Phase	1	Poles	1	Rating	1/2 hp
Mounting	Mounted and Wired	RPM	1725	Wiring (Exp Resist)	None		

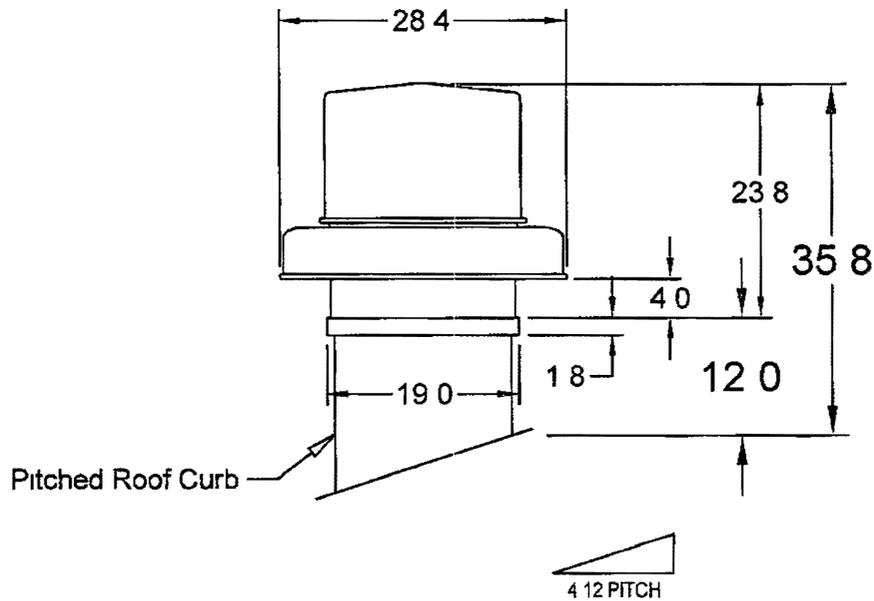
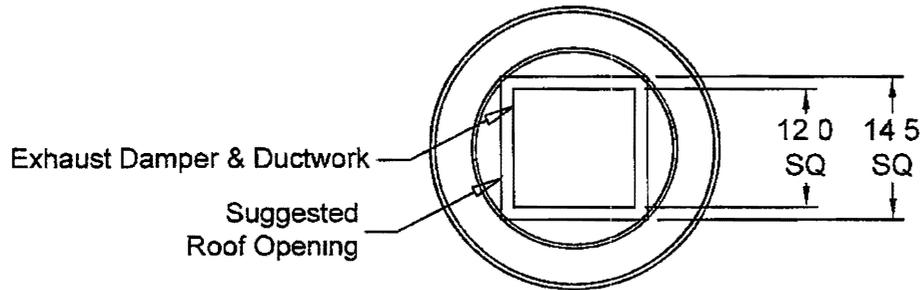
Electrical Drawing Details



Notes: All dimensions shown are in units of in.

Assembly Drawing

Type Belt Drive Centrifugal Roof Exhaust Fan



Notes: All dimensions shown are in units of in.
The following accessories ship loose unless otherwise specified: Roof Curb, Curb Extensions, Curb Cap Adaptors, Windband Extensions, Dampers

Pitched Roof Curb

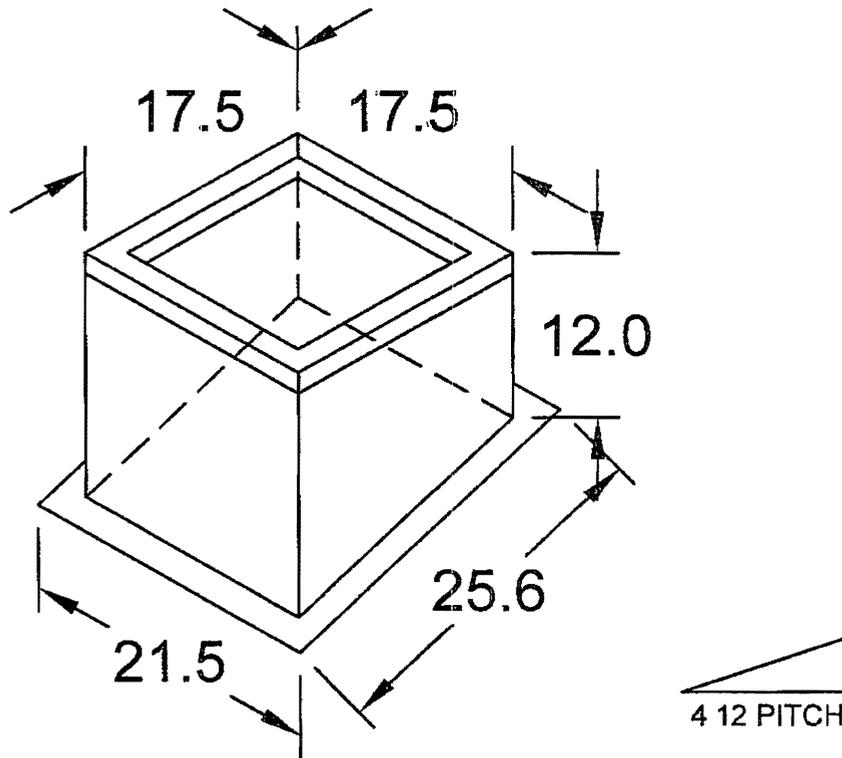
Model GPIIP

Standard Construction Features

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Designed for pitched roofs - Straight sided without a cant - Wood nailer for attachment of roof flashing material - 2 in mounting flange - 1 in thick 3 lb density insulation - Height - Available from 12 in to 24 in as specified in 0.5 in increments

Notes

- The maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Trays are not available on pitched curbs
- The drawing shown is for Short Pitch Run. If Long Pitch Run is selected, the Actual W and L and Flange W and L on the curb drawing would be reversed



ISOMETRIC VIEW

Notes: All dimensions shown are in units of in.

Horizontal Mount Exhaust Damper

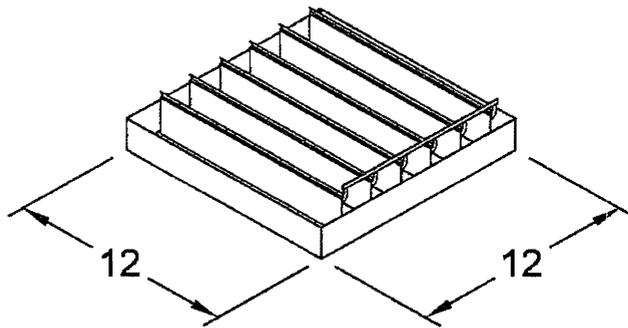
Model WD-100

Standard Construction Features:

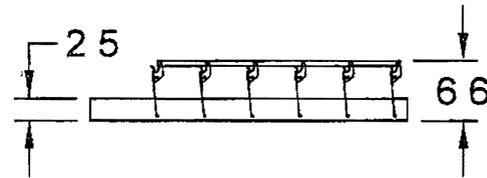
- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge, and spring assisted for ease of opening - Steel axles are 0.188 in diameter zinc plated mounted in acetal bushings - Synthetic axle bearings

Accessory Configuration

Actuator Type	Gravity
End Switch	No



DAMPER



TYP SECTION VIEW

Notes All dimensions shown are in units of in
Width And height furnished approximately 0.125 in undersize

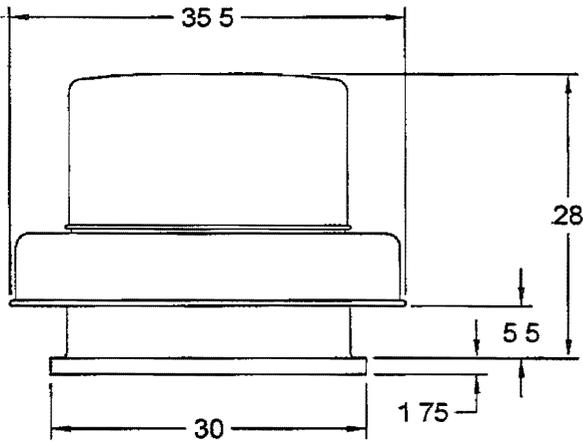
AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance Power (BHP/kW) excludes drives.

- 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 - Performance ratings do not include the effects of appurtenances (accessories) in the airstream - The sound ratings shown are loudness values in fan sones at 5 ft (1.5 m) in a hemispherical free field calculated per AMCA Standard 301 - Values shown are for installation type A free inlet fan sone levels - The AMCA Certified Ratings Seal applies to sone ratings only





Model: GB-180-5

Belt Drive Centrifugal Roof Exhaust Fan

Tag EF-N

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Birdscreen - 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

Options & Accessories

Motor with Thermal Overload
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
Roof Curb, GPIP-30-G12 Under Sized 1.5 in Total, 4 1/2 Pitch
Damper, WD-100-PB-18X18, Gravity Actuated (Shipped Loose)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	92	131	20.5 x 20.5	18 x 18

Performance

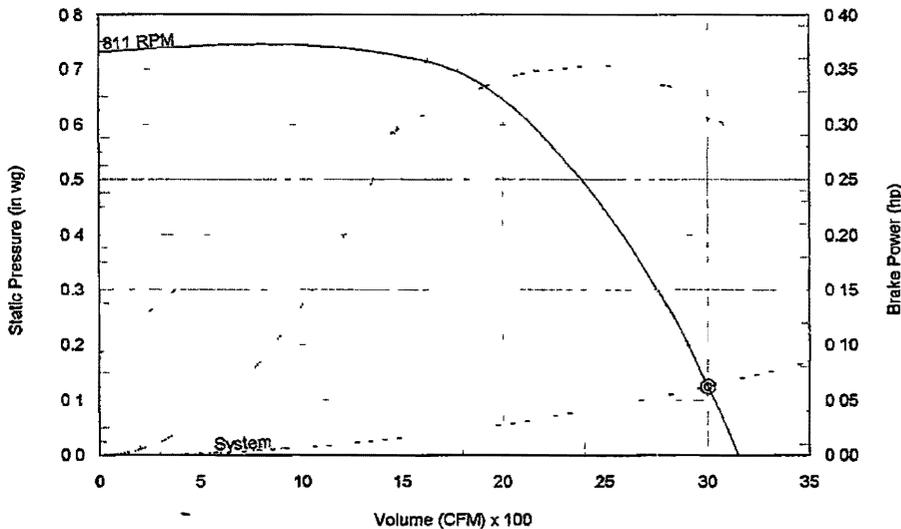
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
3,000	3,000	0.125	0.125	811	0.31	0	70

Motor

Motor Mounted	Size (hp)	V/C/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/2	115 / 60 / 1	ODP	1725	1	9.8

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	74	78	73	68	67	65	52	47	72	61	10.1



Notes

All dimensions shown are in units of in.
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload - consult factory.
LwA - A weighted sound power level based on ANSI S1.4
dBA - A weighted sound pressure level based on 11.5 BA attenuation per Octave band at 5.0 ft.
Sones - calculated using AMCA 301 at 5.0 ft.

— RPM Curve
- - - System Curve
- - - Brake Power Curve
Do not select to the left of this surge curve
○ Desired operating point
○ Actual operating point

Disconnect Switch

Enclosure Rating NEMA-1

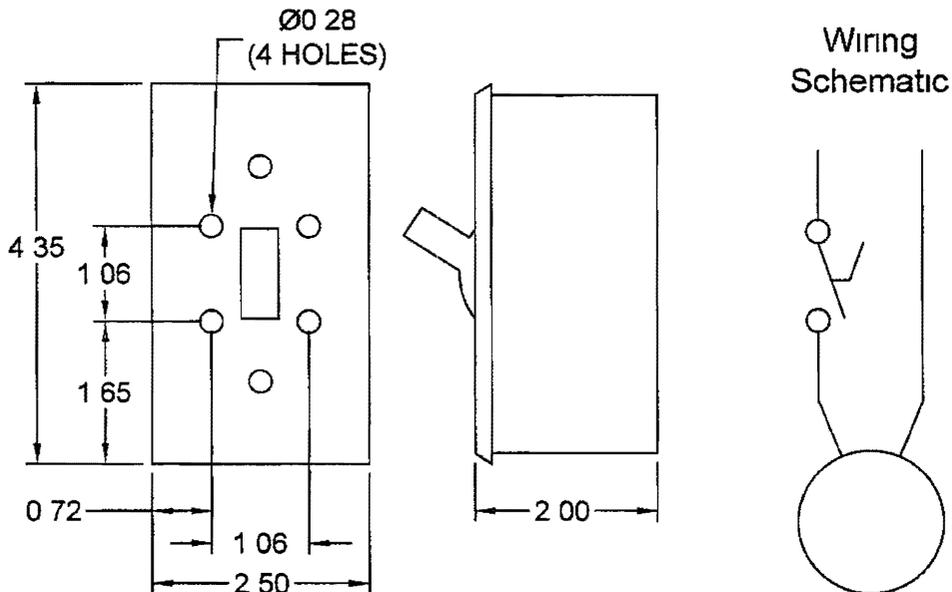
Standard Construction Features.

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/2 hp	Voltage	115	UL Listed	Yes
Manufacturer	Pass and Seymour	Cycle	60	Amperage	15	CSA Approved	Yes
Overload Protection	None	Phase	1	Poles	1	Rating	1/2 hp
Mounting	Mounted and Wired	RPM	1725	Wiring (Exp Resist)	None		

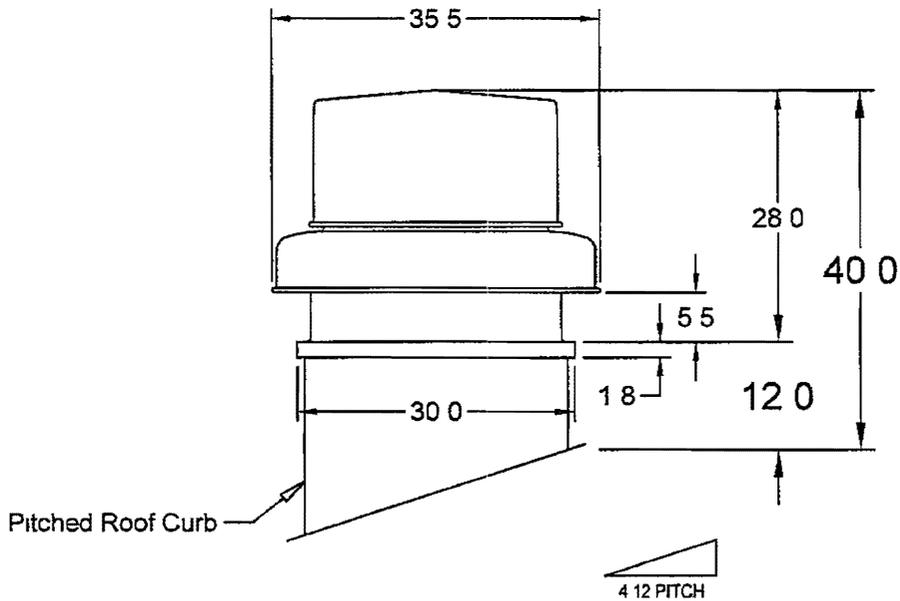
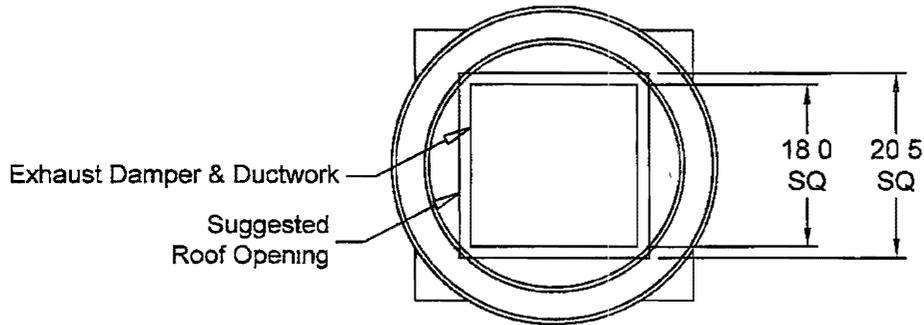
Electrical Drawing Details



Notes: All dimensions shown are in units of in.

Assembly Drawing

Type Belt Drive Centrifugal Roof Exhaust Fan



Notes All dimensions shown are in units of in
The following accessories ship loose unless otherwise specified, Roof Curb, Curb
Extensions, Curb Cap Adaptors, Windband Extensions, Dampers

Pitched Roof Curb

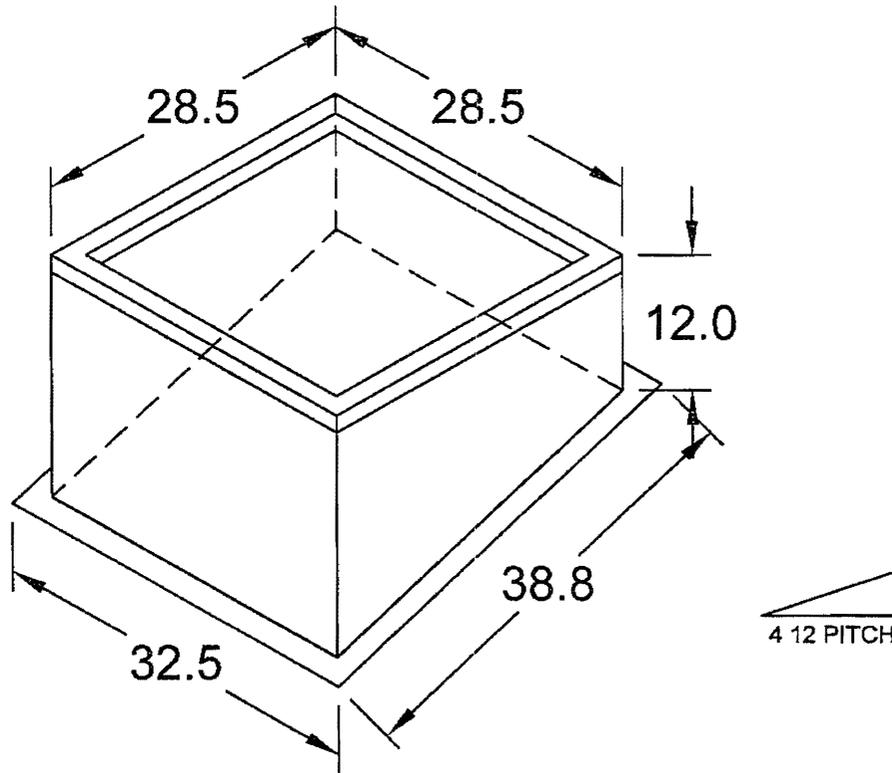
Model GPIP

Standard Construction Features

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Designed for pitched roofs - Straight sided without a cant - Wood nailer for attachment of roof flashing material - 2 in mounting flange - 1 in thick 3 lb density insulation - Height - Available from 12 in to 24 in as specified in 0.5 in increments

Notes

- The maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Trays are not available on pitched curbs
- The drawing shown is for Short Pitch Run. If Long Pitch Run is selected, the Actual W and L and Flange W and L on the curb drawing would be reversed



ISOMETRIC VIEW

Notes All dimensions shown are in units of in

Horizontal Mount Exhaust Damper

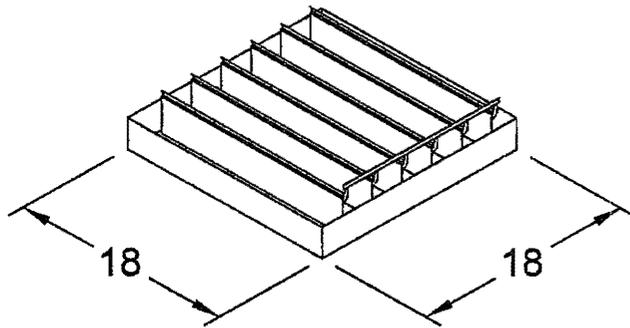
Model WD-100

Standard Construction Features:

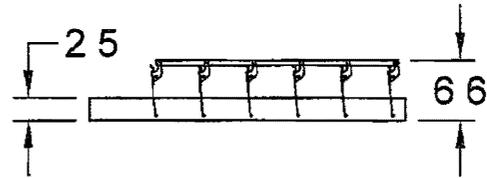
- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge, and spring assisted for ease of opening - Steel axles are 0.188 in diameter zinc plated mounted in acetal bushings
- Synthetic axle bearings

Accessory Configuration

Actuator Type	Gravity
End Switch	No



DAMPER



TYP SECTION VIEW

Notes All dimensions shown are in units of in
 Width And height furnished approximately 0.125 in undersize

AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance. Power (BHP/kW) excludes drives.

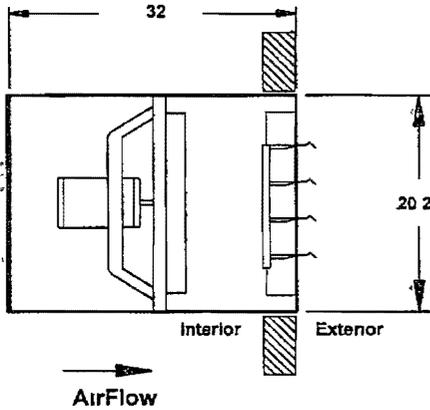
- Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal - The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program -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



1A - Flush Exterior Standard Exhaust
For Interior Service Applications

SE1

Sidewall Direct Drive Exhaust Fan



Tag EF-P

STANDARD CONSTRUCTION FEATURES

- Fan panels of galvanized steel • Aluminum blade propeller • Die formed, galvanized steel drive frame assembly • Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

- Damper WD-320-PB-16x16, 120 VAC Int Mnt
- Long Wall Hsg Flush Exterior (1A-Exhaust) w/ OSHA Guard
- Aluminum Propeller
- UL/cUL-705 - "Power Ventilators"
- Motor w/ Thermal Overloads
- transformer for damper

Note: Wall Housing Sizes 42 and Larger with heavy motors and all Filtered Wall Housings need additional bracing

NOTES All dimensions shown are in units of inches
Fan weight is without accessories

DIMENSIONS

Approx Fan Weight (lb)	Recommended Roof/Wall Opening (in)	Optional Damper (in)
27	21 25 x 21 25	16 x 16

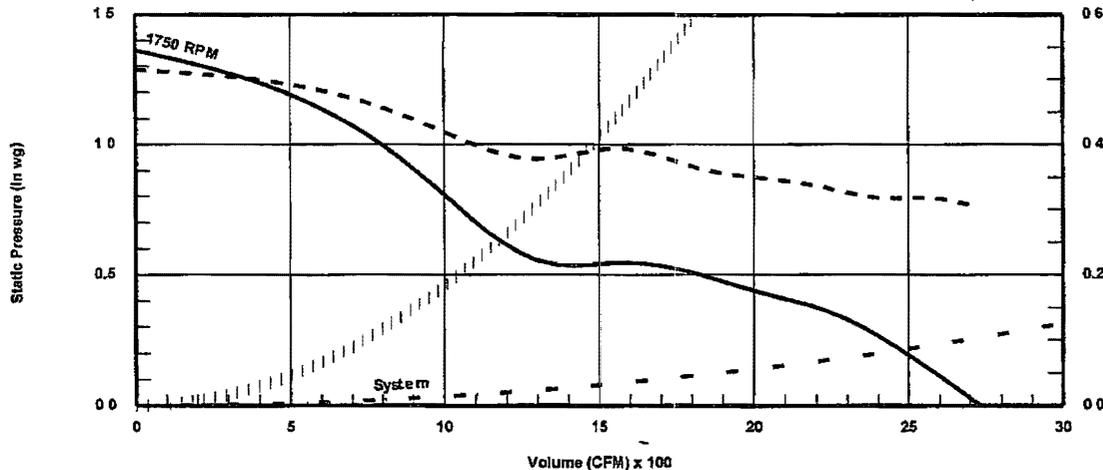
PERFORMANCE (Elevation ft = 0, Airstream Temperature F = 70)

Qty	Model	Volume (CFM)	SP (in wg)	FRPM	Operating Power (hp)	Motor Information				
						Size (hp)	V/C/P	End	Motor RPM	Windings
1	SE1-14-436-A3	2,488	0.2	1,750	0.32	1/3	277/60/1	ODP	1750	1

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
72	77	77	71	70	69	67	61	76	65	13.9

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 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



— RPM Curve
- - System Curve
... Brake Power Curve
Do not select to the left of this surge curve



AMCA



AMCA Licensed for Sound and Air Performance Without Appurtenances

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. Performance ratings do not include the effects of appurtenances (accessories) in the airstream. The sound ratings shown are loudness values in fan sones at 5 ft (1.5 m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type A free inlet fan sone levels. The AMCA Certified Ratings Seal applies to sone ratings only.

The AMCA licensed air and/or sound performance data has been modified for installation, appurtenances or accessories, etc. not included in the certified data. The modified performance is not AMCA licensed but is provided to aid in selection and applications of the product.

WD-320 Vertical Mount Exhaust Damper

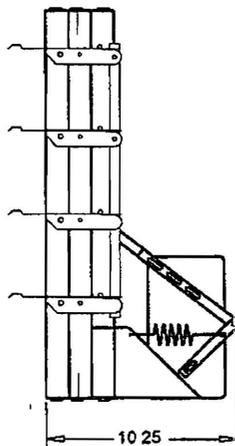
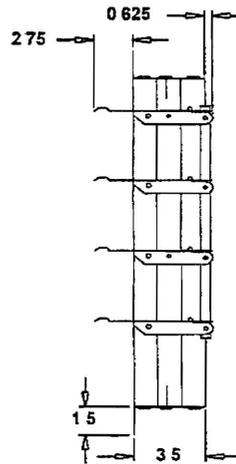
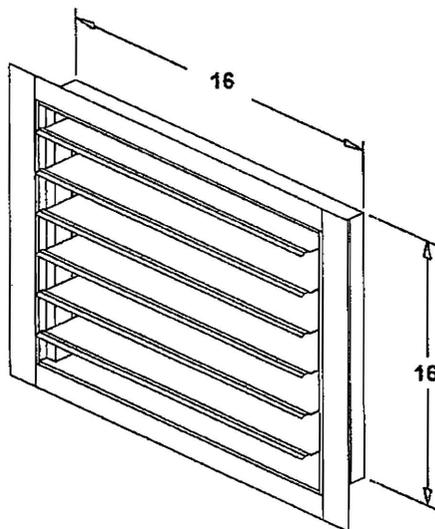
STANDARD CONSTRUCTION FEATURES

Vertical mount exhaust damper is constructed of 18 ga galvanized steel with pre-punched mounting holes and a flanged frame

- Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge
- Steel axles are 0.188 in diameter zinc plated steel mounted in acetal bushings
- Synthetic axle bearings

Accessory Configuration

Blade Action Parallel
Actuator Type 120 VAC

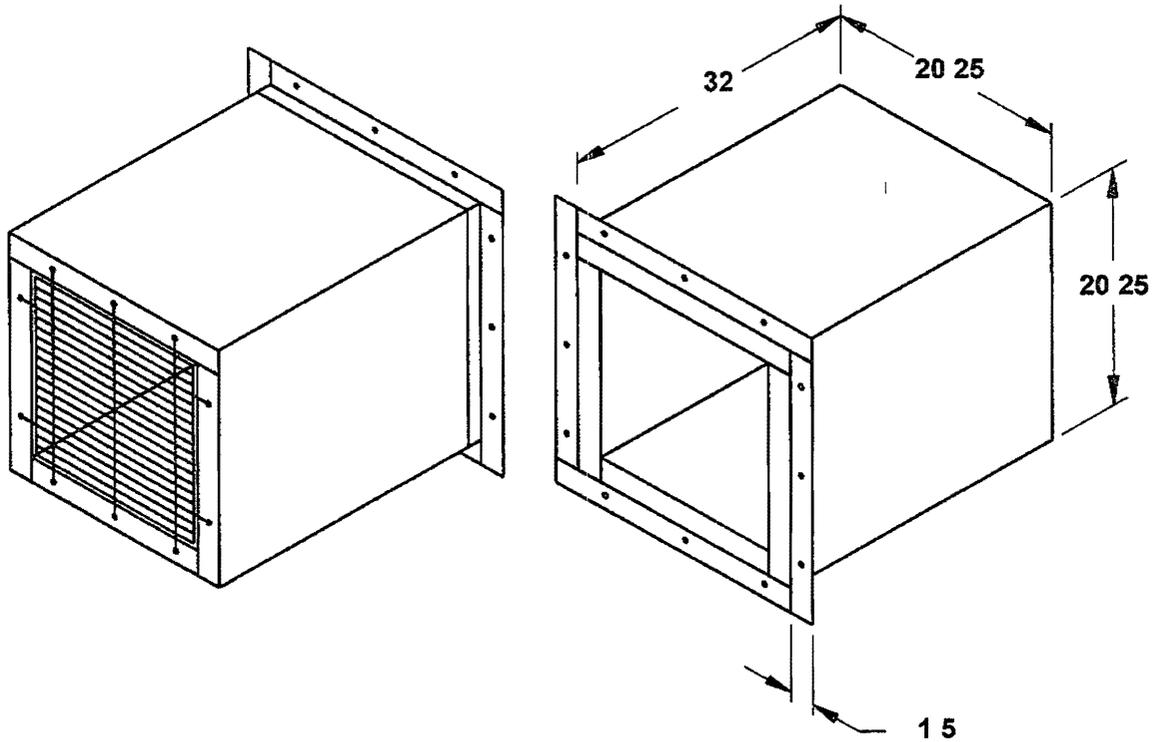


NOTES All dimensions shown are in units of inches
Width and height furnished approximately 0.125 in undersize

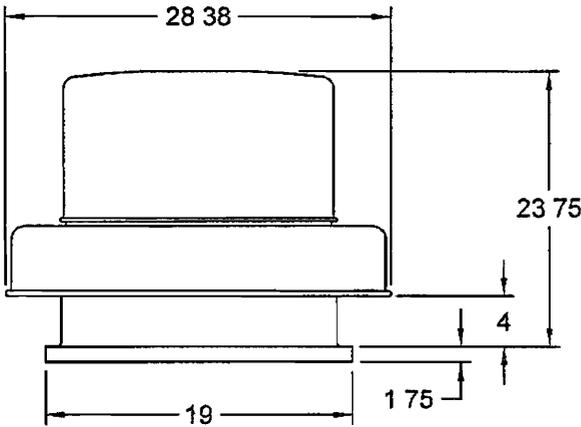
WH Long Wall Housing

STANDARD CONSTRUCTION FEATURES

- Galvanized steel construction
- Heavy gauge mounting flanges
- Pre-punched mounting holes
- Inside flanges allow damper to be mounted
- Overlapping weatherhood flange keeps rain out
- OSHA Protective guard of welded steel wire completely protects the drive side of the wall housing



NOTES All dimensions shown are in units of inches



Model: GB-131-4

Belt Drive Centrifugal Roof Exhaust Fan

Tag EF-S

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Birdscreen - 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

Options & Accessories.

Motor with Thermal Overload
UL/cUL 705 Listed - "Power Ventilators"
Switch, NEMA-1, Toggle, Junction Box Mounted & Wired
Roof Curb, GPIP-19-G12, Under Sized 1 5 in Total, 4 12 Pitch
Damper, WD-100-PB-12X12, Gravity Actuated (Shipped Loose)

Dimensional

Qty	Weight w/o Accessories (lb)	Weight with Accessories (lb)	Roof Opening (in)	Optional Damper (in)
1	57	82	14 5 x 14 5	12 x 12

Performance

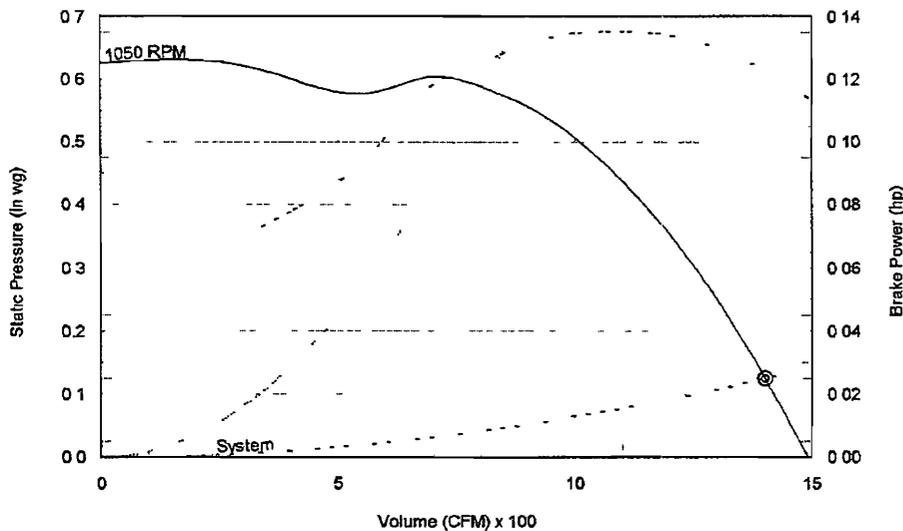
Requested Volume (CFM)	Actual Volume (CFM)	Requested SP (in wg)	Actual SP (in wg)	Fan RPM	Operating Power (hp)	Elevation (ft)	Airstream Temperature (F)
1,400	1 400	0 125	0 125	1,050	0 12	0	70

Motor

Motor Mounted	Size (hp)	VIC/P	Encl	Motor RPM	Windings	NEC FLA* (Amps)
Yes	1/4	115 / 60 / 1	ODP	1725	1	5 8

Sound Power by Octave Band

Sound Data	62 5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	73	72	72	66	61	60	52	46	69	57	8 5



— RPM Curve
 - - - System Curve
 - - - Brake Power Curve
 - - - Do not select to the left of this surge curve
 8 Desired operating point
 Actual operating point



Notes

All dimensions shown are in units of in
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload - consult factory
LwA - A weighted sound power level, based on ANSI S14
dBA - A weighted sound pressure level, based on 11 5 BA attenuation per Octave band at 5 0 ft
Sones - calculated using AMCA 301 at 5 0 ft

Disconnect Switch

Enclosure Rating NEMA-1

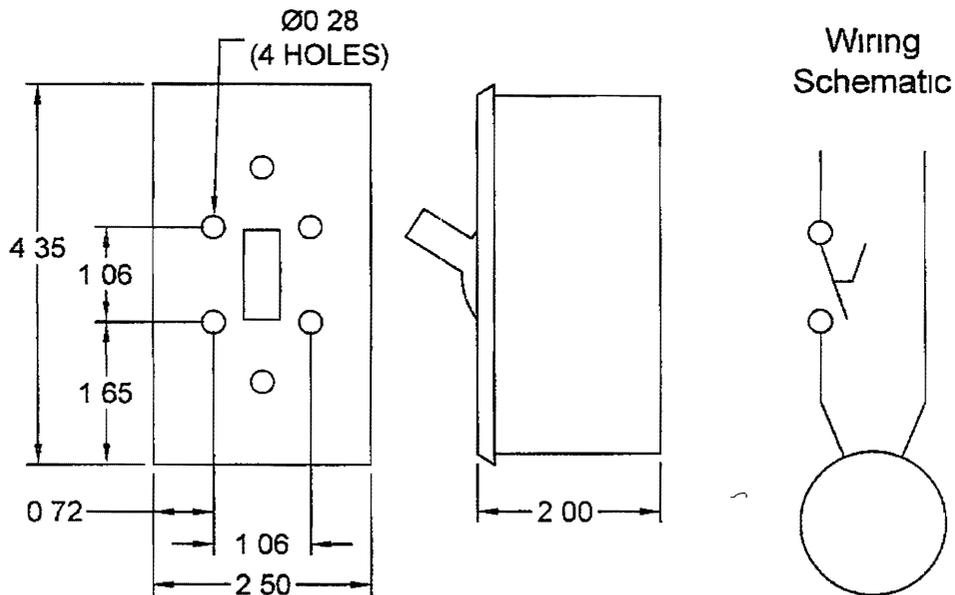
Standard Construction Features

Enclosure constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dust. This enclosure meets the rod-entry and the indoor corrosion protection design tests. The rod entry test is intended to simulate incidental contact with enclosure equipment.

Disconnect Switch Configuration

Type	Toggle	Motor Size	1/4 hp	Voltage	115	UL Listed	Yes
Manufacturer	Pass and Seymour	Cycle	60	Amperage	15	CSA Approved	Yes
Overload Protection	None	Phase	1	Poles	1	Rating	1/2 hp
Mounting	Mounted and Wired	RPM	1725	Wiring (Exp Resist)	None		

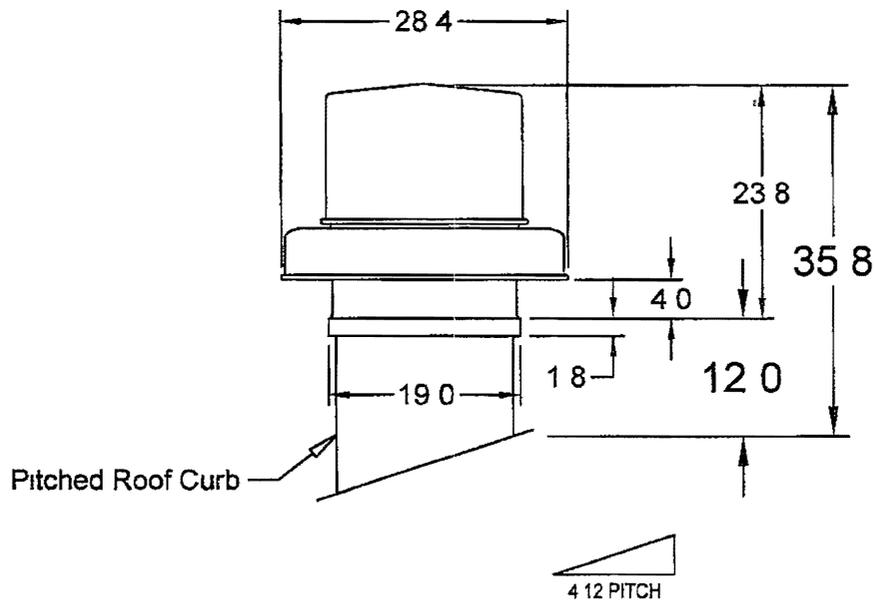
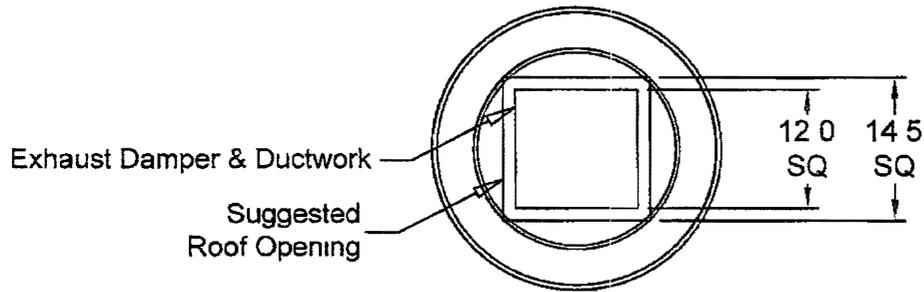
Electrical Drawing Details



Notes: All dimensions shown are in units of in

Assembly Drawing

Type Belt Drive Centrifugal Roof Exhaust Fan



Notes All dimensions shown are in units of in
The following accessories ship loose unless otherwise specified, Roof Curb, Curb Extensions, Curb Cap Adaptors, Windband Extensions, Dampers

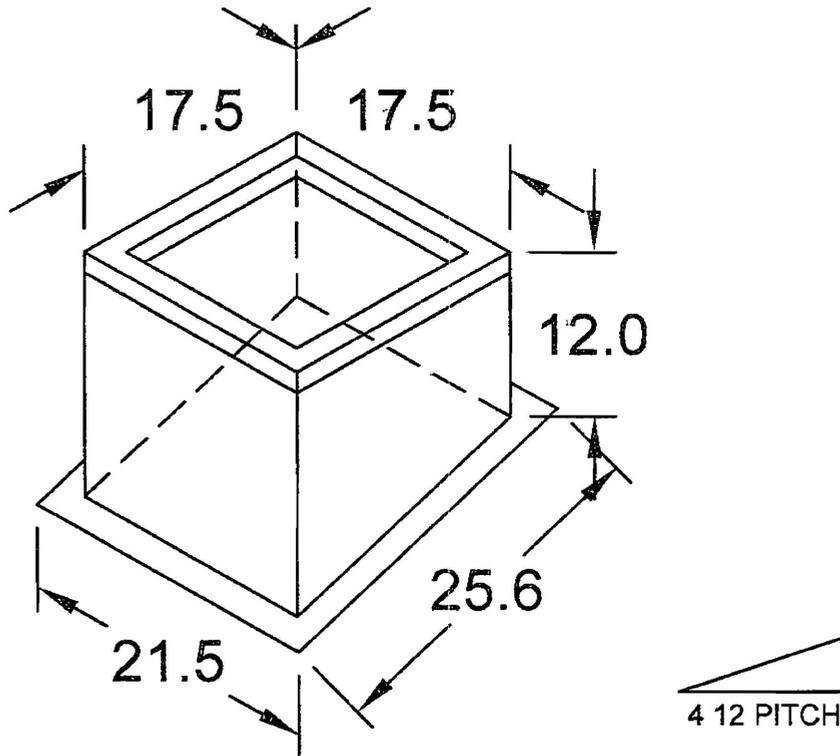
Pitched Roof Curb Model GPIP

Standard Construction Features.

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in aluminum - Designed for pitched roofs - Straight sided without a cant - Wood nailer for attachment of roof flashing material - 2 in mounting flange - 1 in thick 3 lb density insulation - Height - Available from 12 in to 24 in as specified in 0.5 in increments

Notes

- The maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in
- The minimum roof opening dimension should be at least 2.5 in more than the damper dimension or recommended duct size
- The Roof Opening Dimension may NOT be the Structural Opening Dimension
- Damper Trays are not available on pitched curbs
- The drawing shown is for Short Pitch Run. If Long Pitch Run is selected, the Actual W and L and Flange W and L on the curb drawing would be reversed



ISOMETRIC VIEW

Notes: All dimensions shown are in units of in

Horizontal Mount Exhaust Damper

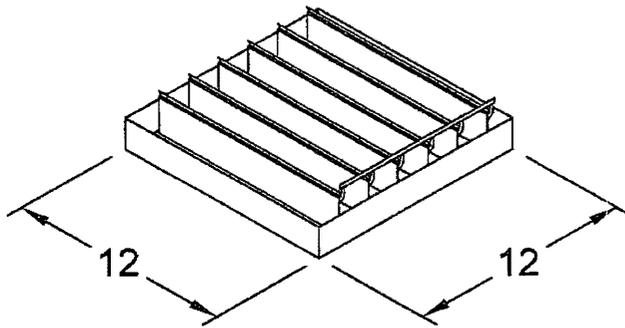
Model WD-100

Standard Construction Features

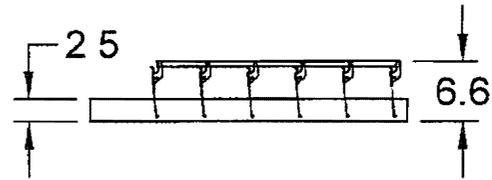
- Horizontal mount exhaust damper (air flow up) is constructed of 18 ga galvanized steel with pre-punched mounting holes - Damper blades are 0.025 in roll formed aluminum with vinyl seals on the closing edge and spring assisted for ease of opening - Steel axles are 0.188 in diameter zinc plated mounted in acetal bushings
- Synthetic axle bearings

Accessory Configuration

Actuator Type	Gravity
End Switch	No



DAMPER



TYP SECTION VIEW

Notes All dimensions shown are in units of in
Width And height furnished approximately 0.125 in undersize

AMCA Certification

Air Movement Control Association International

AMCA Licensed for Sound and Air Performance. Power (BHP/kW) excludes drives

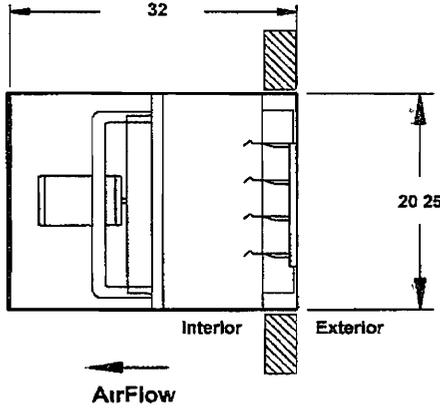
- Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal - The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program -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



1B - Flush Exterior Standard Supply
For Interior Service Applications

SS1

Sidewall Direct Drive Supply Fan



Tag SF-P

STANDARD CONSTRUCTION FEATURES

- Fan panels of galvanized steel
- Aluminum blade propeller
- Die formed, galvanized steel drive frame assembly
- Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

- Damper WD-220-PB-16x16, 120 VAC Int Mint
- Long Wall Hsg, Flush Exterior (1B - Supply) w/ OSHA Guard
- Aluminum Propeller
- UL/cUL-705 - "Power Ventilators"
- Motor w/ Thermal Overloads
- transformer for damper

Note: Wall Housing Sizes 42 and Larger with heavy motors and all Filtered Wall Housings need additional bracing

NOTES All dimensions shown are in units of inches
Fan weight is without accessories

DIMENSIONS

Approx Fan Weight (lb)	Recommended Roof/Wall Opening (in)	Optional Damper (in)
27	21 25 x 21 25	16 x 16

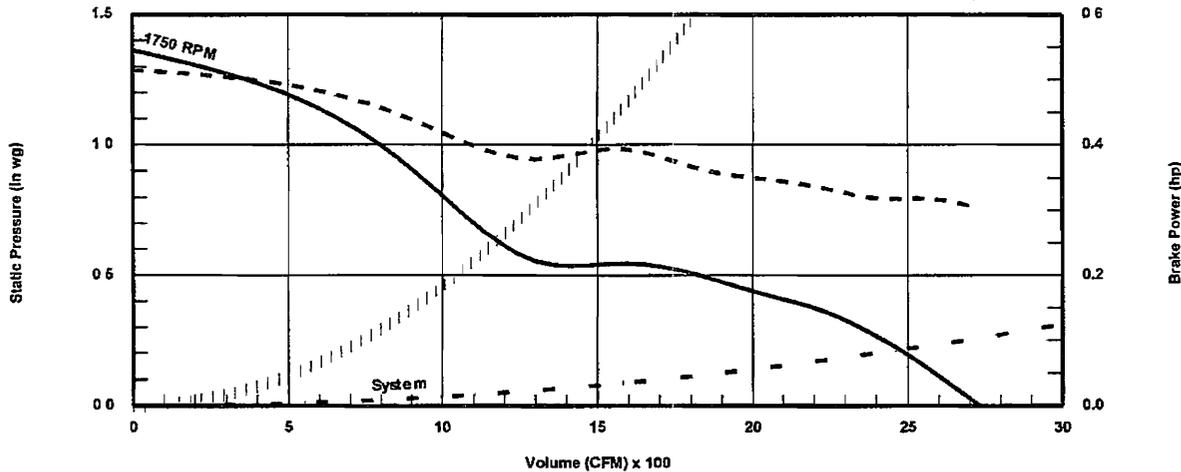
PERFORMANCE (Elevation ft = 0 Airstream Temperature F = 70)

Qty	Model	Volume (CFM)	SP (in wg)	FRPM	Operating Power (hp)	Motor Information				
						Size (hp)	V/C/P	Encl	Motor RPM	Windings
1	SS1-14-436-A3	2,488	0.2	1,750	0.32	1/3	277/60/1	ODP	1750	1

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
72	77	77	71	70	69	67	61	76	65	13.9

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 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



— RPM Curve
- - - System Curve
... Brake Power Curve
Do not select to the left of this surge curve



AMCA



AMCA Licensed for Sound and Air Performance Without Appurtenances

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The AMCA licensed air and/or sound performance data has been modified for installation, appurtenances or accessories, etc. not included in the certified data. The modified performance is not AMCA licensed but is provided to aid in selection and applications of the product.

WD-220 Vertical Mount Intake Damper

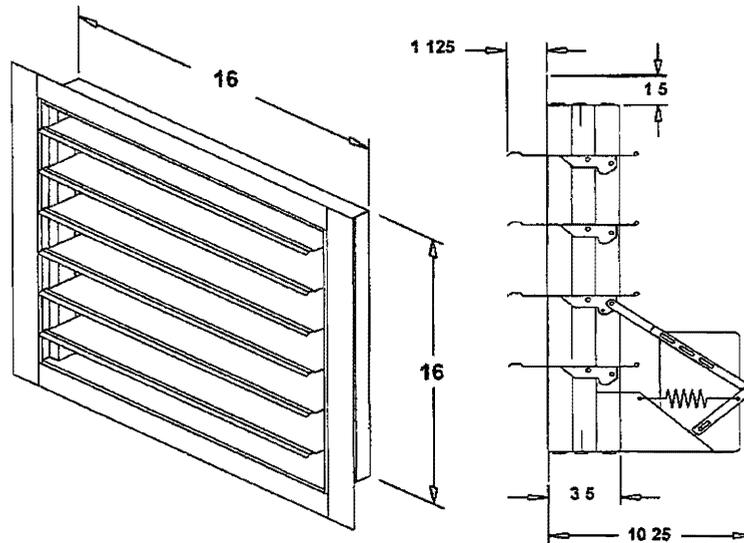
STANDARD CONSTRUCTION FEATURES

An electrically motorized backdraft damper that opens when energized and spring returns closed when de-energized. The WD-220 is designed for vertical mounting to prevent undesirable reverse air flow when installed with roof or sidewall supply (intake) fans.

- Galvanized frame with a flange opposite the motor side of damper
 - Steel axle material
 - Synthetic axle bearings
 - Maximum temperature of 180 degrees F
- Electric motor pack is shipped separately and requires installation in the field.

Accessory Configuration

Blade Action	Parallel
Actuator Type	120 VAC

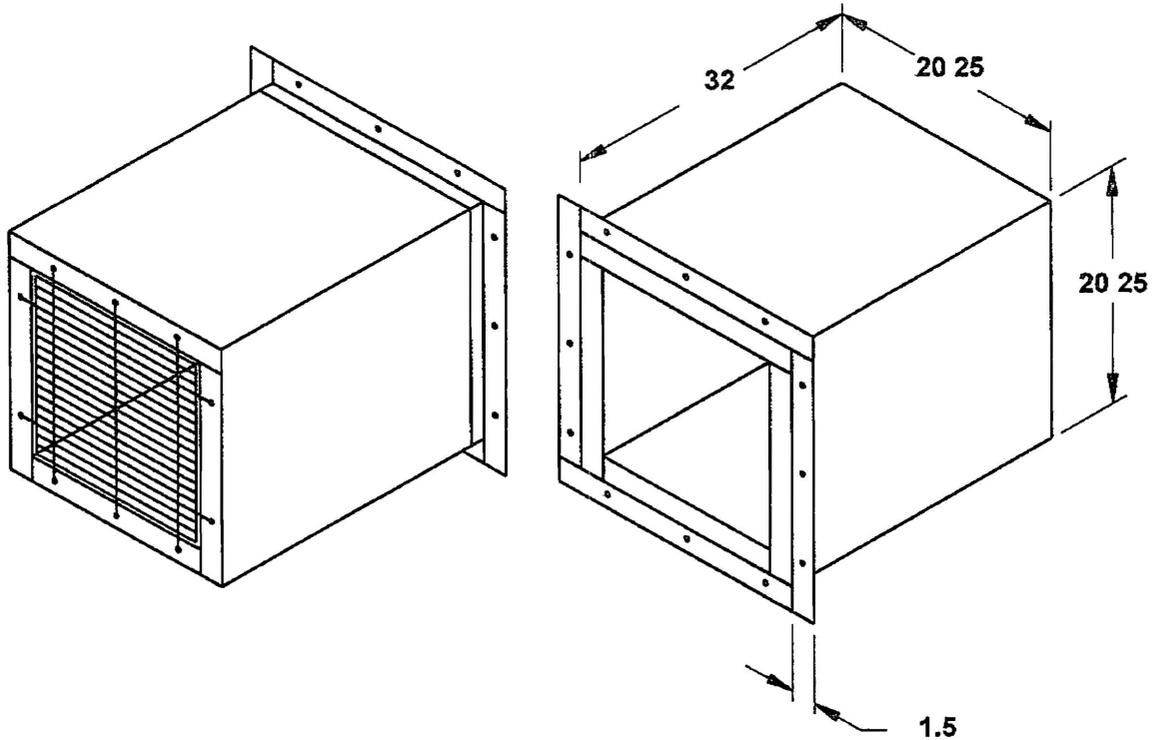


NOTES: All dimensions shown are in units of inches.
Width and height furnished approximately 0.125 in. undersize.

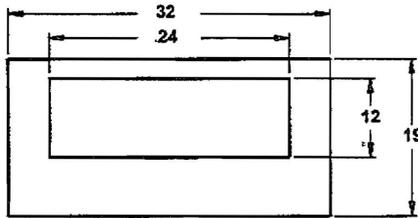
WH Long Wall Housing

STANDARD CONSTRUCTION FEATURES

- Galvanized steel construction
- Heavy gauge mounting flanges
- Pre-punched mounting holes
- Inside flanges allow damper to be mounted
- Overlapping weatherhood flange keeps rain out
- OSHA Protective guard of welded steel wire completely protects the drive side of the wall housing



NOTES All dimensions shown are in units of inches



BCF

Belt Drive Cabinet Fan

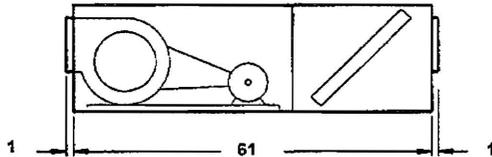
Tag CF-1

STANDARD CONSTRUCTION FEATURES

- Galvanized steel housing
- Hinged access panel on sizes (106, 206, 107, 207), bolted access panels on all larger sizes
- Motor and drive frame isolated on shock mounts
- Inlet and outlet duct connection flanges
- Ball bearing motors
- Fan shafts mounted in ball bearing pillow blocks
- Adjustable motor pulley
- Fan shaft pulley
- Static free belts
- Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

- Top Horizontal Discharge
- Brackets for Isolators
- UL/cUL-705 - "Power Ventilators"
- Sloped Filter Box w/ 2" Filter Racks and Pleated Throwaway Filters
- Premium Efficient Motor exceeds EPACT and NEMA 1210



NOTES All dimensions shown are in units of inches
Fan weight is without accessories

DIMENSIONS

Approx Fan Weight (lb)
265

PERFORMANCE (Elevation ft = 0 Airstream Temperature F = 70)

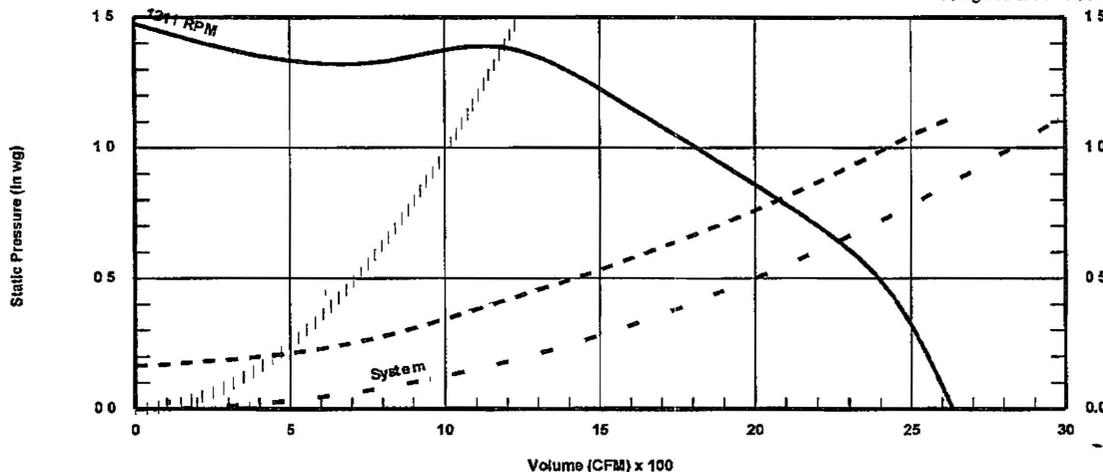
Qty	Model	Volume (CFM)	SP (in wg)	Total SP (in wg)	FRPM	Operating Power (hp)	Motor Information					
							Size (hp)	V/C/P	Encl	Motor RPM	Windings	NEC FLA (A)
1	BCF-110-10	2,000	0.5	0.862	1,211	0.76	1	460/60/3	TEFC	1725	1	2.1

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
79	73	73	68	68	67	64	61	73	62	12.0

FLA - Based on tables 148 or 150 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload. Consult factory.

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 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



— RPM Curve
— System Curve
- - - Brake Power Curve
| | | Do not select to the left of this surge curve



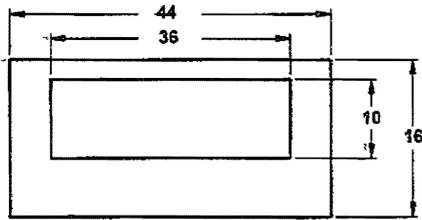
AMCA



AMCA Licensed for Air Performance Without Appurtenances Power (BHP/kW) excludes drives

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BCF

Belt Drive Cabinet Fan

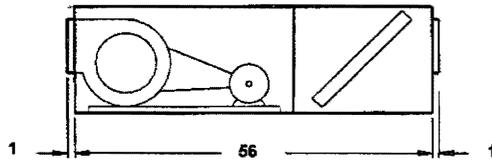
Tag CF-N

STANDARD CONSTRUCTION FEATURES

- Galvanized steel housing
- Hinged access panel on sizes (106, 206, 107, 207), bolted access panels on all larger sizes
- Motor and drive frame isolated on shock mounts
- Inlet and outlet duct connection flanges
- Ball bearing motors
- Fan shafts mounted in ball bearing pillow blocks
- Adjustable motor pulley
- Fan shaft pulley
- Static free belts
- Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

- Top Horizontal Discharge
- Brackets for Isolators
- UL/cUL-705 - "Power Ventilators"
- Sloped Filter Box w/ 2" Filter Racks and Pleated Throwaway Filters
- Premium Efficient Motor exceeds EPACT and NEMA 1210



NOTES All dimensions shown are in units of inches
-Fan weight is without accessories

DIMENSIONS

Approx Fan Weight (lb)
220

PERFORMANCE (Elevation ft = 0 Airstream Temperature F = 70)

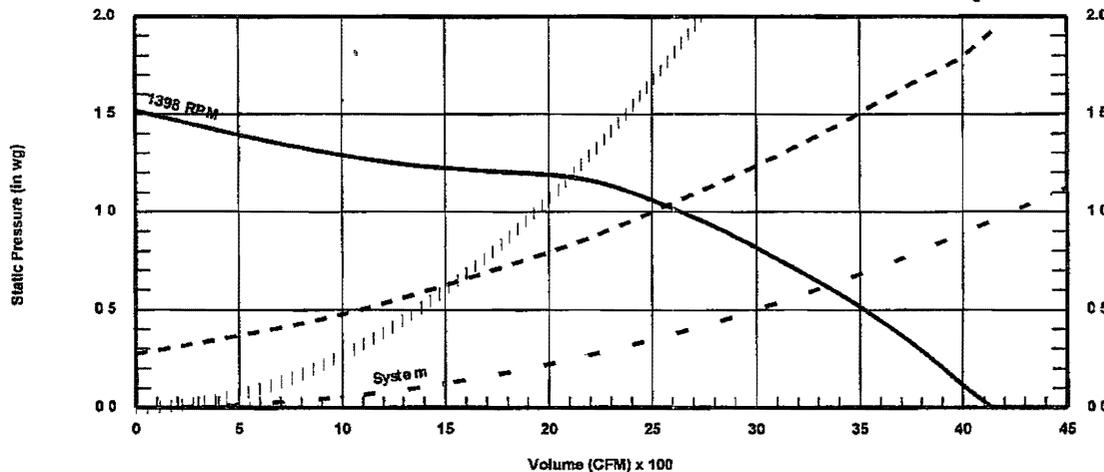
Qty	Model	Volume (CFM)	SP (in wg)	Total SP (in wg)	FRPM	Operating Power (hp)	Motor Information					
							Size (hp)	VIC/P	Encl	Motor RPM	Windings	NEC FLA (A)
1	BCF-208-15	3,000	0.5	0.818	1,398	1.24	1 1/2	460/60/3	TEFC	1725	1	3.0

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
81	82	78	70	71	70	68	67	77	66	16.1

FLA - Based on tables 148 or 150 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload consult factory

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 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft



— RPM Curve
- - - System Curve
- - - Brake Power Curve
| | | | Do not select to the left of this surge curve



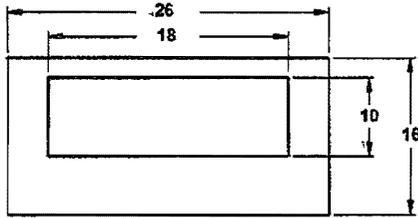
AMCA



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BCF

Belt Drive Cabinet Fan

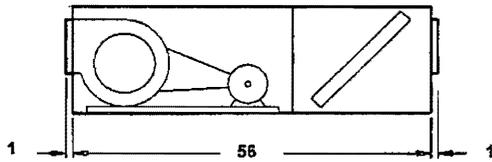
Tag CF-S

STANDARD CONSTRUCTION FEATURES

- Galvanized steel housing
- Hinged access panel on sizes (106, 206, 107, 207), bolted access panels on all larger sizes
- Motor and drive frame isolated on shock mounts
- Inlet and outlet duct connection flanges
- Ball bearing motors
- Fan shafts mounted in ball bearing pillow blocks
- Adjustable motor pulley
- Fan shaft pulley
- Static free belts
- Corrosion resistant fasteners

SELECTED OPTIONS & ACCESSORIES

- Top Horizontal Discharge
- Brackets for Isolators
- UL/cUL-705 - "Power Ventilators"
- Sloped Filter Box w/ 2" Filter Racks and Pleated Throwaway Filters



NOTES All dimensions shown are in units of inches
Fan weight is without accessories

DIMENSIONS

Approx Fan Weight (lb)
120

PERFORMANCE (Elevation ft = 0 Airstream Temperature F = 70)

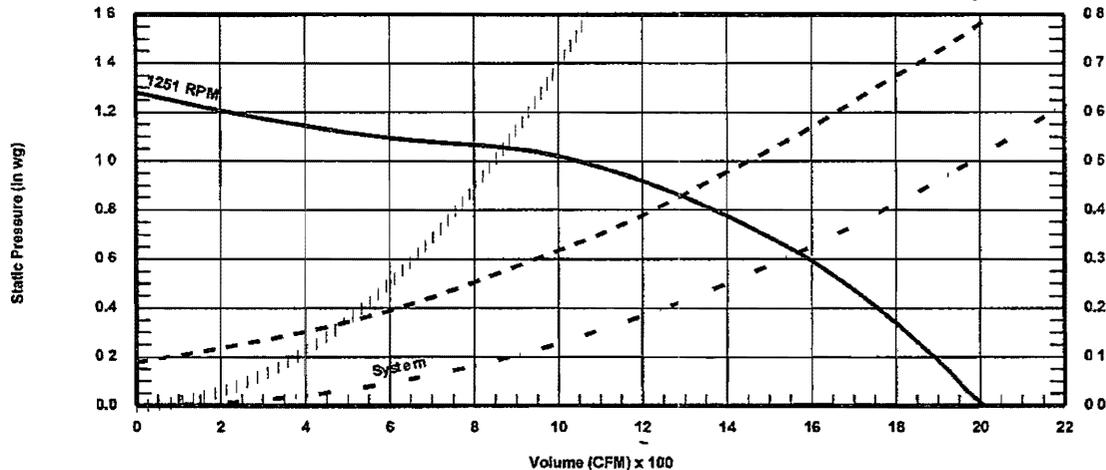
Qty	Model	Volume (CFM)	SP (in wg)	Total SP (in wg)	FRPM	Operating Power (hp)	Motor Information					
							Size (hp)	V/C/P	End	Motor RPM	Windings	NEC FLA (A)
1	BCF-108-5	1 400	0.5	0.776	1,251	0.48	1/2	460/60/3	TEFC	1725	1	11

SOUND

Inlet Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
75	69	69	64	63	62	59	56	69	58	9.1

FLA - Based on tables 148 or 150 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload consult factory

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 5.0 ft. Sones calculated using AMCA 301 at 5.0 ft.



— RPM Curve
— System Curve
— Brake Power Curve
Do not select to the left of this surge curve



AMCA



AMCA Licensed for Air Performance Without Appurtenances Power (BHP/kW) excludes drives

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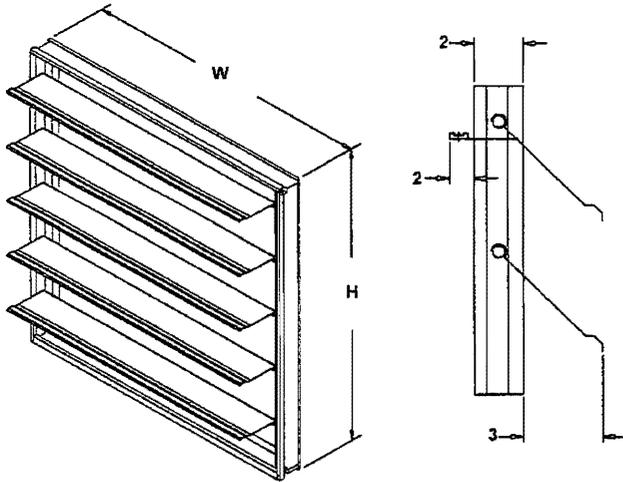
ES-30

Vertical Mount Exhaust Damper

Application & Design

The ES-30 backdraft damper is designed to prevent reversed airflow in vertical (wall) exhaust air applications. The damper is opened by air pressure differential and closed by gravity. Temperatures in excess of 180 F may require special considerations.

- Frame: 6063T5 extruded aluminum 0.063 in nominal wall thickness, mitered corners
- Blades: 6063T5 extruded aluminum 0.05 in nominal wall thickness
- Blade Seals: Vinyl
- Linkage: 0.125 in



Notes: All dimensions shown are in units of inches.

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

CONSTRUCTION FEATURES

sizing Nominal Operation Counterbalance

ID #	Tag	Qty	W (in)	H (in)	Act Trq (in-lb)
1-1		1	36.000	10.000	
1-2		1	24.000	12.000	
1-3		1	18.000	10.000	



Phone 503-234-5071
2220 SE Ninth Ave , Portland, OR 97214
Fax 503-233-0451
800-848-5199

SUBMITTAL

PROJECT Portland International Airport Deicing
LOCATION Portland, OR
ARCHITECT _____
ENGINEER _____
CONTRACTOR Jacobs Heating & A/C
DATE SUBMITTED 10 2 09
CONTRACTOR P O _____
JAirP CONTACT Mike Leavens/Hal Jacklin
MATERIAL SUBMITTED Air Distribution
SPECIFICATIONS 233700

WE ARE PLEASED TO SUBMIT THE FOLLOWING LIST OF EQUIPMENT FOR APPROVAL BASED UPON INFORMATION RECEIVED
WE BELIEVE THIS MATERIAL CONFORMS TO THE SPECIFICATIONS IT SHALL REMAIN THE CONTRACTOR'S RESPONSIBILITY
TO VERIFY SIZES AND QUANTITIES PRIOR TO ORDER RELEASE MATERIAL WILL BE RELEASED TO PRODUCTION UPON
RETURN OF APPROVED SUBMITTALS TO JOHNSON AIR PRODUCTS AT 2220 S E 9TH AVE PORTLAND, OREGON 97214

MANUFACTURER Price Industries

(please see attached literature)



**Price All-In-One
Detailed Submittal Schedule
Grilles/Registers/Diffusers**

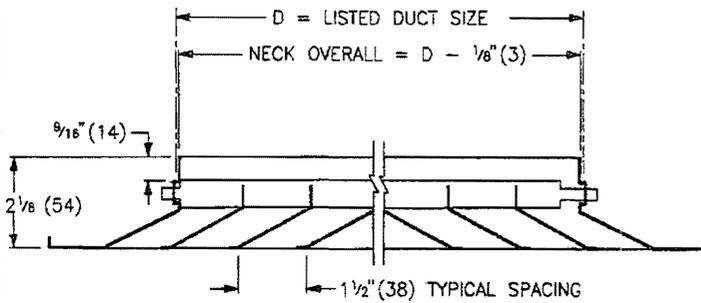
Sorted By Item Location

Job Name	PDX DEICING	Date	10/02/2009
Job Number	QP00001780	Contractor	
Entered By		Engineer	
Reps Job No		SDA No	F
Location	PORTLAND, OR		

Item Tag	Model	Line No	Location	Qty	Type	Size Length Width	Border	Pattern	Panel Size Neck LxW	Accessories 1 2 3	Finish
	SMD	1		1		24 24	3P	2S	6 6	3	B12
	SMD	2		4		24 24	3P	4A	9 9		B12
	SMD	3		1		24 24	3P	3A	12 12		B12
	SMD	4		1		24 24	3P	4A	12 12		B12
	SMD	5		3			6	2G	6 6	3	B12
CR	PDDR	6		3		22 10	3		24 12		B12
CR	PDDR	7		3		22 22	3		24 24		B12
CR	530D	8		1		12 000 10 000	F	L		A SW	B12
CE	80DAL	9		3		8 000 8 000	F	SW		A	B12
CE	80DAL	10		1		26 000 26 000	F	SW		A	B12
HE	530D	11		1		10 000 10 000	F	L		A SW	B12
HS	520D	12		1		36 000 18 000	F	L		A SW	B12
HR	530D	13		1		40 000 24 000	F	L		A SW	B12
	530D	14		1		14 000 14 000	F	L		A SW	B12
	530D	15		1		16 000 16 000	F	L		A SW	B12
	530D	16		1		20 000 18 000	F	S		A SW	B12

The order and sale are made pursuant to the terms of the Sales Agreement and the Sales Policies set out in the latest Customer Service Handbook
See Section AA in price lists

SMD/AMD MODULAR DIFFUSER



OPTIONS.

- 3 COATED STEEL OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- 3L COATED STEEL OPPOSED BLADE DAMPER (FACE OPERABLE SHIPPED LOOSE)
- 3AL ALUM OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- 3LAL ALUM OPPOSED BLADE DAMPER (FACE OPERABLE SHIPPED LOOSE)
- SR SQUARE TO ROUND ADAPTOR (SHIPPED MOUNTED)
- SR2 SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE)
- SR3 SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH STEEL OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- SR3L SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH FACE OPERABLE STEEL DAMPER (SHIPPED LOOSE)
- SR3AL SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH ALUM OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- SR3LAL SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH FACE OPERABLE ALUM DAMPER (SHIPPED LOOSE)
- TRV THROW REDUCING VANE
- SR8E SQUARE TO ROUND ADAPTOR (SHIPPED MOUNTED) WITH STEEL BUTTERFLY VOLUME CONTROL DAMPER (SHIPPED LOOSE) DAMPERS ARE ONLY AVAILABLE IN DUCT SIZES 4 TO 15
- SR9 SQUARE TO ROUND ADAPTOR (SHIPPED MOUNTED) WITH RADIAL DAMPER (SHIPPED LOOSE)

MATERIAL

- SMD - STEEL CONSTRUCTION (EXTR ALUM FRAME #33 T-BAR AND #6 BEVELLED - ONLY)

FINISH

- B12 WHITE (OPTIONAL FINISHES AVAILABLE)

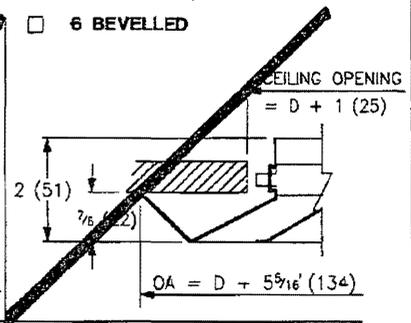
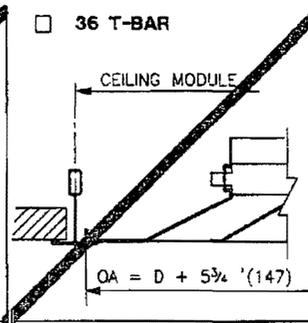
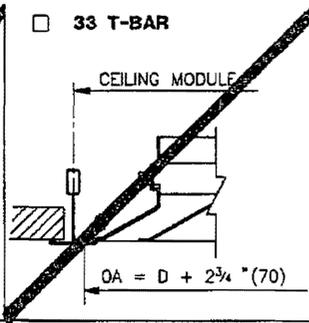
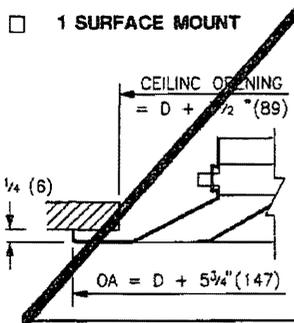
FRAMES

- 1 SURFACE MOUNT

- 33 T-BAR

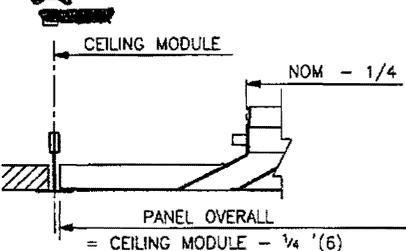
- 36 T-BAR

- 6 BEVELLED

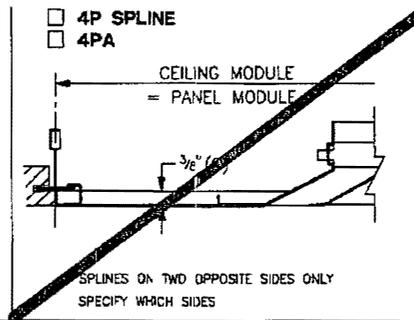


PANELS

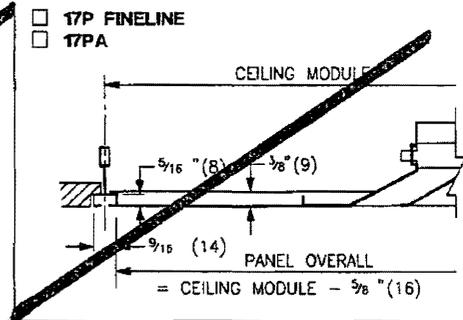
- 3P T-BAR



- 4P SPLINE
- 4PA



- 17P FINELINE
- 17PA



ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING		PRICE	
ENGINEER		 SMD/AMD MODULAR CEILING DIFFUSER	
CUSTOMER			218791
SUBMITTAL DATE 10/02/2009	SPEC SYMBOL		SEP 2008

AVAILABLE DIFFUSER SIZES:

1 SURFACE MOUNT & 6 BEVELLED	
MIN SQUARE NECK 6x6 (152x152)	MIN ROUND NECK 4 (102)
MAX SQUARE NECK 24x24 (610x610)	MAX ROUND NECK 24 (610)

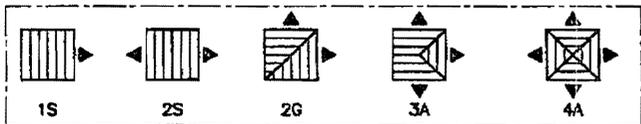
CEILING MODULE	33 T-BAR	
	SQUARE NECK	ROUND NECK
12x12 (305x305)	9x9 (229x229)	6 7 8 9 (152,178,203,229)
24x12 (610x305)	21x9 (533x229)	6 7 8 9 (152 178 203 229)
24x24 (610x610)	21x21 (533x533)	12 14 15 16 18,20 (305,357,381 406 457,508)

CEILING MODULE	36 T-BAR	
	SQUARE NECK	ROUND NECK
12x12 (305x305)	6x6 (152x152)	4,5,6 (102,127,152)
24x12 (610x305)	18x6 (457x152)	6 (152)
24x24 (610x610)	18x18 (457x457)	8,10,12,14,15,16,18 (203,254,305,357,381,406,457)
30x30 (762x762)	24x24 (610x610)	12,14,15,16,18,20,22,24 (305,357,381,406,457,508,559,610)

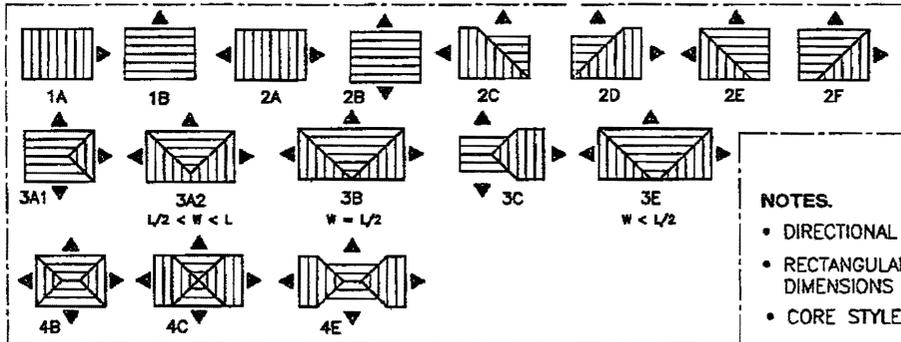
CEILING MODULE	3P/3PA T-BAR PANEL		
	SQUARE NECK	RECTANGULAR NECK	ROUND NECK
24x24 (610x610)	6x6,9x9,12x12 15x15 (152x152 229x229,305x305,381x381)	15x12,15x9,15x6,12x9 12x6,9x6 (381x305 381x229,381x152, 305x229,305x152,229x152)	4 5,6,7,8,9 10 12,14,15 (102 127 152,178,203 229,254 305,357,381)

CEILING MODULE	4P/4PA SPLINE & 17P/17PA FINELINE PANEL	
	SQUARE NECK	ROUND NECK
12x12 (305x305)	6x6 (152x152)	4 5,6 (102,127,152)
24x24 (610x610)	6x6,9x9,12x12,15x15,18x18 (152x152 229x229,305x305,381x381,457x457)	4,5,6,7 8 9 10,12,14 15,16,18 (102 127 152,178 203,229 254,305 357,381 406 457)

AVAILABLE CORE STYLES



← SQUARE CORE STYLES



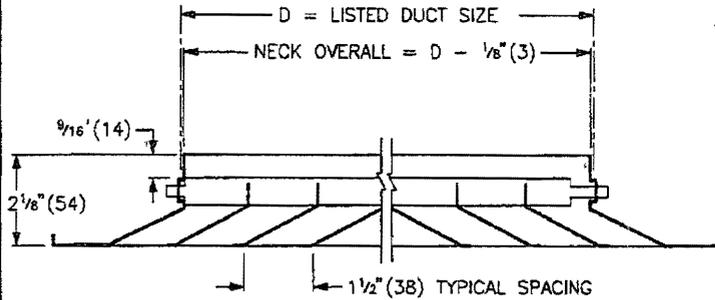
← RECTANGULAR CORE STYLES

- NOTES.**
- DIRECTIONAL CORE REMOVABLE AT DIFFUSER FACE
 - RECTANGULAR UNITS ARE AVAILABLE IN LISTED DUCT DIMENSIONS EXAMPLES 12" X 6" (305 X 152)
 - CORE STYLES SHOWN ARE PLAN VIEW

ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING		PRICE®	
ENGINEER:			
CUSTOMER		218791	MODULAR CEILING DIFFUSER
SUBMITTAL DATE	10/02/2009	SPEC SYMBOL	SEP 2008

SMD/AMD MODULAR DIFFUSER



OPTIONS

- 3 COATED STEEL OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- 3L COATED STEEL OPPOSED BLADE DAMPER (FACE OPERABLE SHIPPED LOOSE)
- 3AL ALUM OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- 3LAL ALUM OPPOSED BLADE DAMPER (FACE OPERABLE SHIPPED LOOSE)
- SR SQUARE TO ROUND ADAPTOR (SHIPPED MOUNTED)
- SR2 SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE)
- SR3 SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH STEEL OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- SR3L SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH FACE OPERABLE STEEL DAMPER (SHIPPED LOOSE)
- SR3AL SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH ALUM OPPOSED BLADE DAMPER (SHIPPED LOOSE)
- SR3LAL SQUARE TO ROUND ADAPTOR (SHIPPED LOOSE) WITH FACE OPERABLE ALUM DAMPER (SHIPPED LOOSE)
- TRV THROW REDUCING VANE
- SR8E SQUARE TO ROUND ADAPTOR (SHIPPED MOUNTED) WITH STEEL BUTTERFLY VOLUME CONTROL DAMPER (SHIPPED LOOSE) DAMPERS ARE ONLY AVAILABLE IN DUCT SIZES 4 TO 15
- SR9 SQUARE TO ROUND ADAPTOR (SHIPPED MOUNTED) WITH RADIAL DAMPER (SHIPPED LOOSE)

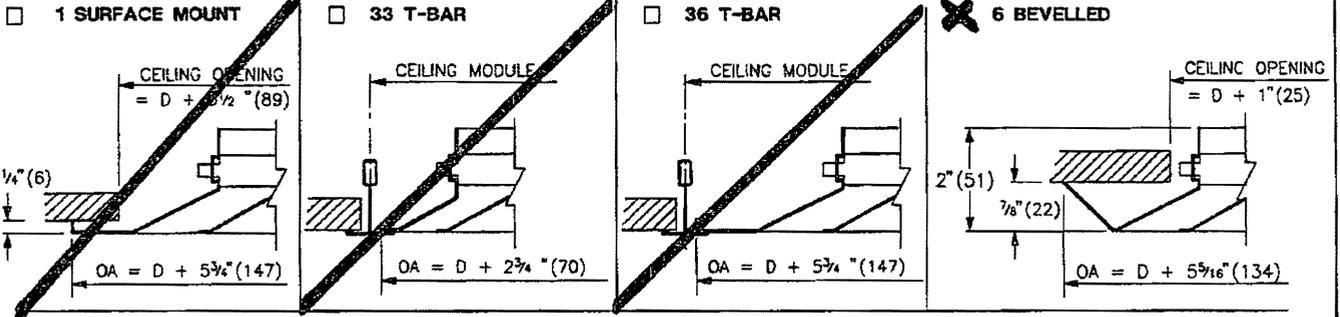
MATERIAL

- SMD - STEEL CONSTRUCTION (EXTR ALUM FRAME #33 T-BAR AND #6 BEVELLED - ONLY)

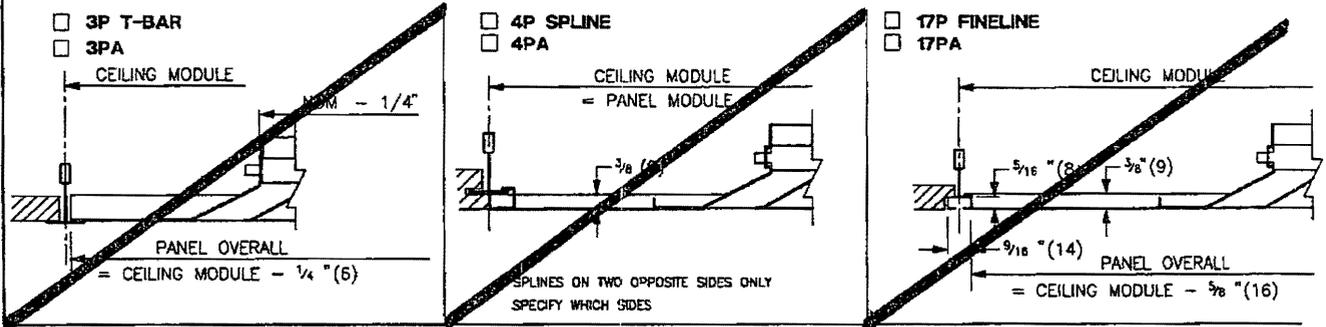
FINISH:

- B12 WHITE (OPTIONAL FINISHES AVAILABLE)

FRAMES



PANELS



ALL METRIC DIMENSIONS () ARE SOFT CONVERTED. IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING		PRICE®	
ENGINEER.		R	SMD/AMD
CUSTOMER			
SUBMITTAL DATE: 10/02/2009	SPEC SYMBOL:	218791	MODULAR CEILING DIFFUSER
		SEP 2008	

AVAILABLE DIFFUSER SIZES.

MIN SQUARE NECK & 6 BEVELLED	
MIN SQUARE NECK 6x6 (152x152)	MIN ROUND NECK 4 (102)
MAX SQUARE NECK 24x24 (610x610)	MAX ROUND NECK 24 (610)

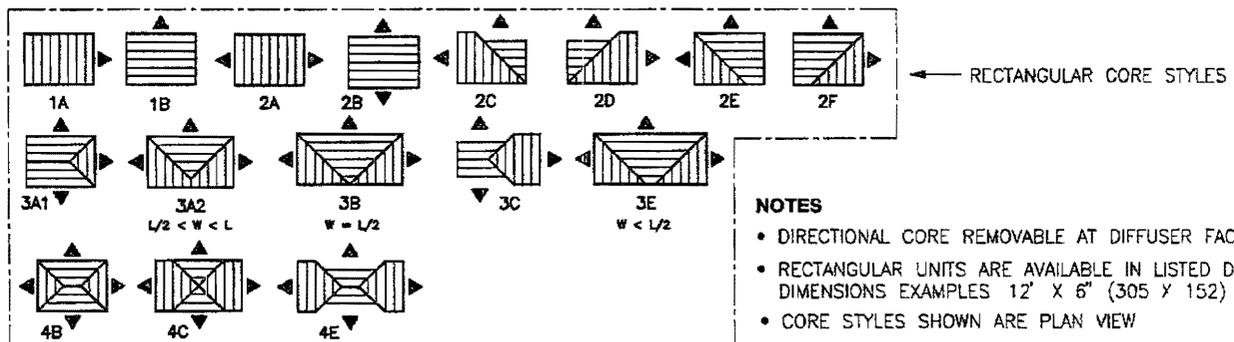
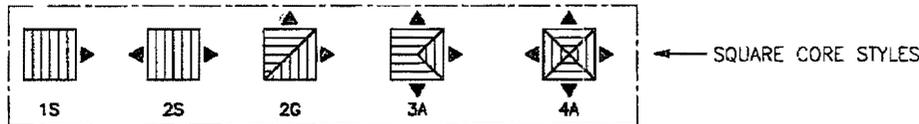
CEILING MODULE	33 T-BAR	
	SQUARE NECK	ROUND NECK
12x12 (305x305)	9x9 (229x229)	6,7,8,9 (152,178,203,229)
24x12 (610x305)	21x9 (533x229)	6,7,8,9 (152,178,203,229)
24x24 (610x610)	21x21 (533x533)	12,14,15,16,18,20 (305,357,381,406,457,508)

CEILING MODULE	36 T-BAR	
	SQUARE NECK	ROUND NECK
12x12 (305x305)	6x6 (152x152)	4,5,6 (102,127,152)
24x12 (610x305)	18x6 (457x152)	6 (152)
24x24 (610x610)	18x18 (457x457)	8,10,12,14,15,16,18 (203,254,305,357,381,406,457)
30x30 (762x762)	24x24 (610x610)	12,14,15,16,18,20,22,24 (305,357,381,406,457,508,559,610)

CEILING MODULE	3P/3PA T-BAR PANEL		
	SQUARE NECK	RECTANGULAR NECK	ROUND NECK
24x24 (610x610)	6x6,9x9,12x12,15x15 (152x152,229x229,305x305,381x381)	9x12,15x9,15x6,12x9,12x6,9x6 (381x305,381x229,381x152,305x229,305x152,229x152)	4,5,6,7,8,9,10,12,14,15 (102,127,152,178,203,229,254,305,357,381)

CEILING MODULE	4P/4PA SPLINE & 17P/17PA FINELINE PANEL	
	SQUARE NECK	ROUND NECK
12x12 (305x305)	6x6 (152x152)	4,5,6 (102,127,152)
24x24 (610x610)	6x6,9x9,12x12,15x15,18x18 (152x152,229x229,305x305,381x381,457x457)	4,5,6,7,8,9,10,12,14,15,16,18 (102,127,152,178,203,229,254,305,357,381,406,457)

AVAILABLE CORE STYLES



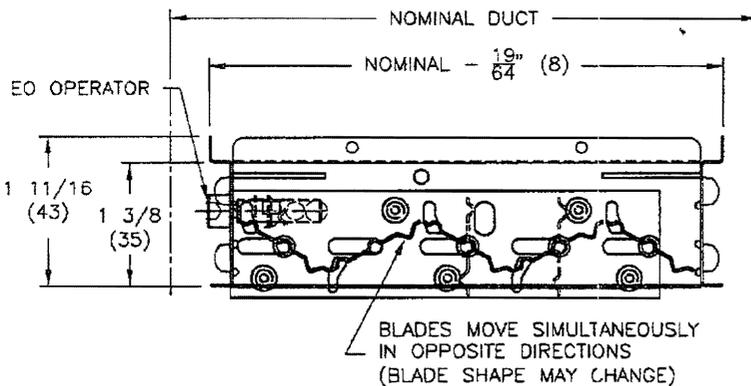
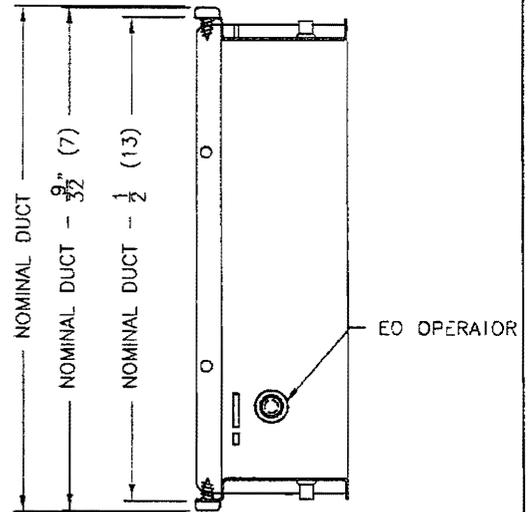
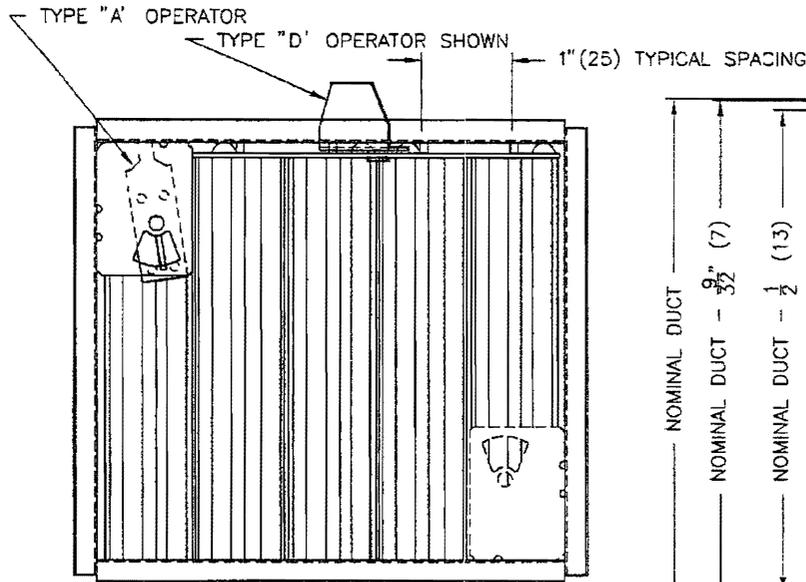
NOTES

- DIRECTIONAL CORE REMOVABLE AT DIFFUSER FACE
- RECTANGULAR UNITS ARE AVAILABLE IN LISTED DUCT DIMENSIONS EXAMPLES 12" X 6" (305 X 152)
- CORE STYLES SHOWN ARE PLAN VIEW

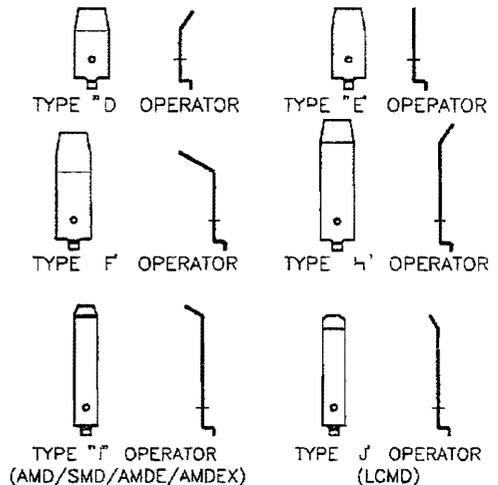
ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT	PDX DEICING	
ENGINEER		
CUSTOMER		218791
SUBMITTAL DATE	10/02/2009	SEP 2008
SPEC SYMBOL		

VCS3 OPPOSED BLADE DAMPER



AVAILABLE OPERATORS



MATERIAL

- DAMPER - COATED STEEL CONSTRUCTION

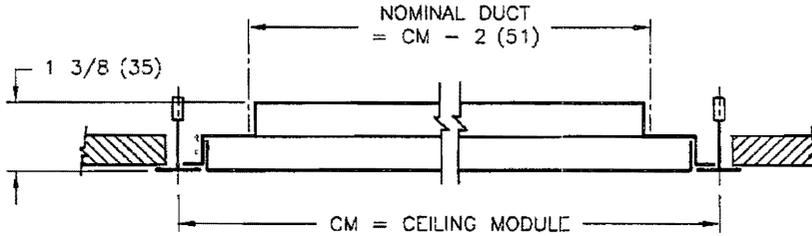
NOTES

- VCS3 IS USED AS A GRILLE AND DIFFUSER ACCESSORY FOR MOUNTING BEHIND THE OUTLET
- TYPE A SLOT OPERATOR IS THE STANDARD OPERATOR VCS3 IS ALSO AVAILABLE WITH A LEVER OPERATOR OR AN EXTERNAL HEX OPERATOR, DEPENDING ON DAMPER APPLICATION
- MINIMUM SIZE = 4 (102) x 2 1/2 (64)
- MAXIMUM SIZE = 24 (610) x 24 (610)
- UNITS LARGER THAN MAXIMUM SIZE WILL BE SUPPLIED IN MULTIPLE DAMPER ARRANGEMENTS
- TYPE "A" OPERATOR MIN SIZE = 4 (102) x 3 (76)
- FACTORY TOLERANCE ± 1/32 (1)

ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING		PRICE [®]	
ENGINEER		R	VCS3
CUSTOMER		219285	OPPOSED BLADE DAMPER
SUBMITTAL DATE 10/02/2009	SPEC SYMBOL	SEP 2008	

PDDR, APDDR PLENUM RETURN PERFORATED DIFFUSER



	CEILING MODULE (CM)	NOM. DUCT SIZE (SQUARE)	
<input type="checkbox"/>	12x12	10x10	PDDR STYLE 1 ONLY
<input type="checkbox"/>	12x12	8x8	
<input type="checkbox"/>	24x12	22x10	
<input type="checkbox"/>	16x16	14x14	
<input checked="" type="checkbox"/>	20x20	18x18	PDDR STYLE 1 & 3 ONLY
<input type="checkbox"/>	24x24	22x22	
<input type="checkbox"/>	24x24	20x20	
<input type="checkbox"/>	48x24	46x22	
<input type="checkbox"/>	300x300	249x249	METRIC
<input type="checkbox"/>	600x300	549x549	
<input type="checkbox"/>	400x400	349x349	
<input type="checkbox"/>	500x500	449x449	
<input type="checkbox"/>	600x600	549x549	
<input type="checkbox"/>	1200x600	1149x549	

17 NARROW MEMBER FRAME AVAILABLE ONLY IN 12x12, 24x12 24x24 CEILING MODULES

MATERIAL

- PDDR - STEEL CONSTRUCTION
- [REDACTED]
- [REDACTED]

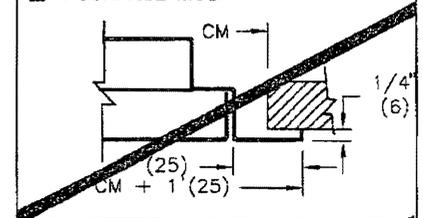
FINISH

- B12 WHITE
- [REDACTED]

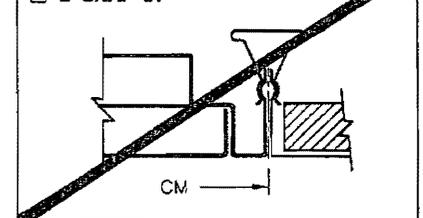
ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

FRAMES

- 1 SURFACE MOUNT

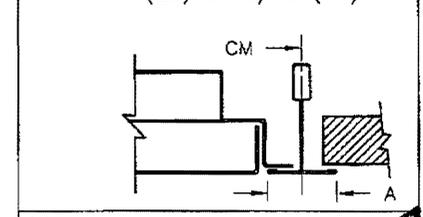


- 2 SNAP-IN

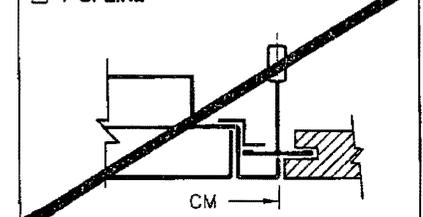


- 3 T-BAR

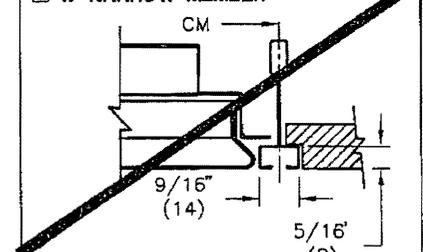
A = 1" (25) or 9/16" (14)



- 4 SPLINE



- 17 NARROW MEMBER



PROJECT	PDX DEICING
ENGINEER	
CUSTOMER	
SUBMITTAL DATE	10/02/2009
SPEC SYMBOL	CR

price®

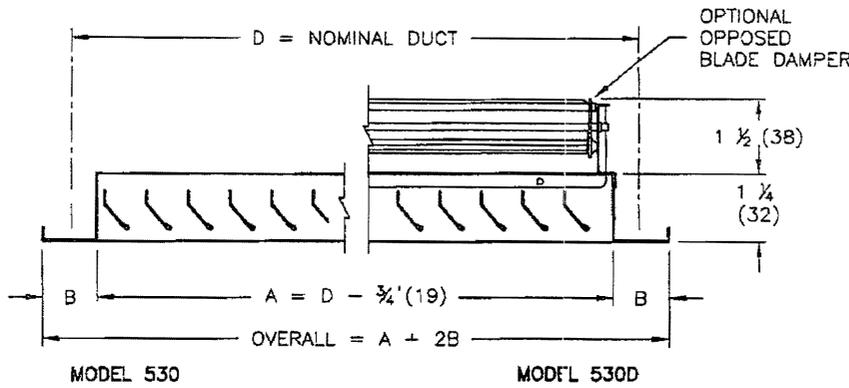
R

PDDR, APDDR
PERFORATED DIFFUSER
FOR NON-DUCTED
RETURN APPLICATIONS

219145

JAN 2009

500 RETURN GRILLES & REGISTERS



MATERIAL

- STEEL CONSTRUCTION

FINISH

- ✕ B12 WHITE

OPTION

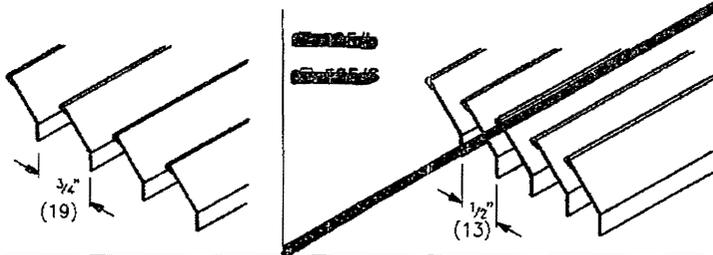
- ✕ C/W COATED STEEL OPPOSED BLADE DAMPER (SPECIFY 530D OR 535D)

NOTE

- TYPE A FASTENING - COUNTERSUNK SCREWHOLES FOR NO 8 SMS PER FACTORY STANDARD (SCREWS SUPPLIED)
- AVAILABLE SIZES
MIN - 6" X 4" (152 X 102)
MAX - 48" X 48" (1219 X 1219)
(ONE PIECE CONSTRUCTION)
- OVERSIZE UNITS AVAILABLE C/W DUCT MOUNTING CHANNEL
- BLADE ORIENTATION - FRONT SET
- L = PARALLEL TO LONG DIMENSION
- S = PARALLEL TO SHORT DIMENSION

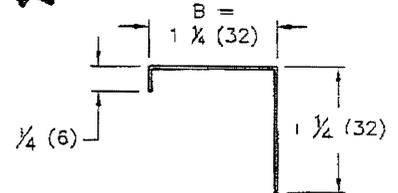
CORE STYLES

- ✕ 530/L
- ✕ 530/S

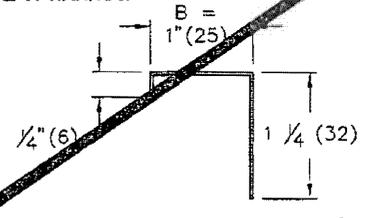


BORDERS

✕ F FLAT

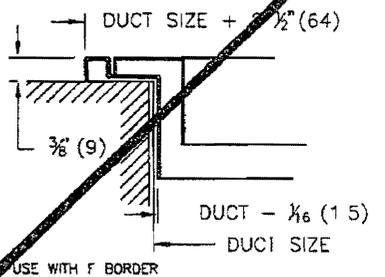


□ N NARROW

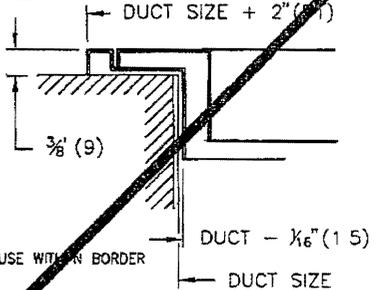


MOUNTING FRAMES

□ D



□ T

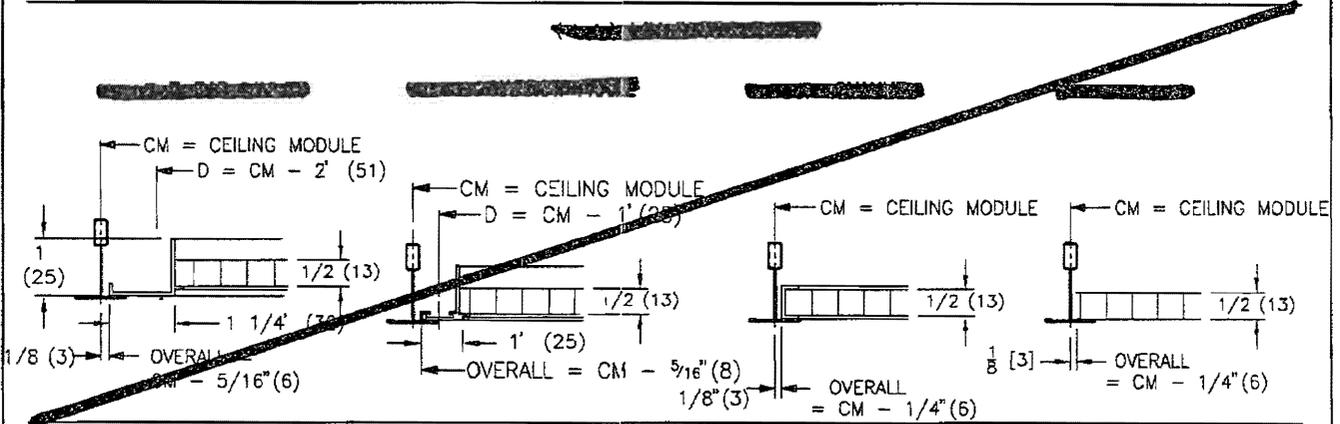
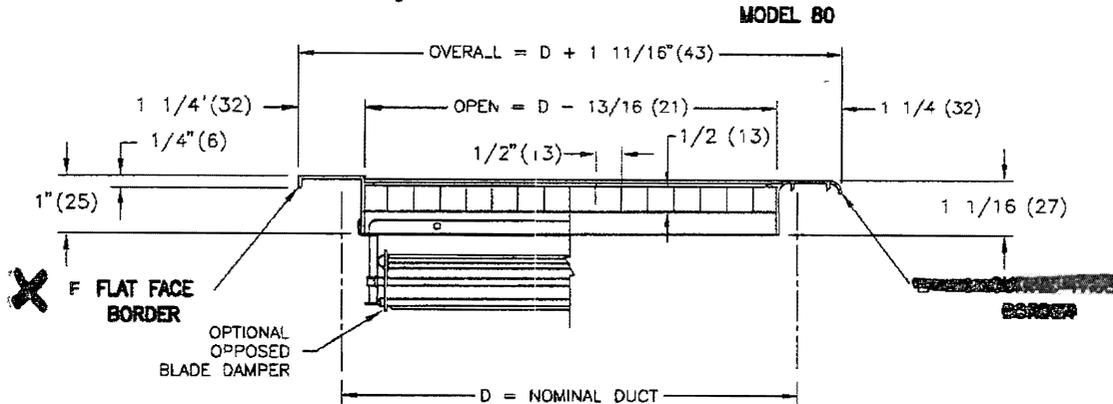


ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING		PRICE	
ENGINEER		RV	530/535
CUSTOMER		219695	STEEL RETURN GRILLES & REGISTERS
SUBMITTAL DATE 10/02/2009	SPEC SYMBOL CR,HE,HR	JULY 2009	

80 RETURN GRILLES & REGISTERS

→ (S W) SIDEWALL APPLICATION



FINISH

X B12 WHITE

MATERIAL

- ALUMINUM CONSTRUCTION

OPTIONS

- FOR OPTIONAL MOUNTING OR BORDERS REFER TO SHEET 2
- X** MODEL 80DAL c/w ALUMINUM OPPOSED BLADE DAMPER NOT AVAILABLE WITH CH & 80 CORE

NOTES

- TYPE A FASTENING - COUNTERSUNK SCREW HOLES FOR NO 8 S M S PER FACTORY STANDARD (SCREWS SUPPLIED)
- AVAILABLE SIZE
MINIMUM DUCT SIZE = 6 X 4 (152 X 102)
MINIMUM DUCT SIZE NF FRAME = 6" X 3" (152 X 76)
MAXIMUM WITHOUT MULLION 48" X 24" (1219 X 610)
- OVERSIZED GRILLE WITH MULLION AVAILABLE UP TO 96" X 48" (2438 X 1219) ONE PIECE FRAME CONSTRUCTION
- UNITS OVER 96" X 48" (2438 X 1219) SUPPLIED IN SECTIONS c/w DUCT MOUNTING CHANNEL
- CH (CHANNEL) UNITS OVER 48" X 24" (1219 X 610) SUPPLIED IN SECTIONS c/w DUCT MOUNTING CHANNEL
- CORE ONLY UNITS MAXIMUM SIZE 48" X 24" (1219 X 610)

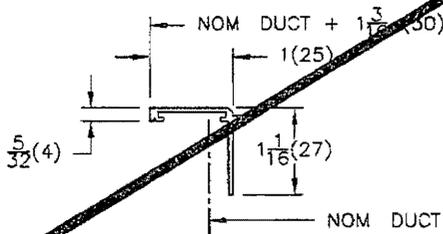
ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING		PRICE®	
ENGINEER		R	80 SERIES ALUMINUM RETURN GRILLES & REGISTERS
CUSTOMER			
SUBMITTAL DATE 10/02/2009	SPEC SYMBOL CE	APRIL 2009	

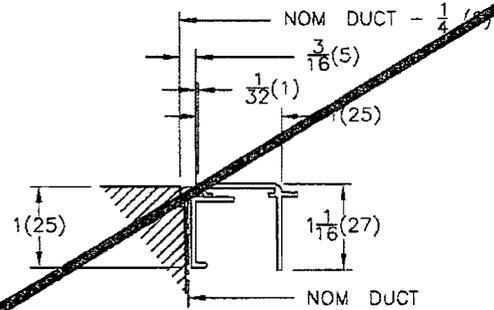
'80 SERIES MOUNTING AND OPTIONAL BORDERS

BORDERS

N NARROW MARGIN



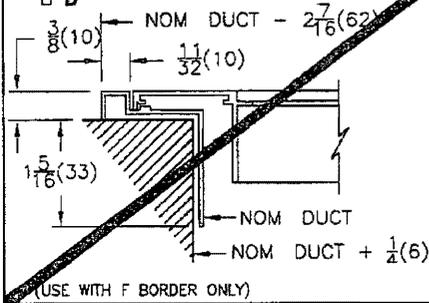
ED EXPOSED DUCT



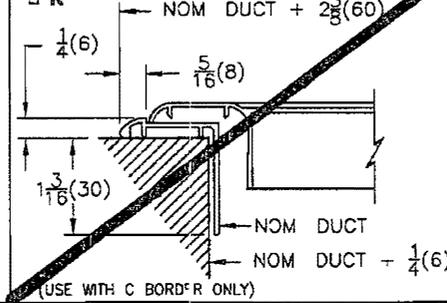
APPLICATION IS SUPPLIED COMPLETE WITH BORDER AND DUCT MOUNTING FRAME

MOUNTING FRAMES

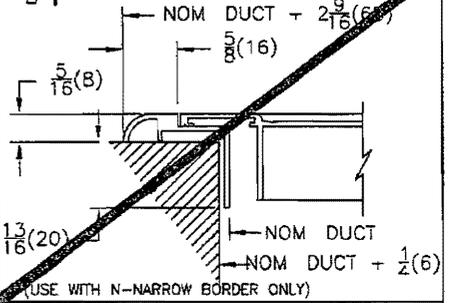
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K

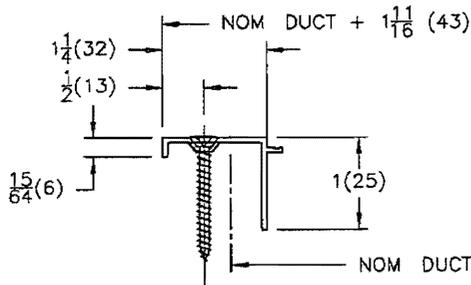


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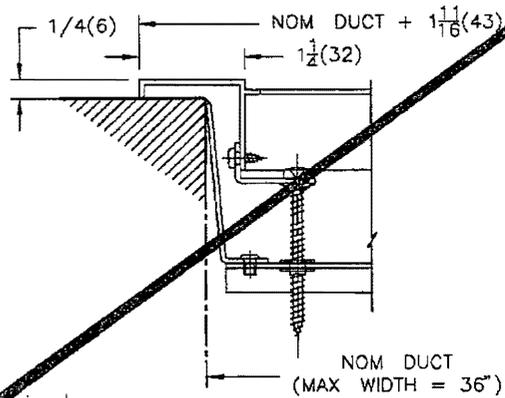


FASTENING

A COUNTER SUNK SCREW



C CONCEALED BRACKET



ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING



ENGINEER

R

00 SERIES

CUSTOMER

222015

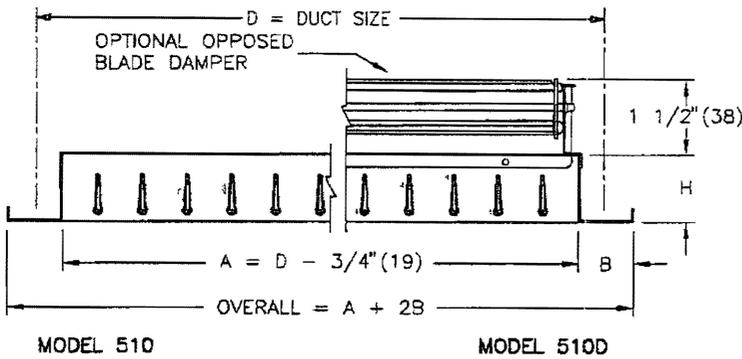
MOUNTING OPTIONS
AND BORDERS

SUBMITTAL DATE 10/02/2009

SPEC SYMBOL CE

APRIL 2009

500 SUPPLY GRILLES & REGISTERS



MATERIAL

- STEEL CONSTRUCTION

FINISH

B12 WHITE

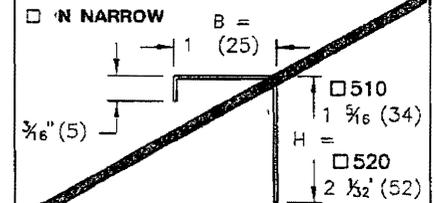
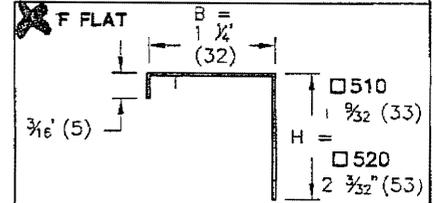
OPTION

C/W COATED STEEL OPPOSED BLADE DAMPER (SPECIFY 510D OR 520D)

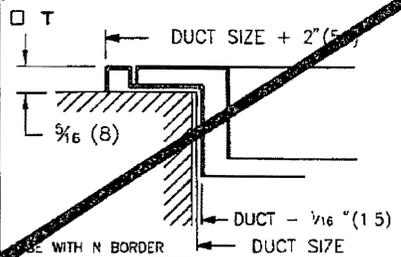
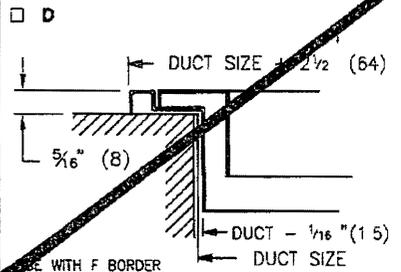
NOTE

- STANDARD CONSTRUCTION WITH A MULLION A MULLION IS PROVIDED WHEN NOMINAL SIZE GRILLE DIMENSIONS EXCEED 24" (610) FOR UNEVEN NOMINAL SIZE GRILLE DIMENSIONS EG 45X6 THE MULLION IS POSITIONED 1/2" (12) FROM THE CENTRE OF THE GRILLE
- INDIVIDUALLY ADJUSTABLE BLADES
- TYPE A FASTENING - COUNTERSUNK SCREWHOLES FOR NO 8 SMS PER FACTORY STANDARD (SCREWS SUPPLIED)
- AVAILABLE SIZES
MIN - 6" X 4" (152 X 102)
MAX - 36" X 36" (914 X 914)
(ONE PIECE CONSTRUCTION)
- OVERSIZE UNITS AVAILABLE C/W NARROW FLANGE OR DUCT CHANNEL
- BLADE ORIENTATION - FRONT SET
- L = PARALLEL TO LONG DIMENSION
- S = PARALLEL TO SHORT DIMENSION

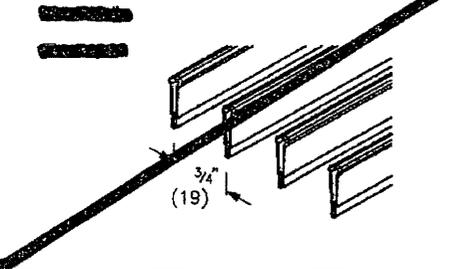
BORDERS



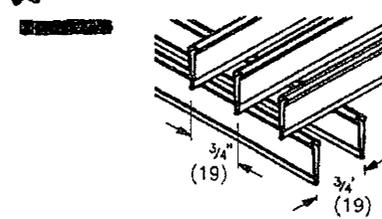
MOUNTING FRAMES



CORE STYLES

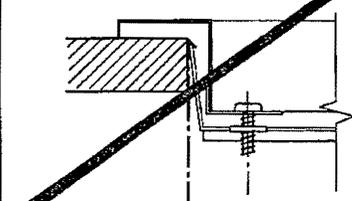


520/L



FASTENING

C- CONCEALED BRACKET



ALL METRIC DIMENSIONS () ARE SOFT CONVERTED IMPERIAL DIMENSIONS ARE CONVERTED TO METRIC AND ROUNDED TO THE NEAREST MILLIMETER

PROJECT PDX DEICING



ENGINEER

R

510/520

CUSTOMER

219693

STEEL SUPPLY GRILLES & REGISTERS

SUBMITTAL DATE 10/02/2009

SPEC SYMBOL HS

OCT 2008



Phone 503-234-5071
2220 SE Ninth Ave , Portland, OR 97214
Fax 503-233-0451
800-848-5199

SUBMITTAL

PROJECT Portland International Airport Deicing
LOCATION Portland, OR
ARCHITECT _____
ENGINEER _____
CONTRACTOR Jacobs Heating & A/C
DATE SUBMITTED 10 2 09
CONTRACTOR P O _____
JAirP CONTACT Mike Leavens/Hal Jacklin
MATERIAL SUBMITTED Louvers
SPECIFICATIONS 89000

WE ARE PLEASED TO SUBMIT THE FOLLOWING LIST OF EQUIPMENT FOR APPROVAL BASED UPON INFORMATION RECEIVED
WE BELIEVE THIS MATERIAL CONFORMS TO THE SPECIFICATIONS IT SHALL REMAIN THE CONTRACTOR'S RESPONSIBILITY
TO VERIFY SIZES AND QUANTITIES PRIOR TO ORDER RELEASE MATERIAL WILL BE RELEASED TO PRODUCTION UPON
RETURN OF APPROVED SUBMITTALS TO JOHNSON AIR PRODUCTS AT 2220 S E 9TH AVE , PORTLAND, OREGON 97214

MANUFACTURER Greenheck

(please see attached literature)

AMCA



Greenheck Fan Corporation certifies that the louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air performance and water penetration ratings. The AMCA licensed performance data has been modified for installation, appurtenances, accessories etc. not included in the certified data. The modified performance is not AMCA licensed but is provided to aid in selection and applications of the air control device.

PERMIT #:

09-150216-DFS 1-CO

Jandek

<input type="checkbox"/> Drawings (8 5x11 or 11x17)	<input type="checkbox"/> Misc Documents
<input type="checkbox"/> Geotech	<input checked="" type="checkbox"/> Structural Calcs, Reports
<input type="checkbox"/> Special Inspections Form	<input type="checkbox"/> Zoning Plan Review
<input type="checkbox"/>	<input type="checkbox"/>



15860 SW Upper Boones Ferry Road
 Lake Oswego, OR 97035-4036
 P: 503-620-4300 F: 503-620-4234
 www.oregonairreps.com

SUBMITTAL

December 11, 2009

Project Portland International Airport
 Deicing System Enhancements
 Portland, OR

Contractor Jacobs Heating and Air Conditioning
 4474 SE Milwaukie Ave
 Portland, OR 97202

Specification Section 238100 – Decentralized Unitary HVAC Equipment
 Part 2 1 Rooftop-Mounted, Variable Speed, Packaged Air-Conditioning Unit

Manufacturer AAON

Quantity	Tag	Model
1	RTU-1	RM-04
1	CF-1	RN-015

460/60/3Φ voltage
 Galvanized steel casing with polyurethane topcoat
 Double wall access doors with stainless hinges
 Supply fan
 Power Exhaust
 Premium efficiency ODP fan motors with factory mounted Yaskawa VFD's
 Factory charged with R-410a refrigerant
 Copeland Scroll compressors
 5 min anti-short cycle delay
 20 second delay timer between stages (TAG CF-1 only)
 Fan cycling
 Fully modulating economizer with actuator and sensible limit
 2" 25% air filters
 Hot water coil (TAG RTU-1 only)
 Factory installed GFI receptacle (field wired by others)
 Non-fused unit disconnect
 Low voltage terminal strip for direct landing of controls by others
 Standard 1 year parts warranty
 5 year compressor parts warranty
 Spring isolated and insulated roof curb with seismic calculations

Notes

- 1 Exception taken to Section 232923 VFD's are factory standard but not specified brand Specified VFD's will not fit within above units or any manufactures unit of same capacity size Factory mounted VFD's do not contain manual bypass Yaskawa VFD's mounted within the above units provided in lieu of specified
- 2 1 ea variable capacity Copeland (digital) scroll can be provided per unit in lieu of factory standard on/off scroll compressors however the digital scroll will require a 24volt enable as well as a 1-5vdc analog signal in order to modulate This signal would be provided by others if supplied Please confirm prior to order if digital scroll compressors are desired Coordination will have to be made for electrical may vary slightly in addition to above stated controls requirement
- 3 Units provided with fan cycling allowing DX cooling operation down to 35° F ambient in lieu of 0° F ambient operation as specified Per code, units will utilize economizer for "free" cooling in low ambient conditions
- 4 Others to provide and install DDC controls

Steve Patnode
 Oregon Air Reps, Inc

10-157995-M7
 10-157995-M7

09-150216-BFS 1-C0

Guide Specifications - RM Model Size 04

TAG RTU-1

A Description

- 1 Self-Contained - Factory assembled and tested, designed for roof or slab installation, and consisting of compressors, condenser, evaporator coil, condenser and evaporator fans, hot water coils, exhaust fans, filters, and dampers

B Construction

- 1 Unit shall be completely factory assembled, piped and wired and shipped in one section
- 2 Unit shall be specifically designed for outdoor rooftop application with a fully weatherproof cabinet
- 3 Cabinet shall be constructed entirely of G90 galvanized steel with the exterior constructed of 20 gauge or heavier material
- 4 Paint finish shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure Unit exterior shall be "Gray" in color
- 5 The unit roof shall be sloped or cross-broken to assure drainage
- 6 Unit specific color coded wiring diagrams shall match the unit color coded wiring and will be provided in both point to-point and ladder form
- 7 Diagrams shall also be laminated in plastic and permanently affixed inside the control compartment
- 8 Access to filters, blower, heating section, and other items needing periodic checking or maintenance shall be through hinged access doors with quarter turn handles Door fastening screws are not acceptable
- 9 Access doors shall have full-length stainless steel hinges and full perimeter gasketing
- 10 All openings through the base pan of the unit shall have upturned flanges of at least 1/2" in height around the opening through the base pan
- 11 Air side service access doors shall have rain break overhangs
- 12 The interior air side of the cabinet on 4 ton model shall be entirely insulated on all exterior panels with 1" thick, 1 1/2 lb density fiberglass insulation
- 13 Unit shall have decals and tags to indicate unit lifting and rigging, service areas and caution areas Installation and maintenance manuals shall be supplied with each unit

C Supply Fan

- 1 Blower shall be entirely self-contained on a slide deck for service and removal from the cabinet
- 2 All direct drive blowers shall have backward curved blades
- 3 Adjustable V-belt drive shall be provided with a minimum rating of 140% of the motor nameplate brake horsepower when the adjustable pulley is at the minimum RPM
- 4 Blowers, drives and motors shall be dynamically balanced

- 5 For VAV systems, VFD drive shall be factory mounted and wired to the fan motor
- 6 Motors shall be premium efficiency Motors for use with a VFD shall be premium efficiency inverter rated only Motors shall have ball bearings rated for 200,000 hours service and external lubrication connections

D Outside Air

- 1 Units shall have a 0-100% economizer consisting of a motor operated outdoor air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals Damper blades shall be gear driven and designed to have no more than 15 CFM of leakage per sq ft of damper area when subjected to 2" w g air pressure differential across the damper Damper motor shall be spring return to ensure closing of outdoor air damper during periods of unit shut down or power failure Barometric relief dampers shall be provided as part of the economizer option

Options

- a Economizer shall be furnished with a sensible temperature activated fully modulating actuator with dual minimum position option

E Optional Fan Sections

- 1 Power Exhaust
 - a Shall use a belt drive forward curved fan
 - b The control shall be on-off with a VFD factory mounted and wired to the fan motor
 - c Exhaust air relief dampers shall be sized for 100% relief
 - d Fan and motor shall be dynamically balanced
 - e Motors shall be premium efficiency Motors for use with a VFD shall be premium efficiency inverter rated only Motors shall have ball bearings rated for 200,000 hours service and external lubrication connections

F Condenser Options

- 1 Air-Cooled Condenser Section
 - a The condensing section shall be equipped with vertical discharge axial flow direct drive fans Direct drive fans shall be directly connected to and supported by the motor shaft
 - b The condenser coils shall be sloped at least 30° to protect the coils from damage
 - c Condenser coils shall be copper tubes with aluminum fins mechanically bonded to the tubes
 - d Condenser coil fin design shall be sine wave rippled
 - e Condenser coils to be sized for a minimum of 10°F of refrigerant sub-cooling

G Filters

- 1 4 ton model sizes shall have 2" thick fiberglass throwaway filters with an ASHRAE efficiency of 25% and a MERV rating of 4

H Evaporator Coils

- 1 Evaporator coil shall be copper tube with aluminum fins mechanically bonded to the tubes
- 2 Evaporator coil fin design shall be sine wave rippled
- 3 Evaporator coil shall have galvanized steel end casings
- 4 Evaporator coil shall have equalizing type vertical tube headers
- 5 Evaporator coil shall be furnished with a thermostatic expansion valve
- 6 Evaporator coil shall be furnished with a double sloped drain pan for the positive drainage of condensate

I Refrigeration System

- 1 Compressors shall be scroll type with internal thermal overload protection and mounted on the compressor manufacturer's recommended rubber vibration isolators
- 2 Compressors shall carry a 5 year non pro-rated warranty
- 3 Each compressor shall be individually stage for capacity control All units over 7 tons shall be multiple stage and shall have a minimum of 2 stages of capacity control
- 4 Compressors shall be mounted in an isolated compartment to permit operation of the unit without affecting air flow when the door to the compartment is open
- 5 Compressors shall be isolated from the base pan and supply air to avoid any transmission of noise from the compressor into the building area
- 6 Each refrigerant circuit shall be equipped with thermostatic expansion valve type refrigerant flow control
- 7 Each refrigerant circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant controls
- 8 Each refrigeration circuit shall be equipped with Schrader type service fittings on both the high pressure and low pressure sides
- 9 Each refrigeration circuit shall be equipped with refrigerant liquid line driers
- 10 Unit shall be fully factory charged with R-410A refrigerant

Options

- a Hot gas bypass shall be provided on the first refrigerant circuit
- b Unit shall be equipped with a 5 minute anti-short cycle delay timer for each stage
- c First stage cooling shall be provided with condenser fan cycling to allow operation down to 35°F

J Hot Water Coils

- 1 Unit shall be provided with a 1 ~~row~~ row hot water heating coil, with copper tubes and aluminum fins mechanically bonded to the tubes
- 2 Hot water coil fin design shall be sine wave rippled

K Controls

- 1 Field Installed DDC Controls by Others

L Power Options

- 1 Unit shall be provided with a factory installed and wired non-fused internal disconnect
- 2 Unit shall be provided with a factory installed and field wired 115 volt, 20 amp ground fault service receptacle to be field wired



Unit Rating

2425 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 583 2266 Fax (918) 583 6094
AAONEcat32 Ver 4 141 (SN 7050384 AR0GD7UL)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RM - A04 - 3 - 0 - BA01 - EHN : BEAC - COA - DBD - 000 - GA0A00H - 00 - 00000000B
Tag RTU-1

Job Information

Job Name PIA DEICING
Job Number
Site Altitude 0 ft
Refrigerant R 410A

Unit Information

Approx Op /Ship Weights 992 / 992 lbs
Supply CFM/ESP 1600 / 1 75 m ug
Final-Filter FV / Qty 180 00 fpm / 4
Exhaust CFM/ESP/TSP 1600 / 0 25 / 0 56 m ug
Outside CFM 480
Ambient Temperature 95 °F DB / 75 °F WB
Return Temperature 75 °F DB / 62 °F WB

Static Pressure

External 1 75 m wg
Evaporator 0 23 m ug
Filters Clean 0 07 m wg
Dirt Allowance 0 15 m ug

Economizer 0 05 m ug
Heating 0 10 m ug

Total 2 35 m wg

Cooling Section

	Gross	Net
Total Capacity	48 78	45 32 MBH
Sensible Capacity	38 84	35 38 MBH
Latent Capacity	9 94 MBH	
Mixed Air Temp	80 00 °F DB	67 00 °F WB
Entering An Temp	80 00 °F DB	67 00 °F WB
Lv Air Temp (Coil)	57 09 °F DB	56 99 °F WB
Lv Air Temp (Unit)	59 06 °F DB	57 75 °F WB
Supply An Fan	1 x 150 @ 1 08 BHP	
SA Fan RPM / Width	1833 / 5 160'	
Exhaust An Fan	1 x RM12X9 @ 0 39 BHP	
EA Fan RPM	741	
Evaporator Coil	4 7 ft - / 3 Rows / 14 FPI	
Evaporator Face Velocity	338 8 fpm	

Heating Section

PreHeat Type Std (No Preheat)
Heating Type Hot Water Heat
Heating CFM 1600
Total Capacity 67 6 MBH
OA Temp 10 0 DB / 9 0 °F WB
RA Temp 75 0 °F DB / 62 0 °F WB
Entering An Temp 60 0 °F DB / 45 0 °F WB
Leaving An Temp 98 4 °F DB / 60 6 °F WB
Entering Water 180 0 °F
Leaving Water 170 7 °F
GPM / Head 15 / 4 7 ft
Water Velocity 3 25 fps
FA / RD / FPI / FV 3 27 ft² / 1 / 12 / 489 8

EER - ARI Listing Information

SEER @ ARI Conditions 13 0 Application EER @ Op Conditions 9 5

Electrical Data

Rating	460/3/60	Minimum Circuit Amp	14				
Unit FLA	13	Maximum Overcurrent	20				
	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1	1		460	3			6 2
Condenser Fans	1	0 33	460	1	1075	1 1	
Supply Fan	1	2 00	460	3	1760	3 4	
Exhaust Fan	1	1 00	460	3	1760	2 1	

Cabinet Sound Power Levels*

Octave Bands	63	125	250	500	1000	2000	4000	8000
Discharge LW(dB)	78	73	77	82	76	77	70	61
Return LW(dB)	80	72	67	65	61	60	54	47

*Sound power levels are given for informational purposes only. The sound levels are not guaranteed.



15.0" STAR Plenum

2425 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 583 2266 Fax (918) 583 609-
AAONEcat32 Ver 4 141 (SN 7050384 AR0GD7UL)

JOB INFORMATION

Job Name *PIA DEICING*
 Job Tag *RTU 1*
 Rep Firm
 Date *12/10/2009*

WHEEL SPECIFICATION

Max RPM *2,200*
 Diameter x Qty *15 0 in x 1*
 Width% *100*
 Tip Speed *7,198 FPM*
 Inertia *3 WR²*

OPERATING CONDITIONS

Air Flow *1,600 CFM*
 Static Pressure *2 35 in Wg*
 Plenum DP *0 00 in Wg*
 Inlet Grill DP *0 00 in Wg*
 TSP *2 35 in Wg*
 Site Altitude *0 00 Ft*
 TSP @ Sea Level *2 35 in Wg*

MOTOR SELECTION

Rated HP / Bypass *2 / No*
 Frame Size *145T*
 Nominal RPM *1760*
 VAC/PH/HZ *460/3/60*
 Efficiency *Premium / 0 865*
 Enclosure Type *ODP*
 Max Inertial Load *27 WR²*

FAN PERFORMANCE

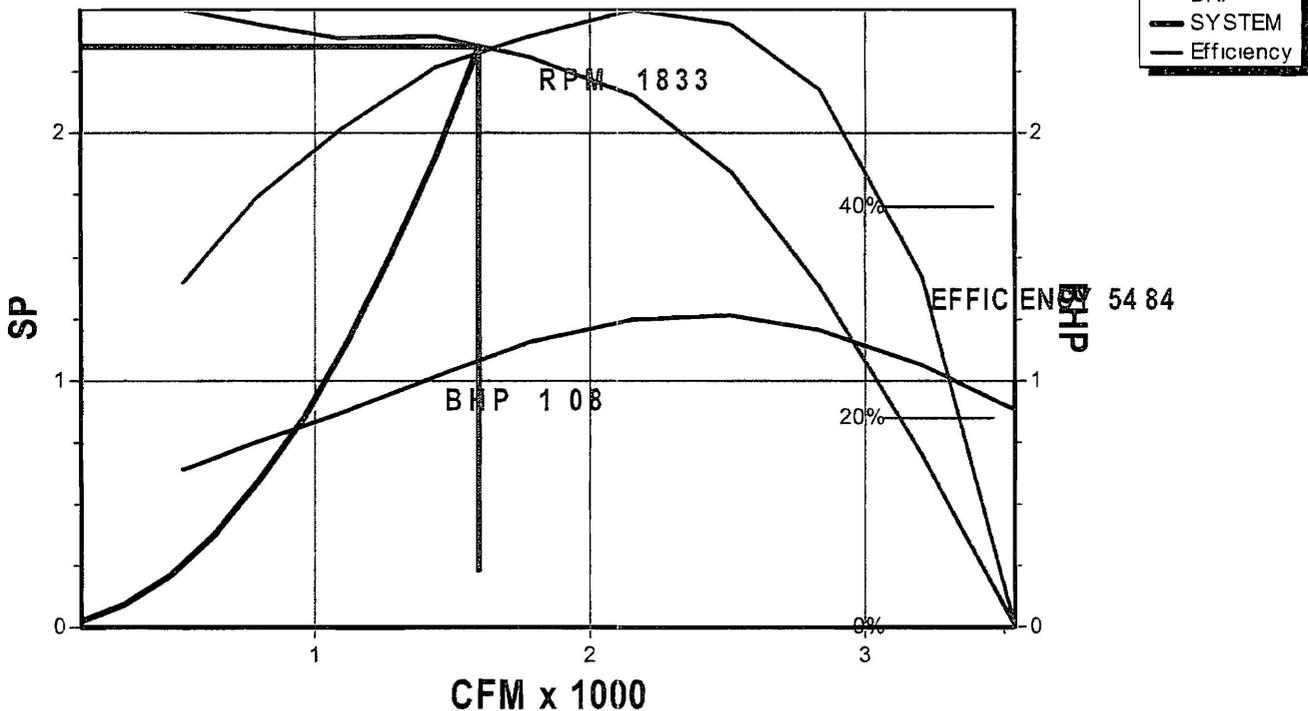
RPM *1833*
 BHP *1 08*
 Efficiency *54 8%*
 In/Out Velocity *812/630 FPM*
 Plenum Out Velocity *27 FPM*

FAN SOUND POWER (Inlet/Outlet)

Octave Band	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	71	71	75	77	69	70	68	62
	71	71	77	84	79	80	74	65

SOUND POWER A-Weighted *77 / 84 dB*

Supply Fan Model: 150 @ 1833 RPM and 100% Width
 Design Conditions: 1600 CFM @ 2.35" SP





12X9 FC Fan

2425 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 583 2266 Fax (918) 583 6094
AAONEcat32 Ver 4 141 (SN 70-0384-AR0GD7UL)

JOB INFORMATION

Job Name *PIA DEICING*
Job Tag *RTU 1*
Rep Firm
Date *12/10/2009*

WHEEL SPECIFICATION

Max RPM *1,440*
Diameter x Qty *11 0 in x 1*
CFM *1600*
Tip Speed *2,134 FPM*
Inertia *3 WR'*

OPERATING CONDITIONS

Air Flow *1,600 CFM*
Static Pressure *0 25 in Wg*
Relief Dampers DP *0 31 in Wg*

TSP *0 56 in Wg*
Site Altitude *0 00 Ft*
TSP @ Sea Level *0 56 in Wg*

MOTOR SELECTION

Rated HP / Bypass *1 / No*
Frame Size *143T*
Nominal RPM *1760*
VAC/PH/HZ *460/3/60*
Efficiency *Premium / 0 855*
Enclosure Type *ODP*
Max Inertial Load *15 WR'*

FAN PERFORMANCE

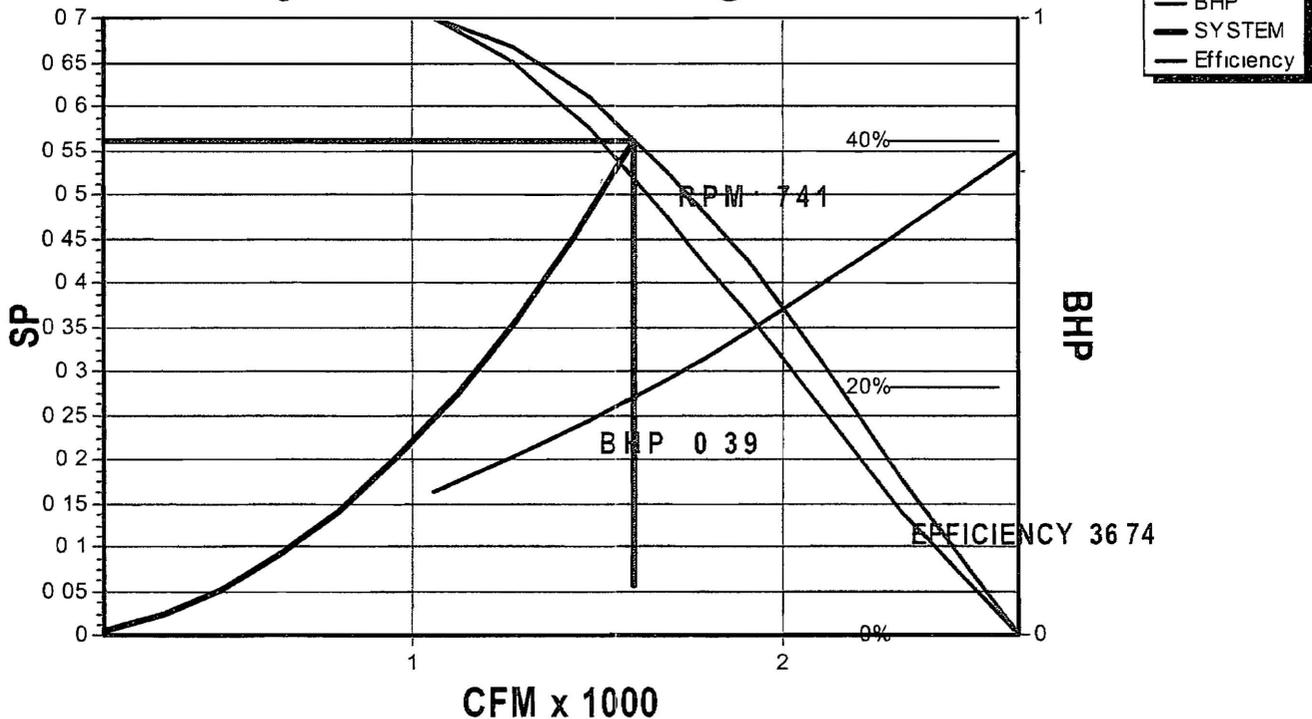
RPM *741*
BHP *0 39*
Efficiency *36 7%*
In/Out Velocity *812/630 FPM*
Plenum Out Velocity *27 FPM*

FAN SOUND POWER (Inlet/Outlet)

Octave Band	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	80	71	64	65	59	54	49	44
	80	71	64	65	59	54	49	44

SOUND POWER A-Weighted *80 / 80 dB*

Exhaust Fan Model: RM12X9 @ 741 RPM and 100% Width
Design Conditions: 1600 CFM @ 0.56" SP





Unit Submittal

2420 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 583 2266 Fax (918) 583 6094
AAONEcat3.2 Ver 4 141 (SN 7050384 AR0GD7UL)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RM-A04-3-0-BA01-EHN:BEAC-C0A-DBD-000-GA0A00H-00-00000000B
Tag RTU-1

Job Name
Job Number

PIA DEICING

Unit Submittal For
Unit Submittal Date

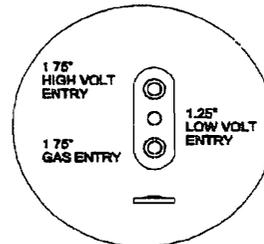
December 09 2009

	Base Option	Description
R	Series	Roof Top Unit
M	Generation	Eighth Generation
004	Unit Size	Four
3	Voltage	460V/3Ø/60Hz
0	Interior Protection	Standard
B	Refrigerant Style	R 410A
A	Unit Configuration	Air Cooled Cond + Std Evap Coil
0	Coil Coating	Standard
1	Cooling/Heat Pump Staging	1 Stage
E	Heating Type	Hot Water Standard Coil
H	Heating Designation	1 Row Coil
N	Heating Staging	Half Serpentine 12 FPI

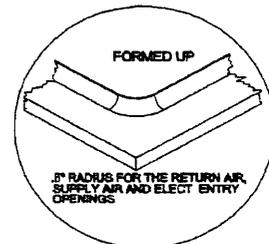
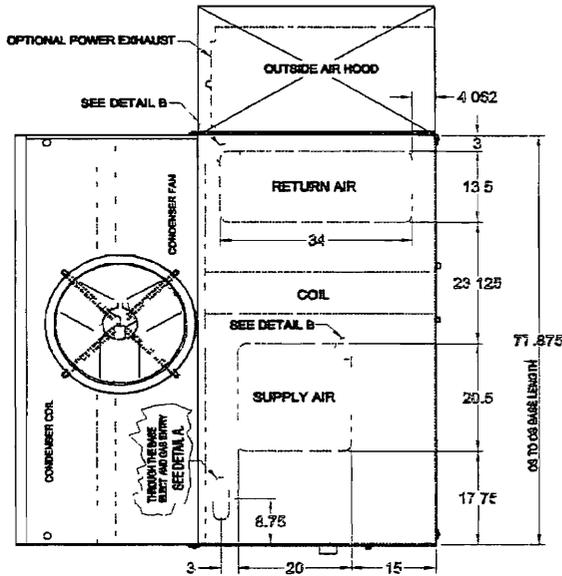
	Feature Option	Description
B	1A RA/OA Section	Economizer + Power Exhaust
E	1B RA/EA Blower Configuration	1 Blower - Premium Efficiency Motor + 1 VFD
A	1C RA/EA Blower	12 x 9 Forward Curved
C	1D RA/EA Blower Motor	1.0 hp 1760 rpm
C	2 OA Control	Fully Modulating Actuator Sensible Limit
0	3 Heat Options	Standard
A	4 Maintenance Options	115V Convenience Outlet Field Wired
D	5A SA Blower Configuration	1 Blower - Premium Efficiency Motor + 1 VFD
B	5B SA Blower	15 Backward Curved Plenum
D	5C SA Motor	2.0 hp 1760 rpm
0	6A Pre Filter Type	Standard None
0	6B Unit Filter Type	2 Throwaway
0	6C Filter Options	Standard
G	7 Refrigeration Control	5 MTDR Off + Fan Cycling
A	8 Refrigeration Options	Hot Gas Bypass Lead Stage
0	9 Refrigeration Accessories	Standard
A	10 Power Options	Power Switch 100 amps
0	11 Safety Options	Standard
0	12 Controls	Standard
H	13 Special Controls	Field Installed DDC Controls by Others
0	14A Preheat Configuration	Standard None
0	14B Preheat Sizing	Standard None
0	15 Blank	Standard
0	16 Interior Cabinet Options	Standard
0	17 Exterior Cabinet Options	Standard
0	18 Customer Code	Standard
0	19 Code Options	Standard ETL U S A Listing
0	20 Coating	Standard
0	21 Water Cooled Cond	Standard None
0	22 Control Vendors	Standard
B	23 Type	Standard Includes AAON Gray Paint

RM SERIES A-CABINET WITH ECONOMIZER AND POWER EXHAUST OPTIONS ~ 2-7 TON

CLEARANCES	
LOCATION	UNIT SIZE
	2 3-4 5 6 7
RETURN AIR (BACK)	36
VENT SIDE (FRONT)	48
LEFT SIDE	6
RIGHT SIDE	48
TOP	UNOBSTRUCTED

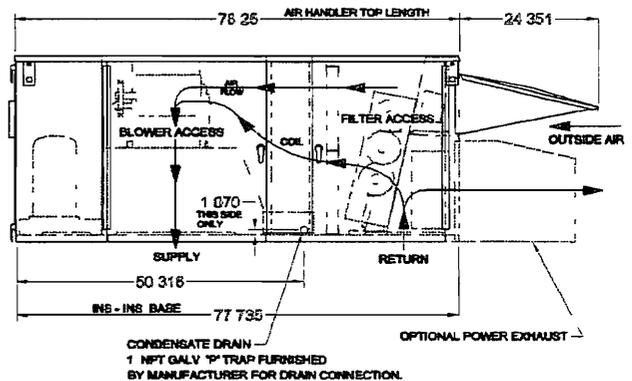
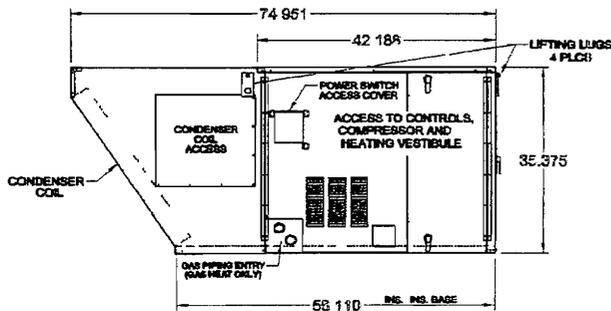


DETAIL A



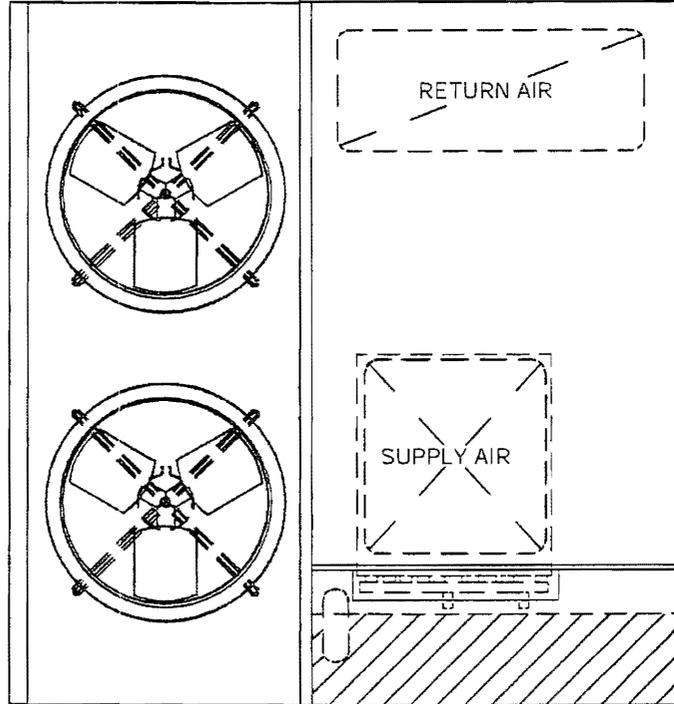
DETAIL B

NUMBER OF CONDENSER FANS
2-5 TON - 1 FAN
6-7 TON - 2 FANS



NOTES. RMA-00018 REV.A 09/23/09 SJS
ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE UNLESS NOTED OTHERWISE
ALLOW 625" SCREW CLEARANCE AROUND UNDERSIDE OF BASE.

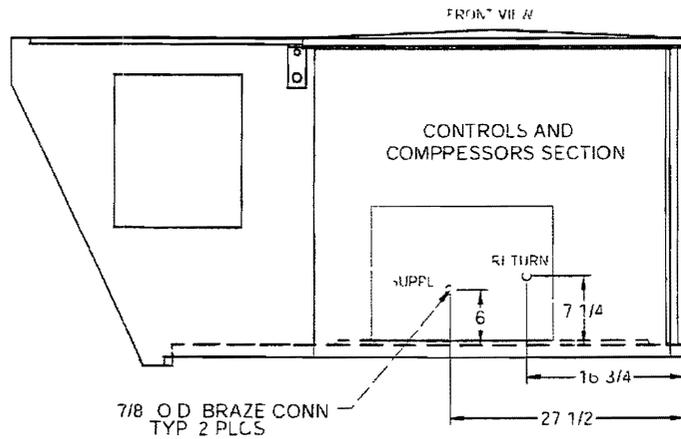
→ A Cabinet (2-7 Tons) Hot Water Heating Coil Piping
 RU-1



NOTE COIL IS SLOPED TO THE HEADER SIDE

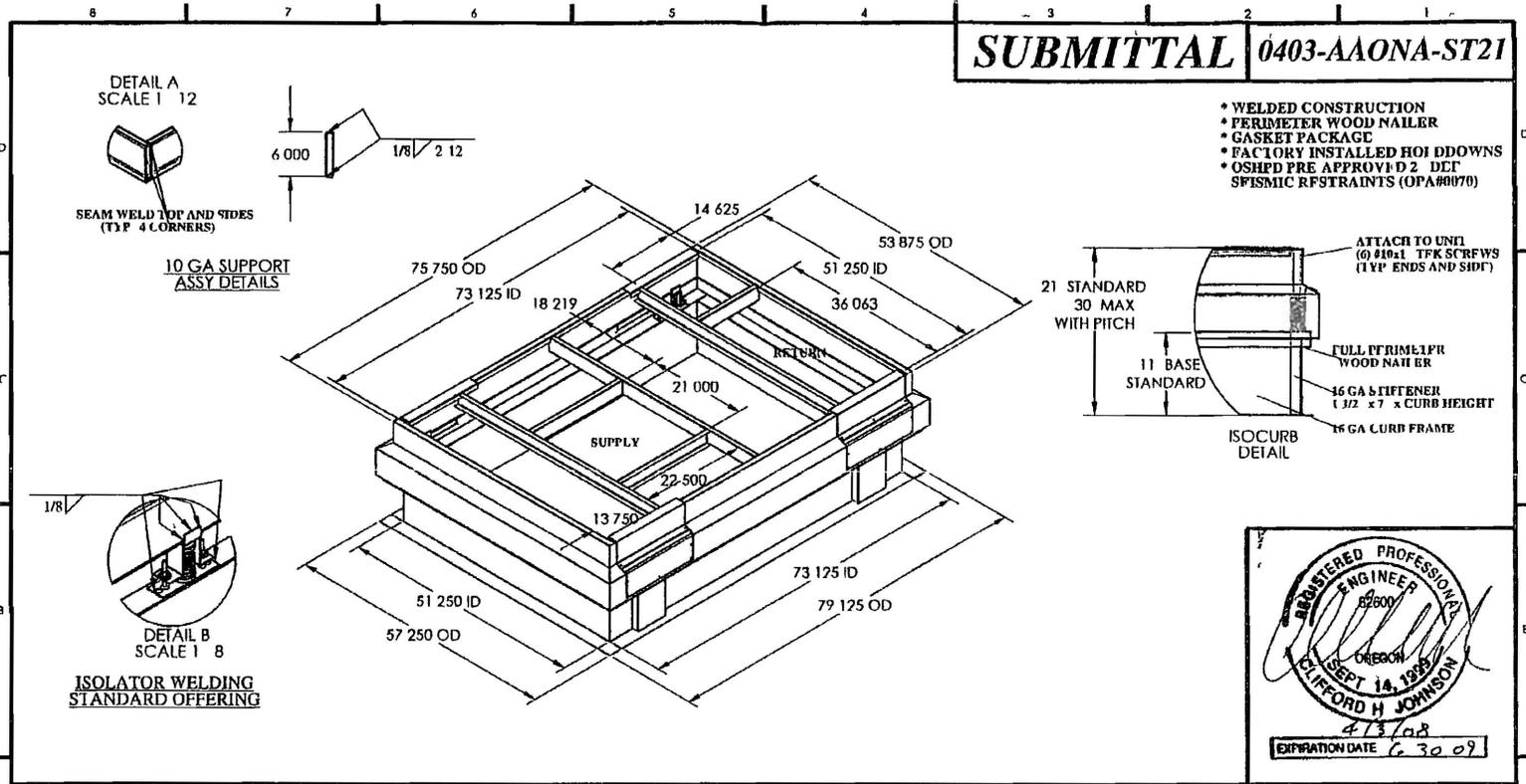
NOTE 

Coil piping can be brought up through service entry
 Shaded area represents possible routing for piping

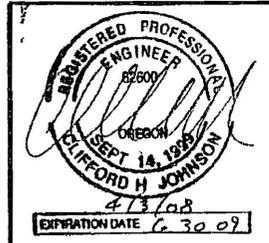


ALL DIMENSIONS SHOWN ARE IN INCHES
 DIMENSIONS ARE FOR REFERENCE ONLY

SUBMITTAL 0403-AAONA-ST21



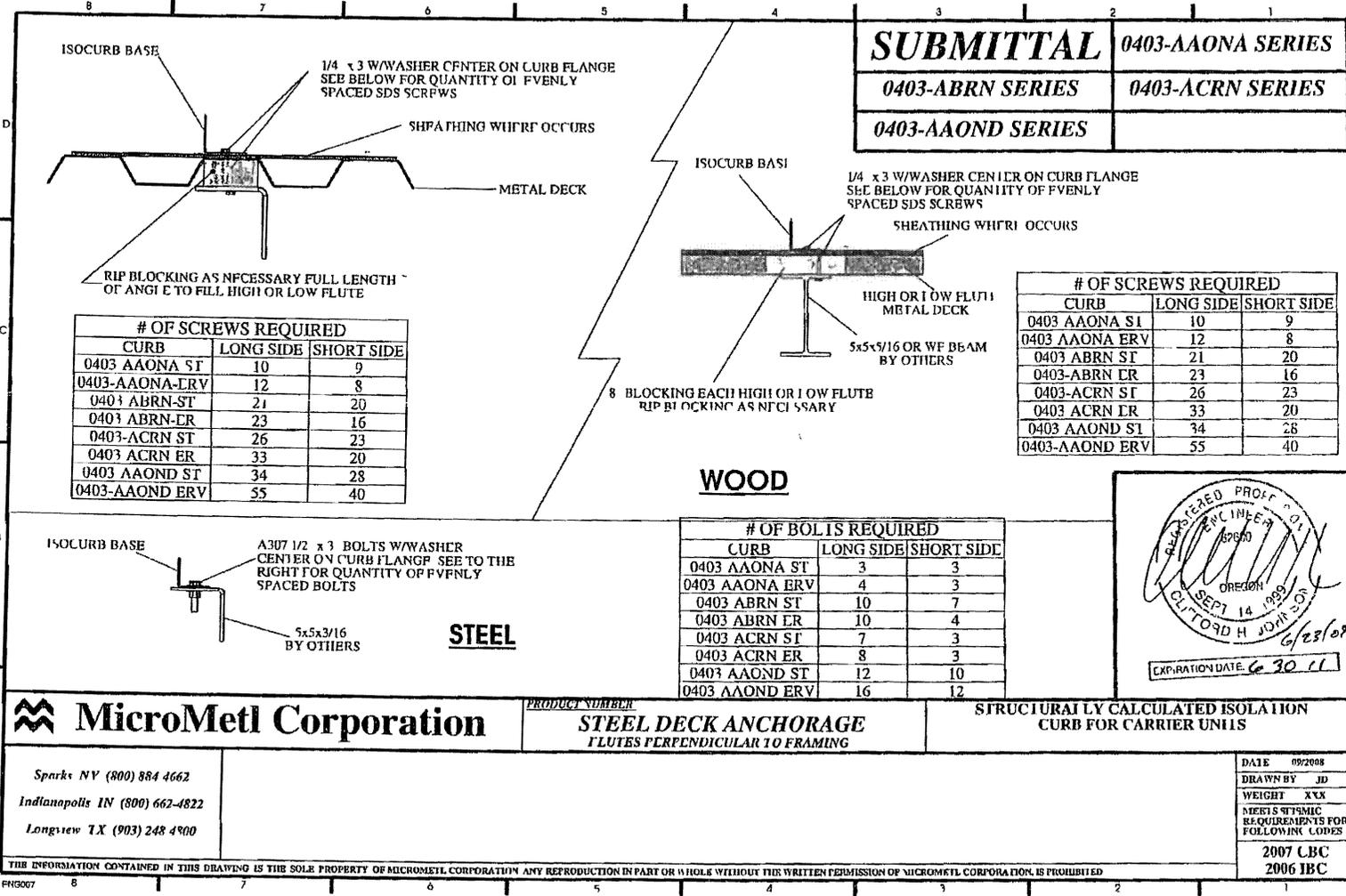
- WELDED CONSTRUCTION
- PERIMETER WOOD NAILER
- GASKET PACKAGE
- FACTORY INSTALLED HOI DDOWNS
- OSHRD PRE APPROVED 2 DEF SFISMIC RFSTRAINTS (OPA#0070)



		PRODUCT NUMBER 0403-AAONA-ST 0403 AAONA ST21 21" TALL ISOLATION CURBS		STRUCTURALLY CALCULATED VIBRATION ISOLATION CURB FOR AAONA STANDARD AND POWER EXHAUST CABINET, RM 02 07	
Sparks, NV (800) 884-4662 Indianapolis, IN (800) 662-4822 Longview TX (903) 248 4800		ANCHORAGE DETAILS TO ROOF		DATE 02/2008 DRAWN BY JD WEIGHT 323 MEETS SEISMIC REQUIREMENTS FOR FOLLOWING CODES 2007 CBC 2006 IBC	
STEEL ATTACHMENT SEE STEEL ATTACHMENT DETAIL SHEETS		WOOD ATTACHMENT (DOUGLAS FIR) (8) 1/4 x 3 SIMPSON SDS W/WASHER CENTER ON CURB FLANGE EVENLY SPACED, (10) EACH LONG SIDE (9) EACH SHORT SIDE		CONCRETE ATTACHMENT (3000 PSI MINIMUM 4" MIN THICKNESS) (6 MIN EDGE DISTANCE) (12) 1/2 SIMPSON TITEN HD EVENLY SPACED CENTER ON CURB FLANGE 8 MIN SPACING (3) EACH LONG SIDE, (3) EACH SHORT SIDE	

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RTU-1 CURB



SUBMITTAL	0403-AAONA SERIES
0403-ABRN SERIES	0403-ACRN SERIES
0403-AAOND SERIES	

OF SCREWS REQUIRED

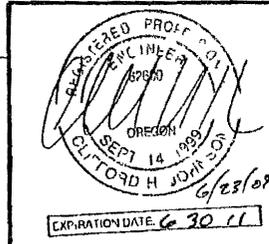
CURB	LONG SIDE	SHORT SIDE
0403-AAONA ST	10	9
0403-AAONA-ERV	12	8
0403-ABRN-ST	21	20
0403-ABRN-ER	23	16
0403-ACRN ST	26	23
0403-ACRN ER	33	20
0403-AAOND ST	34	28
0403-AAOND ERV	55	40

OF SCREWS REQUIRED

CURB	LONG SIDE	SHORT SIDE
0403-AAONA ST	10	9
0403-AAONA-ERV	12	8
0403-ABRN ST	21	20
0403-ABRN ER	23	16
0403-ACRN ST	26	23
0403-ACRN ER	33	20
0403-AAOND ST	34	28
0403-AAOND ERV	55	40

OF BOLTS REQUIRED

CURB	LONG SIDE	SHORT SIDE
0403-AAONA ST	3	3
0403-AAONA-ERV	4	3
0403-ABRN ST	10	7
0403-ABRN ER	10	4
0403-ACRN ST	7	3
0403-ACRN ER	8	3
0403-AAOND ST	12	10
0403-AAOND ERV	16	12



MicroMetl Corporation

PRODUCT NUMBER
STEEL DECK ANCHORAGE
FLUTES PERPENDICULAR TO FRAMING

STRUCTURALLY CALCULATED ISOLATION CURB FOR CARRIER UNITS

Sparks NY (800) 884 4662
Indianapolis IN (800) 662-4822
Longview TX (903) 248 4800

DATE 09/2008
DRAWN BY JD
WEIGHT XXX
MEET SEISMIC REQUIREMENTS FOR FOLLOWING CODES
2007 CBC
2006 IBC

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RTV-1

BJG ARCHITECTURE + ENGINEERING

Reno NV
Las Vegas NV
Pleasanton CA

Structural Calculations

BJG# 20080043

Project

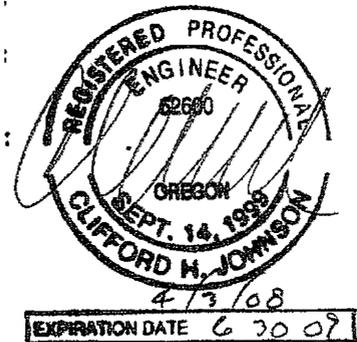
0403-AAONA-ST21

Prepared for

MicroMetl Corporation
905 Southern Way
Sparks, NV 89431

Date

April 2008



Curb Information

Product Number 0403 AACNA-STR

h _{frame} = 30 in	**Overall height from support substrate to top of curb
h _{support} = 6 in	**Height of support curb from top of isolators to bottom of unit
L _{unit} = 73.75 in	**Longitudinal distance from center-to-center of transverse curb
W _{unit} = 33.875 in	**Transverse distance from center-to-center of longitudinal curb
h _i = 4.375 in	**Height of isolator
d = 7.5 in	**Dist off long member end to isolator
h _{hd} = 7.31 in	**Dist off short member end to holddown

Unit Information

W _p = 250 lbf	**Max unit weight
h _{unit} = 35.875 in	**Overall unit height above curb
h _{cm} = 23.583 in	**Height above curb to center of mass
L _{unit} = 76.25 in	**Overall unit length (longitudinal direction)
W _{unit} = 36.5 in	**Overall unit length (transverse direction)

Seismic Loading - 2006 International Building Code (2006 IBC)

S_s = 2 (2 is worst case in NV, OR, WA, AZ)
 (1.0 at worst case Site D, S_s ≥ 1.25)

S_{ms} = S_s F_a = 2

$$S_{dsIBC} = \frac{2 S_{ms}}{3} = 1.33$$

I_p = 1.5 (1.5 at worst case Occupancy)

$$F_{pIBC} = \frac{1.6 S_{dsIBC} I_p}{1.4} W_p = 2857.1 \text{ lbf (ASD values will be used throughout unit)}$$

Seismic Loading - 2007 California Building Code (2007 CBC)

S_s = 2 (2 is worst case in CA)
 (1.0 at worst case Site D, S_s ≥ 1.25)

S_{ms} = S_s F_a = 2

$$S_{dsCBC} = \frac{2 S_{ms}}{3} = 1.33$$

I_p = 1.5 (1.5 at worst case Occupancy)

$$F_{pCBC} = \frac{1.6 S_{dsCBC} I_p}{1.4} W_p = 2857.1 \text{ lbf (ASD values will be used throughout unit)}$$

Controlling Seismic Loads

$$F_{p_{max}} = \max(F_{p_{IBC}}, F_{p_{CBC}}) = 2857.1 \text{ lbf}$$

Wind Loading Check

$$\text{Max Projected Area } (A_{max}) = h_{unit} * \text{Max}(L_{unit} \text{ or } W_{unit})$$

$$A_{max} = h_{unit} \max(L_{unit}, W_{unit}) = 19 \text{ ft}^2$$

Equivalent wind pressure required to equal seismic loading (P_{EQ}) = $F_{p_{max}}/A_{max}$

$$P_{EQ} = \frac{F_{p_{max}}}{A_{max}} = 149 \text{ psf} \quad \text{OK by Inspection } P_{EQ} > 60 \text{ psf}$$

Structural Design

Connectors from Unit to Support

use Self-drilling, Self Tapping Steel Screws, allowable load per Table IV-7A of the cold formed steel manual #10 screw allowable load in 16 gage minimum material



Nominal Shear Strength

Transverse or Longitudinal Loading

$$V_w = \frac{2 F_{p_{max}}}{3} = 1905 \text{ lbf}$$

Transverse Loading
 Holddowns



Number of holddowns per long side

$$R_{HD1} = \frac{(F_{p_{max}} h_{cm})}{N_{HD} W_{curb}} - \frac{W_p}{3} = 209 \text{ lbf} \quad \text{**Uplift}$$

$$\text{Screws} = \max \left[2 \frac{\left(R_{HD1}^2 + V_{HD1}^2 \right)^{\left(\frac{1}{2} \right)}}{P_{ns}} \right] = 2 \text{ min per HD}$$

Isolators

$$R_{\max} = \frac{[F_{p\max}(h_{cm} + h_{\text{support}})]}{W_{\text{curb}}} + \frac{2 W_p}{3} = 2402.2 \text{ lbf per side - Downward}$$

$$R_{\text{IsoMin}} = \frac{F_{p\max}(h_{cm} - h_{\text{support}})}{W_{\text{curb}}} - \frac{W_p}{3} = 1152 \text{ lbf}$$

$$V = 1905 \text{ lbf per side}$$

Longitudinal Loading

Holddowns

$$R_{\text{HD2}} = \frac{(F_{p\max} h_{cm})}{L_{\text{curb}} - 2 d_{\text{HD}}} - \frac{W_p}{6} = 901 \text{ lbf} \quad \text{**Uplift into end holddowns}$$

$$V_{\text{HD}} = \frac{V}{2} = 952 \text{ lbf}$$

$$\text{Resultant} = \sqrt{R_{\text{HD2}}^2 + V_{\text{HD}}^2} = 1311 \text{ lbf}$$

$$\text{Screws}_{\text{HD}} = \text{ceil}\left(\frac{\text{Resultant}}{P_{ns}}\right) = 3 \text{ per holddown}$$

Isolators

$$R_{\max1} = \frac{[F_{p\max}(h_{cm} + h_{\text{support}})]}{L_{\text{curb}} - 2 d_1} + \frac{2W_p}{3} = 2225 \text{ lbf}$$

$$R_{\text{IsoMin1}} = \frac{F_{p\max}(h_{cm} + h_{\text{support}})}{L_{\text{curb}} - 2 d_1} - \frac{W_p}{3} = 975 \text{ lbf}$$

$$V = 1905 \text{ lbf}$$

Isolator Load Summary

Use $N_{IsoLong} = 2$ Type OPA0070 Isolator restraints each long side for shear and vertic

Use $N_{IsoShort} = 0$ Type OPA0070 Isolator restraints each long side for shear and vertic

Max V = 1905 lbf per side

$$V_{Iso} = \frac{V}{(N_{IsoLong} + N_{IsoShort})} = 952 \text{ lbf per isolator}$$

Max $R_{Iso} = \max(R_{max1}, R_{max}) = 2402 \text{ lbf per side}$

$$R_{IsoDown} = \frac{R_{Iso}}{N_{IsoLong}} = 1201 \text{ lbf per Isolator}$$

Max $R_w = \max(R_{IsoMin1}, R_{IsoMin}) = 1152 \text{ lbf}$

$$R_{IsoUplift} = \frac{R}{N_{IsoLong}} = 576 \text{ lbf}$$

PRE-APPROVED MAXIMUM ALLOWABLE LOADS

Allowable Horizontal = 1000 lbf per each isolator

Allowable Vertical = 1600 lbf per each isolator



Shear_Status = "OK"

Vertical_Status = "OK"

Tube Steel Support Assembly

Use 10GA cold-formed overlapping channels, 6" tall, 1 125" wide, Use properties for hollow rectangle
 Conditions and formulas per AISI Cold-Formed Steel Specification (2007)
 Analyze as a beam

Bending (Per C3.1)

$t = 0.1343$
 $b = 1.25$
 $d = 0.6$

$C_b = 1.1$ AISC 13th ed Table 3-1
 $E = 29000$
 $G = 11500$
 $F_y = 44$

$A_x = 2 t d = 1.614 \text{ in}^2$

$b_1 = b - 2 t = 0.856 \text{ in}$

$d_1 = d - 2 t = 0.332 \text{ in}$

$b_{eff} = b - 3 t = 0.721 \text{ in}$

$h_{eff} = d - 3 t = 0.332 \text{ in}$

$I_y = \frac{d b^3}{12} - \frac{d_1 b_1^3}{12} = 0.4124 \text{ in}^4$

$L_{max} = L_{curb} - 2 d_1 = 60.75 \text{ in}$

$L_u = \frac{L}{2} = 30.37 \text{ in}$

$J_w = \frac{2 b^2 d^2 t^2}{t (b + d)} = 1.72 \text{ in}^4$

$S_x = \frac{b d^2}{6} - \frac{b_1 d_1^2}{6} = 2 \text{ in}^3$

Allowed Lateral Unbraced Length L_a

$L_a = \frac{0.36 C_b \pi}{F_y S_x} \sqrt{E G J I_y} = 291.1 \text{ in}$

Status_Le = $\begin{cases} \text{"Lu < La OKAY"} & \text{if } L_u \leq L_a \\ \text{"Check Lu"} & \text{otherwise} \end{cases} = \text{"Lu < La OKAY"}$

Nominal Moment M_n

$M_n = S_x F_y = 68.1 \text{ kip in}$ $\frac{M_n}{\Omega_b} = 40.8 \text{ kip in}$

Max Moment M_u

$M_u = \frac{\max(R_{max}, R_{max1}) L}{8} = 18 \text{ kip in}$



Status_Le = "Lu < La OKAY"

Bending_Status = "Bending OK"

B|G

Project MicroMetl
 Job # 20080022
 Designer TRH

Shear (Per C3.2.1)

[REDACTED]

$$\frac{d}{t} = 44.61$$

[REDACTED]

$$\sqrt{\frac{E k_v}{F_y}} = 68.5$$

$$F_v = \begin{cases} (0.60 F_y) & \text{if } \frac{d}{t} \leq \sqrt{\frac{E k_v}{F_y}} \\ \frac{0.60 \sqrt{E k_v F_y}}{\left(\frac{d}{t}\right)} & \text{if } \sqrt{\frac{E k_v}{F_y}} < \frac{d}{t} \leq 1.51 \sqrt{\frac{E k_v}{F_y}} \\ \frac{0.904 E k_v}{\left(\frac{d}{t}\right)^2} & \text{otherwise} \end{cases}$$

$$F_v = 19.8 \text{ ksi}$$

Nominal Shear Strength

$$V_n = A_x F_v = 31.96 \text{ kip}$$

$$\frac{V_n}{\Omega_v} = 19.97 \text{ kip}$$

Max Shear Force

$$V_u = \frac{\max(R_{max}, R_{max1})}{2} = 1.2 \text{ kip}$$



Shear_Status = "SHEAR OK"

Anchorage to Supporting Structure

Shear to each long side $V_L = V = 1905 \text{ lbf}$

Shear to each short side $V_S = V = 1905 \text{ lbf}$

Transverse Loading

$$P_{tu} = \frac{F_{pmax} (h_{cm} + h_{frame})}{W_{curb}} - \frac{W_p}{3} = 2425 \text{ lbf} \quad \text{**Uplift per side}$$

Longitudinal Loading

$$P_{lu} = \frac{F_{pmax} (h_{cm} + h_{frame})}{L_{curb} - 2 d_t} - \frac{W_p}{3} = 2103 \text{ lbf} \quad \text{**Uplift per end}$$

Anchorage to Concrete Pad

4 in thick concrete pad - min embedment of 3 in, min spacing of 8 in, and min edge distance of 6 in

w/ 1/2" Simpson Titen, HD, allowable shear $V_a = 60 \text{ lbf}$

w/ 1/2" Simpson Titen, HD, allowable tension $T_a = 113 \text{ lbf}$

$T_{itenHD_L} = 3$ per long side at a minimum

$$\text{Elliptical Interaction Equation} \left(\frac{V}{T_{itenHD_L} V_a} \right)^{\left(\frac{5}{3}\right)} + \left(\frac{P_{tu}}{T_{itenHD_L} T_a} \right)^{\left(\frac{5}{3}\right)} = 0.765$$

$T_{itenHD_S} = 3$ per short side at a minimum

$$\text{Elliptical Interaction Equation} \left(\frac{V}{T_{itenHD_S} V_a} \right)^{\left(\frac{5}{3}\right)} + \left(\frac{P_{lu}}{T_{itenHD_S} T_a} \right)^{\left(\frac{5}{3}\right)} = 0.648$$

Elliptical Interaction Equation must be less than 1 and have a min of 3 concrete anchors per side

Frame Assembly Stiffeners

Use 16 gage stiffener material
 Conditions and formulas per AISI Cold-Formed Steel Specification (2007)



$$A_{stiff} = L_{stiff} t_{stiff} + 2 (W_{stiff} - t_{stiff}) t_{stiff} = 0.591 \text{ in}^2$$

$$r_1 = \sqrt{\frac{L_{stiff} W_{stiff}^3 - (L_{stiff} - 2 t_{stiff})(W_{stiff} - t_{stiff})^3}{12 A_{stiff}}} = 0.66 \text{ in}$$

$$r_2 = \sqrt{\frac{W_{stiff} L_{stiff}^3 - (W_{stiff} - t_{stiff})(L_{stiff} - 2 t_{stiff})^3}{12 A_{stiff}}} = 2.53 \text{ in}$$

$$\frac{k H_{stiff}}{\min(r_1, r_2)} = 30.39$$

$$F_e = \frac{\pi^2 E}{\left(\frac{k H_{stiff}}{\min(r_1, r_2)}\right)^2} = 310 \text{ ksi} \quad (\text{Eq C4 1 1-1})$$

$$\lambda_c = \sqrt{\frac{F_y}{F_e}} = 0.33 \quad (\text{Eq C4 1-4})$$

$$F_n = \begin{cases} \left(0.658 \lambda_c^2 F_y\right) & \text{if } \lambda_c \leq 1.5 \\ \left(\frac{0.877}{\lambda_c^2} F_y\right) & \text{otherwise} \end{cases} \quad (\text{Eq C4 1-2})$$

$$F_n = 31.56 \text{ ksi} \quad (\text{Eq C4 1-1})$$

$$P_n = A_{stiff} F_n = 18.65 \text{ kip}$$

$$\frac{P_n}{\Omega_c} = 10.36 \text{ kip} \quad P_u = \frac{R_{max}}{2} = 1.2 \text{ kip}$$



Stiffener_Status = "STIFFENER OK"

Anchorage to Wood sub-Structure

With Simpson 1/4 x 3" SDS screws

Allowable Shear $V_{wood} = 470 \text{ lb}$ per screw from simpson catalog
 Allowable Tension $T_{wood} = 350 \text{ lb}$ assume 2" penetration per NDS Table 11.2B #14 wood screw

$$\text{Number_Screws}_L = \text{ceil}\left(\frac{P_{tu}}{T_{wood}}\right) = 5 \quad \text{screws required for uplift long side}$$

$$\text{Number_Screws}_S = \text{ceil}\left(\frac{P_{lu}}{T_{wood}}\right) = 4 \quad \text{screws required for uplift short side}$$

$$\text{Number_Screws} = \text{ceil}\left(\frac{V}{V_{wood}}\right) = 5 \quad \text{screws required for shear both sides}$$

$$\text{Total_Screws}_{\text{LongSide}} = \text{Number_Screws}_L + \text{Number_Screws} = 10$$

$$\text{Spacing}_{\text{LongSide}} = \left\lceil \text{floor}\left[\frac{l_{\text{curb}}}{(\text{Total_Screws}_{\text{LongSide}} - 1 \text{ in})}\right] \right\rceil \text{ in} = 8 \text{ in}$$

$$\text{Total_Screws}_{\text{ShortSide}} = \text{Number_Screws}_S + \text{Number_Screws} = 9$$

$$\text{Spacing}_{\text{ShortSide}} = \left\lceil \text{floor}\left[\frac{W_{\text{curb}}}{(\text{Total_Screws}_{\text{ShortSide}} - 1 \text{ in})}\right] \right\rceil \text{ in} = 6 \text{ in}$$

Anchorage to Steel sub-Structure

The steel sub-structure will have wood blocking in place between flutes of metal deck, therefore the required number of SDS screws will be the same as for the wood sub-structure

BJG ARCHITECTURE + ENGINEERING

Project MicroMetl
Job # 20080022
Designer TRH

Anchor Calculations

Anchor Designer for ACI 318 (Version 3 6.0 1)

Job Name : General Anchors

Date/Time : 6/22/2009 10:44:20 AM

1) Input

Calculation Method : ACI 318 Appendix D For Cracked Concrete

Calculation Type : Analysis

Number of Anchors : 1

Anchor : 1/2" Titen HD

Embedment Depth : 3.75 in

Built-up Grout Pads : No

Anchor Layout Dimensions (in).

Cx1 : 6

Cx2 : 4

Cy1 : 32

Cy2 : 6

Bx1 : 1.5

Bx2 : 1.5

By1 : 1.5

By2 : 1.5

Concrete : Normal weight

 f_c : 3000.0 psi

Cracked Concrete : Yes

 $\Psi_{c,v}$: 1.00

Condition : B

 ϕF_p : 1657.5 psi

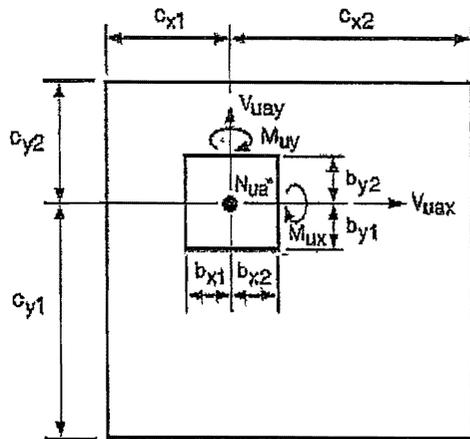
Thickness, h : 6 in

Supplementary edge reinforcement : No

Load factor source : ACI 318 Section 9.2

 N_{ua} : 0 lb V_{uax} : 1600 lb V_{uay} : 0 lb M_{ux} : 0 lb*ft M_{uy} : 0 lb*ft

Moderate/high seismic risk or intermediate/high design category : Yes



SINGLE ANCHOR

N_{ua} IS POSITIVE FOR TENSION
AND NEGATIVE FOR COMPRESSION

From C-SAS-2009.

Anchor Model = THD50 $d_o = 0.5$ in

Category = 1 $h_{ef} = 2.78$ in

$h_{min} = 5.833$ in $c_{ac} = 4.1875$ in

$c_{min} = 1.75$ in $s_{min} = 3$ in

Ductile = No

2) Tension Force on Each Individual Anchor

Anchor #1. $N_{ua1} = 0.00$ lb

$e'_{Nx} = 0.00$ in

$e'_{Ny} = 0.00$ in

3) Shear Force on Each Individual Anchor

Resultant shear forces in each anchor

Anchor #1. $V_{ua1} = 1600.00$ lb ($V_{ua1x} = 1600.00$ lb, $V_{ua1y} = 0.00$ lb)

$e'_{Vx} = 0.00$ in

$e'_{Vy} = 0.00$ in

4) Steel Strength of Anchor in Tension [Sec. D.5.1]

$N_{sa} = nA_{se}f_{uta}$ [Eq. D-3]

Number of anchors acting in tension, $n = 0$

$N_{sa} = 20130$ lb (for a single anchor) [C-SAS-2009]

$\phi = 0.65$ [D.4.4]

$\phi N_{sa} = 13084.50$ lb (for a single anchor)

5) Concrete Breakout Strength of Anchor in Tension [Sec. D.5.2]

$$N_{cb} = A_{Nc} / A_{Nco} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \quad [\text{Eq D-4}]$$

Number of influencing edges = 1

$$h_{ef} = 2.78 \text{ in}$$

$$A_{Nco} = 69.56 \text{ in}^2 \quad [\text{Eq. D-6}]$$

$$A_{Nc} = 68.14 \text{ in}^2$$

Smallest edge distance, $c_{a,\min} = 4.00 \text{ in}$

$$\Psi_{ed,N} = 0.9878 \quad [\text{Eq D-10 or D-11}]$$

Note Cracking shall be controlled per D 5.2.6

$$\Psi_{c,N} = 1.0000 \quad [\text{Sec D 5.2.6}]$$

$$\Psi_{cp,N} = 1.0000 \quad [\text{Eq D-12 or D-13}]$$

$$N_b = k_c \sqrt{f'_c} h_{ef}^{1.5} = 4315.95 \text{ lb} \quad [\text{Eq D-7}]$$

$$k_c = 17$$

$$N_{cb} = 4176.27 \text{ lb} \quad [\text{Eq D-4}]$$

$$\phi = 0.65 \quad [\text{D 4.4}]$$

$$\phi N_{cb} = 2714.58 \text{ lb} \quad (\text{for a single anchor})$$

6) Pullout Strength of Anchor in Tension [Sec. D.5.3]

Pullout does not occur, and is therefore not applicable

7) Side Face Blowout of Anchor in Tension [Sec D.5.4]

Concrete side-face blowout strength is only calculated for headed anchors close to an edge, $c_{a1} < 0.4h_{ef}$. Not applicable in this case

8) Steel Strength of Anchor in Shear [Sec D.6.1]

$$V_{eq} = 4790.00 \text{ lb} \quad (\text{for a single anchor}) \quad [\text{C-SAS-2009}]$$

$$\phi = 0.60 \quad [\text{D 4.4}]$$

$$\phi V_{eq} = 2874.00 \text{ lb} \quad (\text{for a single anchor})$$

9) Concrete Breakout Strength of Anchor in Shear [Sec D.6.2]

In x-direction

$$V_{cbx} = A_{vcx} / A_{vcox} \Psi_{ed,V} \Psi_{c,V} V_{bx} \quad [\text{Eq D-21}]$$

$$A_{vcx} = 72.00 \text{ in}^2$$

$$A_{vcox} = 72.00 \text{ in}^2 \quad [\text{Eq D-23}]$$

$$\Psi_{ed,V} = 1.0000 \quad [\text{Eq D-27 or D-28}]$$

$$\Psi_{c,V} = 1.0000 \quad [\text{Sec. D.6.2.7}]$$

$$V_{bx} = 7(l_e/d_o)^{0.2} \sqrt{d_o} \sqrt{f_c(c_{a1})^{1.5}} \text{ [Eq D-24]}$$

$$V_{bx} = 3056.67 \text{ lb}$$

$$V_{cbx} = 3056.67 \text{ lb [Eq D-22]}$$

$$\phi = 0.70 \text{ [D.4.4]}$$

$$\phi V_{cbx} = 2139.67 \text{ lb (for a single anchor)}$$

In y-direction

$$V_{cby} = A_{vcy}/A_{vcoy} \Psi_{ed,V} \Psi_{c,V} V_{by} \text{ [Eq D-21]}$$

$$A_{vcy} = 60.00 \text{ in}^2$$

$$A_{vcoy} = 72.00 \text{ in}^2 \text{ [Eq D-23]}$$

$$\Psi_{ed,V} = 0.9000 \text{ [Eq D-27 or D-28]}$$

$$\Psi_{c,V} = 1.0000 \text{ [Sec D 6 2 7]}$$

$$V_{by} = 7(l_e/d_o)^{0.2} \sqrt{d_o} \sqrt{f_c(c_{a1})^{1.5}} \text{ [Eq D-24]}$$

$$V_{by} = 3056.67 \text{ lb}$$

$$V_{cby} = 2292.50 \text{ lb [Eq D-21]}$$

$$\phi = 0.70 \text{ [D 4 4]}$$

$$\phi V_{cby} = 1604.75 \text{ lb (for a single anchor)}$$

Check parallel to edge condition

Limit ϕV_{cby} by parallel to edge strength

$$V_{cbx} = A_{vcx}/A_{vcox} \Psi_{ed,V} \Psi_{c,V} V_{bx} \text{ [Eq D-21]}$$

$$A_{vcx} = 72.00 \text{ in}^2$$

$$A_{vcox} = 72.00 \text{ in}^2 \text{ [Eq D-23]}$$

$$\Psi_{ed,V} = 1.0000 \text{ [Sec D 6 2 1(c)]}$$

$$\Psi_{c,V} = 1.0000 \text{ [Sec D.6 2 7]}$$

$$V_{bx} = 7(l_e/d_o)^{0.2} \sqrt{d_o} \sqrt{f_c(c_{a1})^{1.5}} \text{ [Eq D-24]}$$

$$V_{bx} = 3056.67 \text{ lb}$$

$$V_{cbx} = 3056.67 \text{ lb [Eq D-22]}$$

$$V_{cby} = 2 * V_{cbx} \text{ [Sec D 6 2 1(c)]}$$

$$V_{cby} = 6113.34 \text{ lb}$$

$$\phi = 0.70 \text{ [D 4 4]}$$

$$\phi V_{cby} = 4279.34 \text{ lb (for a single anchor)}$$

Limit ϕV_{cbx} by parallel to edge strength .

$$V_{cby} = A_{vcy}/A_{vcoy} \Psi_{ed,V} \Psi_{c,V} V_{by} \text{ [Eq D-21]}$$

$$A_{vcy} = 60.00 \text{ in}^2$$

$$A_{vcoy} = 72.00 \text{ in}^2 \text{ [Eq D-23]}$$

$$\Psi_{ed,V} = 1.0000 \text{ [Sec D 6 2 1(c)]}$$

$$\Psi_{c,V} = 1.0000 \text{ [Sec D 6 2 7]}$$

$$V_{by} = 7(l_e/d_o)^{0.2} \sqrt{d_o} \sqrt{f_c} (c_{a1})^{1.5} \text{ [Eq D-24]}$$

$$V_{by} = 3056.67 \text{ lb}$$

$$V_{cby} = 2547.23 \text{ lb [Eq D-21]}$$

$$V_{cbx} = 2 * V_{cby} \text{ [Sec D.6 2 1(c)]}$$

$$V_{cbx} = 5094.45 \text{ lb}$$

$$\phi = 0.70 \text{ [D 4 4]}$$

$$\phi V_{cbx} = 3566.12 \text{ lb (for a single anchor)}$$

Governing strengths are

$$\phi V_{cbx} = 2139.67 \text{ lb}$$

$$\phi V_{cby} = 1604.75 \text{ lb}$$

10) Concrete Pryout Strength of Anchor in Shear [Sec D.6 3]

$$V_{cp} = k_{cp} N_{cb} \text{ [Eq. D-29]}$$

$$k_{cp} = 2 \text{ [Sec D 6.3 1]}$$

$$N_{cb} = 4176.27 \text{ lb (from Section (5) of calculations)}$$

$$V_{cp} = 8352.54 \text{ lb}$$

$$\phi = 0.70 \text{ [D 4 4]}$$

$$\phi V_{cp} = 5846.78 \text{ lb (for a single anchor)}$$

11) Check Demand/Capacity Ratios [Sec. D 7]

An additional 0.75 factor will be applied automatically to all design strengths related to concrete failure modes per Sec D 3 3 3 of ACI 318 Appendix D

Tension

- Steel 0.0000

- Breakout 0.0000

- Pullout 0.0000

- Sideface Blowout N/A

Shear

- Steel 0.5567

- Breakout 0.9970

- Pryout 0.3649

$T_{Max(0)} \leq 0.2$ and $V_{Max(1)} \leq 1.0$ [Sec D 7.2]

Interaction check PASS

Use 1/2" diameter Titen HD anchor(s) with 3.75 in. embedment

BRITTLE FAILURE GOVERNS. Governing anchor failure mode is brittle failure. Per 2006 IBC Section 1908.1.6, anchors shall be governed by a ductile steel element in structures assigned to Seismic Design Category C, D, E, or F. Alternatively the minimum design strength of the anchor(s) shall be at least 2.5 times the factored forces or the anchor attachment to the structure shall undergo ductile yielding at a load level less than the design strength of the anchor(s). Designer must exercise own judgement to determine if this design is suitable.

Guide Specifications - RN Model Size 15

TAG CF-1

A Description

- 1 Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, dampers, air-cooled condenser coils, condenser fans, water-cooled condensers, exhaust fans
- 2 Unit shall be factory assembled and tested including leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the controls compartment's literature pocket
- 3 Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel
- 4 Unit components shall be labeled, including pipe stub outs, refrigeration system components and electrical and controls components
- 5 Estimated sound power levels (dB) shall be shown on the unit ratings sheet
- 6 Installation, Operation and Maintenance manual shall be supplied within the unit
- 7 Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's access door
- 8 Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's access door

B Construction

- 1 All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels
- 2 Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610°F
- 3 Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break with no metal path from inside to outside the cabinet. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel
- 4 Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Refrigerant piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage
- 5 Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors
- 6 Access to filters, dampers, cooling coils, reheat coil, heaters, supply fans, exhaust fans, return fans, energy recovery wheels, compressors, water-cooled condensers, and electrical and controls components shall be through hinged access doors with quarter

turn, zinc cast, lockable handles Full length stainless steel piano hinges shall be included on the doors

- 7 Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure
- 8 Units with cooling coils shall include double sloped 304 stainless steel drain pans
- 9 Unit shall be provided with base discharge and return air openings All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening
- 10 Unit shall include lifting lugs on the top of the unit

C Electrical

- 1 Unit shall be provided with standard power block for connecting power to the unit

Options

- a Unit shall be provided with factory installed and factory wired, non-fused disconnect switch
- b Unit shall be provided with factory installed and field wired 115V, 20 amp GFI outlet in the unit control panel

D Supply Fan

- 1 Unit shall include direct drive, unhooded backward curved, plenum supply fans
- 2 Blowers and motors shall be dynamically balanced and mounted on rubber isolators
- 3 Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points

Options

- a Variable frequency drives shall be factory wired and mounted in the unit Fan motors shall be premium efficiency

E Exhaust Fans

- 1 Exhaust dampers shall be sized for 100% relief
- 2 Fans and motors shall be dynamically balanced
- 3 Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points
- 4 Access to exhaust fans shall be through double wall, hinged access doors with quarter turn handles

Options

- a Unit shall include belt driven forward curved exhaust fans
- b Variable frequency drives shall be factory wired and mounted in the unit Fan motors shall be premium efficiency

G Cooling Coils

- 1 Evaporator Coils

- a Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum (copper) fins mechanically bonded to the tubes and galvanized (304 stainless) steel end casings. Fin design shall be sine wave rippled.
- b Coils shall have interlaced circuitry and shall be standard (6 row high) capacity.
- c Coils shall be helium leak tested.
- d Coils shall be furnished with a factory installed thermostatic expansion valves.

H Refrigeration System

- 1 Unit shall be factory charged with R-410A refrigerant.
- 2 Compressors shall be scroll type with thermal overload protection, independently circuited, and carry a 5 year non-prorated warranty.
- 3 Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam insulated panels to prevent the transmission of noise outside the cabinet.
- 4 Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
- 5 Each refrigeration circuit shall be equipped with thermostatic expansion valve type refrigerant flow control.
- 6 Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides, and factory installed liquid line filter driers.
- 7 Unit shall include 2 stages of capacity control.

Options

- a Each capacity stage shall be equipped with a 5 minute off, delay timer to prevent compressor short cycling.
- b Each capacity stage shall be equipped with an adjustable, 20 second delay timer to prevent multiple capacity stages from starting all at once.
- c Lead refrigeration circuit shall be provided with factory installed hot gas bypass to protect against evaporator frosting and to prevent excessive compressor cycling.
- d First capacity stage shall be provided with on/off condenser fan cycling and adjustable compressor lockout to allow cooling operation down to 35°F.

I Condensers

- 1 Air-Cooled Condenser
 - a Condenser fans shall be vertical discharge, axial flow, direct drive fans.
 - b Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
 - c Coils shall be designed for a minimum of 10°F of refrigerant sub-cooling.
 - d Coils shall be helium leak tested.

M Filters

- 1 Unit shall include 2 inch thick, fiberglass throwaway filters with an ASHRAE efficiency of 25% and MERV rating of 4 upstream of the cooling coil

N Outside Air/Economizer

Options

- 1 Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 CFM of leakage per sq ft of damper area when subjected to 2 inches w g air pressure differential across the damper. Damper assembly shall be controlled by spring return sensible temperature activated fully modulating with dual minimum position actuator. Unit shall include outside air opening bird screen, outside air hood with rain lip and barometric relief dampers

G Controls

- 2 Field Installed DDC Controls by Others
 - a Controls shall be field provided and field installed by others



Unit Rating

2425 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 563 2266 Fax (918) 683 6094
AAONEeat32 Ver 4 141 (SN 7050384 AR0GD7LL)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-015-3-0-BA02-000-BEAD-C0A-DRP-000-RA0A00H-00-000000000B
Tag CF-1

Job Information

Job Name *PIA DEICING*
Job Number
Site Altitude *0 ft*
Refrigerant *R 410A*

Unit Information

Approx Op /Ship Weights *1892 / 1892 lbs*
Supply CFM/ESP *4000 / 0.75 in wg*
Final-Filter FV / Qty *288 00 fpm / 4*
Exhaust CFM/ESP/TSP *4000 / 0.25 / 0.57 in wg*
Outside CFM
Ambient Temperature *95 °F DB / 75 °F WB*
Return Temperature *75 °F DB / 62 °F WB*

Static Pressure

External *0.75 in wg*
Evaporator *0.27 in wg*
Filters Clean *0.11 in wg*
Dirt Allowance *0.15 in wg*

Economizer *0.17 in wg*
Heating *0.00 in wg*
Cabinet *0.11 in wg*
Total *1.54 in wg*

Cooling Section

	G108S	Net
Total Capacity	<i>179.78</i>	<i>175.61 MBH</i>
Sensible Capacity	<i>120.82</i>	<i>116.65 MBH</i>
Latent Capacity	<i>58.96 MBH</i>	
Mixed Air Temp	<i>80.00 °F DB</i>	<i>67.00 °F WB</i>
Entering Air Temp	<i>80.00 °F DB</i>	<i>67.00 °F WB</i>
Lv Air Temp (Coil)	<i>51.64 °F DB</i>	<i>51.44 °F WB</i>
Lv Air Temp (Unit)	<i>52.59 °F DB</i>	<i>51.85 °F WB</i>
Supply Air Fan	<i>1 x 220 @ 1.43 BHP</i>	
SA Fan RPM / Width	<i>1120 / 4.871"</i>	
Exhaust Air Fan	<i>1 x RM12X9X2 @ 1.23 BHP</i>	
EA Fan RPM	<i>874 / 9.000"</i>	
Evaporator Coil	<i>14.6 ft² / 4 Rows / 14 FPI</i>	
Evaporator Face Velocity	<i>274.3 fpm</i>	

Heating Section

PieHeat Type *Std (No Preheat)*
Heating Type *No Heat*

EER - ARI Listing Information

EER @ ARI Conditions *11.5* Application EER @ Op Conditions *11.0*

Electrical Data

Rating	<i>460/3/60</i>		Minimum Circuit Amp	<i>35</i>			
Unit FLA	<i>32</i>		Maximum Overcurrent	<i>45</i>			
	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1	<i>2</i>		<i>460</i>	<i>3</i>			<i>12.2</i>
Condenser Fans	<i>2</i>	<i>0.75</i>	<i>460</i>	<i>1</i>	<i>1075</i>	<i>2.3</i>	
Supply Fan	<i>1</i>	<i>2.00</i>	<i>460</i>	<i>3</i>	<i>1170</i>	<i>3.4</i>	
Exhaust Fan	<i>1</i>	<i>2.00</i>	<i>460</i>	<i>3</i>	<i>1760</i>	<i>3.4</i>	

Cabinet Sound Power Levels*

Octave Bands	63	125	250	500	1000	2000	4000	8000
Discharge LW(dB)	<i>84</i>	<i>84</i>	<i>83</i>	<i>76</i>	<i>71</i>	<i>69</i>	<i>64</i>	<i>58</i>
Return LW(dB)	<i>84</i>	<i>79</i>	<i>74</i>	<i>65</i>	<i>64</i>	<i>61</i>	<i>54</i>	<i>47</i>

*Sound power levels are given for informational purposes only. The sound levels are not guaranteed.



22.0" STAR Plenum

2425 South Yukon Ave Tulsa Oklahoma 74107 2726 Ph (918) 683 2266 Fax (918) 583 6094
AAONEcat32 Ver 4 141 (SN 7050384 AROGD/UL)

JOB INFORMATION

Job Name *PIA DEICING*
Job Tag *CF 1*
Rep Firm
Date *12/10/2009*

WHEEL SPECIFICATION

Max RPM *2,200*
Diameter x Qty *22 0 in 1*
Width% *99*
Tip Speed *6,451 FPM*
Inertia *5 WR²*

OPERATING CONDITIONS

Air Flow *4,000 CFM*
Static Pressure *1 54 in Wg*
Plenum DP *0 00 in Wg*
Inlet Grill DP *0 00 in Wg*
TSP *1 54 in Wg*
Site Altitude *0 00 Ft*
TSP @ Sea Level *1 54 in Wg*

MOTOR SELECTION

Rated HP / Bypass *2 / No*
Frame Size *184T*
Nominal RPM *1170*
VAC/PH/HZ *460/3/60*
Efficiency *Premium / 0 875*
Enclosure Type *ODP*
Max Inertial Load *72 WR²*

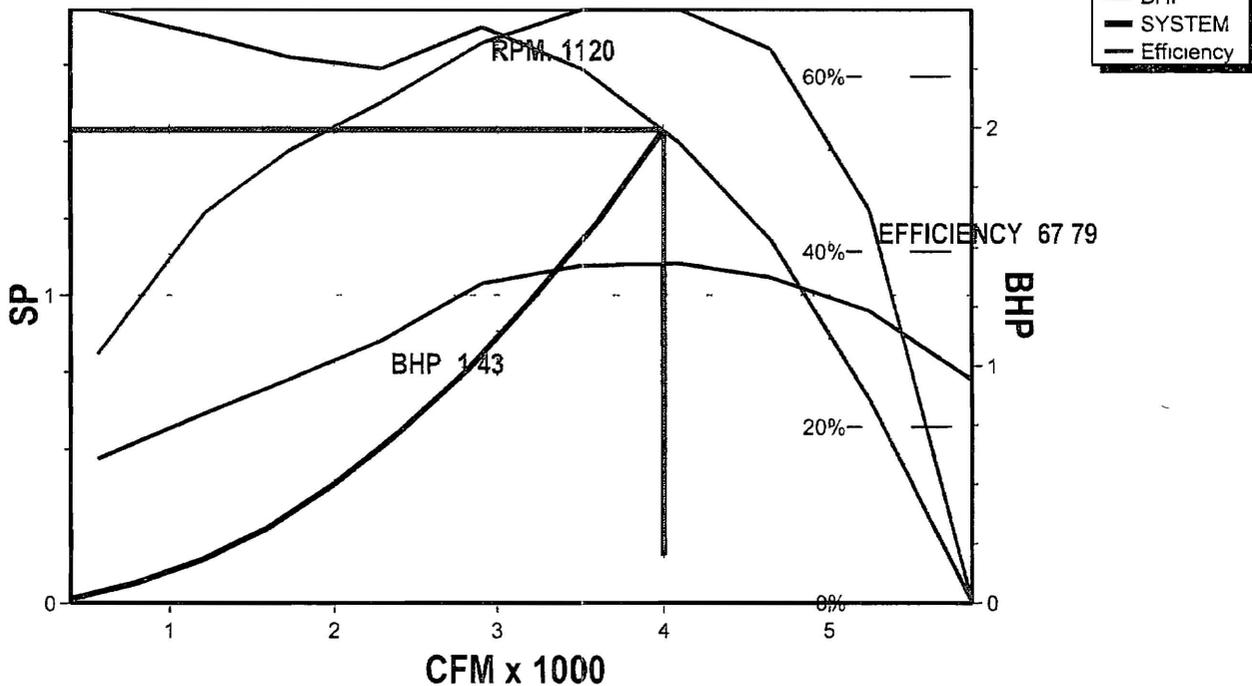
FAN PERFORMANCE

RPM *1120*
BHP *1 43*
Efficiency *67 8%*
In/Out Velocity *1223/1347 FPM*
Plenum Out Velocity *67 FPM*

FAN SOUND POWER (Inlet/Outlet)

Octave Band	(Re 10' -12 watts)							
	1	2	3	4	5	6	7	8
	83	83	83	77	74	72	67	61
SOUND POWER A-Weighted	84 / 84 dB							

Supply Fan Model: 220 @ 1120 RPM and 99% Width
Design Conditions: 4000 CFM @ 1.54" SP





12X9X2 FC Fan

2425 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 583 2266 Fax (918) 583 6094
AAONEcat3.2 Ver 4 141 (SN 7050384 AR0GD7L)

JOB INFORMATION

Job Name *PIA DEICING*
Job Tag *CF 1*
Rep Firm
Date *12/10/2009*

WHEEL SPECIFICATION

Max RPM *1,440*
Diameter x Qty *11 0 in x 1*
CFM *4000*
Tip Speed *2,517 FPM*
Inertia *3 WR²*

OPERATING CONDITIONS

Air Flow *4,000 CFM*
Static Pressure *0 25 in Wg*
Relief Dampers DP *0 32 in Wg*

TSP *0 57 in Wg*
Site Altitude *0 00 Ft*
TSP @ Sea Level *0 57 in Wg*

MOTOR SELECTION

Rated HP / Bypass *2 / No*
Frame Size *145T*
Nominal RPM *1760*
VAC/PH/Hz *460/3/60*
Efficiency *Premium / 0 865*
Enclosure Type *ODP*
Max Inertial Load *27 WR²*

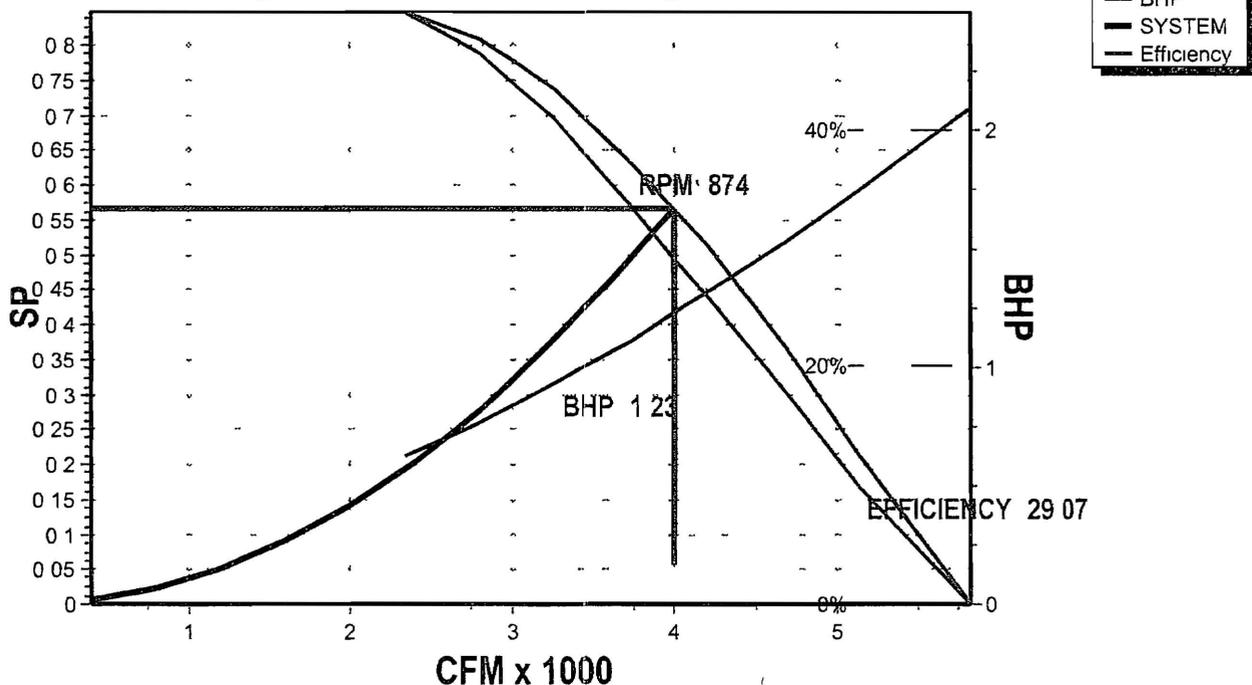
FAN PERFORMANCE

RPM *874*
BHP *1 23*
Efficiency *29 1%*
In/Out Velocity *2030/1575 FPM*
Plenum Out Velocity *67 FPM*

FAN SOUND POWER (Inlet/Outlet)

Octave Band	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	84	77	69	69	64	59	54	49
SOUND POWER A-Weighted	84 / 0 dB							

Exhaust Fan Model: RM12X9X2 @ 874 RPM and 100% Width
Design Conditions: 4000 CFM @ 0.57" SP





Unit Submittal

2420 South Yukon Ave Tulsa Oklahoma 74107 2728 Ph (918) 583 2266 Fax (918) 583 6094
AAONEcat92 Ver 4 141 (SN 7050384 ARQD7UL)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-015-3-0-BA02-000.BEAD-C0A-DRP-000-RA0A00H-00-00000000B
Tag CF-1

Job Name
Job Number

PIA DEICING

Unit Submittal For
Unit Submittal Date

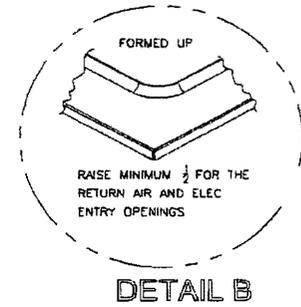
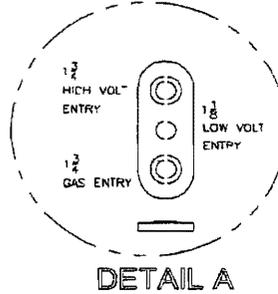
December 10 2009

	Base Option	Description
R	Series	Roof Top Unit
N	Generation	Ninth Generation
015	Unit Size	Fifteen
3	Voltage	460V/30/60Hz
0	Interior Protection	Standard
B	Refrigerant Style	R 410A High Efficiency
A	Unit Configuration	Air Cooled Cond + Std Evap Coil
0	Coil Coating	Standard
2	Cooling/Heat Pump Staging	2 Stage
0	Heating Type	No Heating
0	Heating Designation	No Heating
0	Heating Staging	No Heating

	Feature Option	Description
B	1A. RA/OA Section	Economizer + Power Exhaust
E	1B RA/EA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
A	1C RA/EA Blower	12 x 9" Forward Curved
D	1D RA/EA Blower Motor	2.0 hp 1760 rpm
C	2 OA Control	Full Modulating Actuator Sensible Limit
0	3 Heat Options	Standard
A	4 Maintenance Options	115V Convenience Outlet Field Wired
D	5A. SA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
R	5B SA Blower	22 Direct Drive Backward Curved Plenum
P	5C SA Motor	2.0 hp 1170 rpm
0	6A Pre Filter Type	Standard None
0	6B Unit Filter Type	2 Pleated 30% Eff
0	6C Filter Options	Standard
R	7 Refrigeration Control	5 MTDR Off + 20 STDR Staging + Fan Cycling
A	8 Refrigeration Options	Hot Gas Bypass Lead Stage
0	9 Refrigeration Accessories	Standard
A	10 Power Options	Power Switch 100 amps
0	11 Safety Options	Standard
0	12 Controls	Standard
H	13 Special Controls	Field Installed DDC Controls by Others
0	14A Preheat Configuration	Standard None
0	14B Preheat Sizing	Standard None
0	15 Blank	Standard
0	16 Interior Cabinet Options	Standard Double Wall - R 13 Foam Insulation + Stainless Steel Drain Pan
0	17 Exterior Cabinet Options	Standard
0	18 Customer Code	Standard
0	19 Code Options	Standard ETL U S A Listing
0	20 Coating	Standard
0	21 Water Cooled Cond	Standard None
0	22 Control Vendors	Standard
B	23 Type	Standard Includes AAON Gray Paint

RN SERIES B - CABINET WITH ECONOMIZER ~ 9-15 TON AND POWER EXHAUST

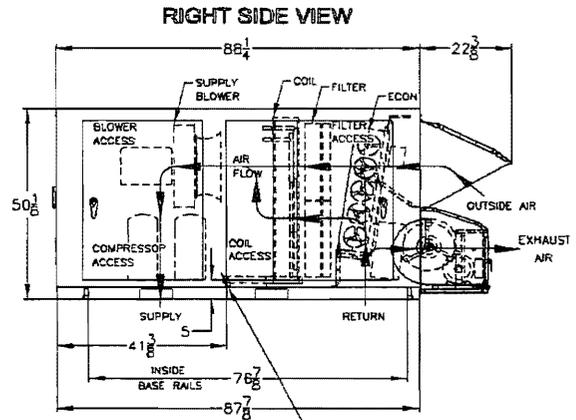
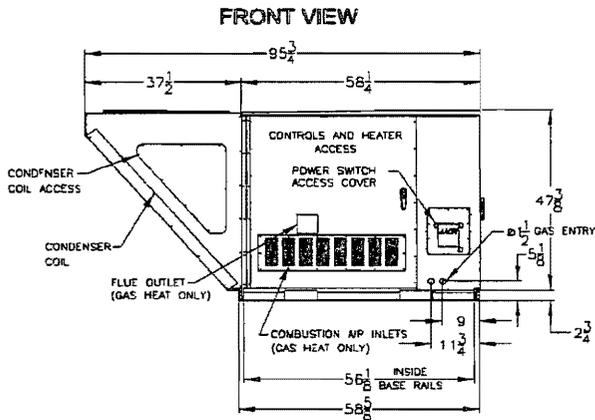
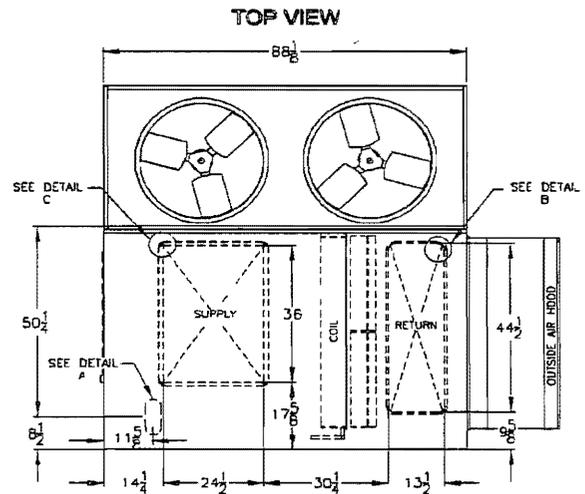
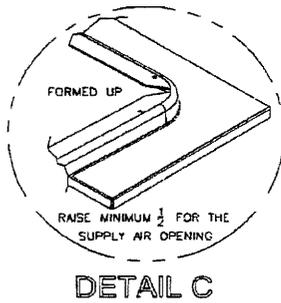
CLEARANCES	
LOCATION	• UNIT SIZE 9 - 15 TON
OUTSIDE AIR (BACK)	48
CONTROLS SIDE (FRONT)	48
LEFT SIDE	6
RIGHT SIDE	48
TOP	UNOBSTRUCTED



NUMBER OF CONDENSER FANS

9 & 11 TON - 1 FAN

13 & 15 TON - 2 FANS



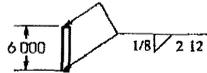
RNB-00003 NEW 12/31/08 SJS
NOTE: ALL DIMENSIONS ARE IN INCHES

1 - 1 WPT STAINLESS CONDENSATE CONNECTION P TRAP FURNISHED BY MANUFACTURER FOR DRAIN CONNECTION.

SUBMITTAL 0403-ABRN-ST⁺

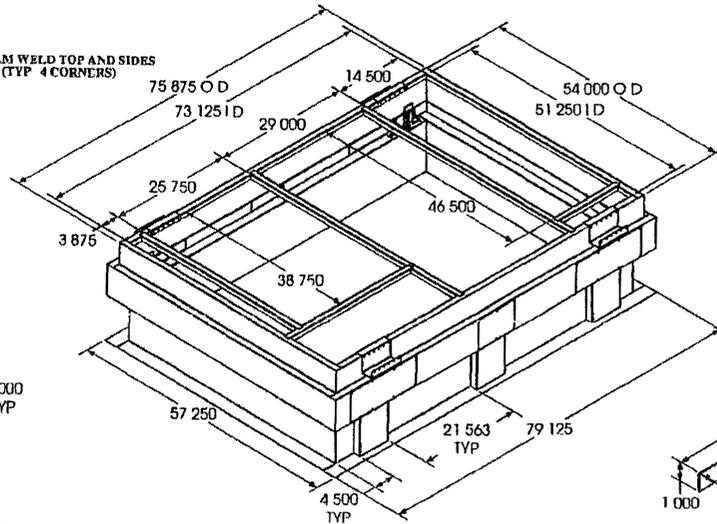
- * WELDED CONSTRUCTION
- * PERIMETER WOOD NAIL DR
- * GASKET PACKAGED
- * FACTORY INSTALLED HOLDDOWNS
- * OSH/D PRE-APPROVED 2 DEF
- * SEISMIC RESTRAIN IS (OPA#0070)

DETAIL A
SCALE 1/2



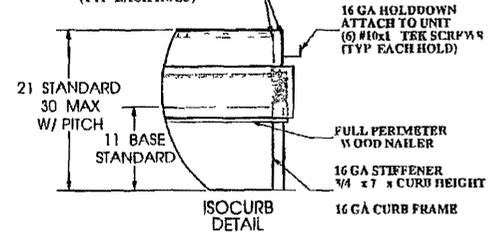
10 GA SUPPORT
ASSY DETAILS

SEAM WELD TOP AND SIDES
(TYP 4 CORNERS)



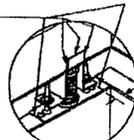
ISOCURB TO HAVE A MINIMUM OF
(4) ISOLATORS PER LONG SIDE

SECURE HOLDDOWN
(12) #10x1/2 TEK SCREWS
(TYP EACH HOLD)



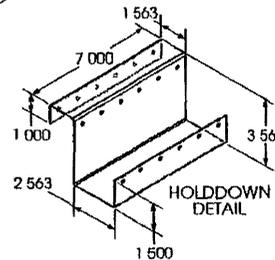
ISOCURB
DETAIL

1/8

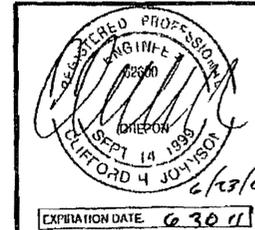


DETAIL B
SCALE 1/8

ISOLATOR WELDING
STANDARD OFFERING



HOLDDOWN
DETAIL



MicroMetl Corporation

PRODUCT NUMBER: 0403 ABRN-ST⁺
0403 ABRN-ST18 18' TALL
0403 ABRN-ST21 21" TALL
ISOLATION CURBS 0403 ABRN-ST24 24" TALL

STRUCTURALLY CALCULATED VIBRATION ISOLATION
CURB FOR AAOB STANDARD, POWER EXHAUST
CABINET, RN 08 15

<p>Sparks, NV (800) 884-4662 Indianapolis IN (800) 662-4822 Longview, TX (903) 248-4800</p>	<p>STEEL ATTACHMENT. SEE STEEL ATTACHMENT DETAIL SHEETS</p>	<p>WOOD ATTACHMENT (DOUGLAS FIR) (82) 1/4 x 3 SIMPSON SDS W/WASHER CENTER ON CURB FINANCE EVENLY SPACED (21) EACH LONG SIDE (20) EACH SHORT SIDE</p>	<p>CONCRETE ATTACHMENT (3000 PSI MINIMUM 6" MIN THICKNESS) (6 MIN EDGE DISTANCE 3 3/4" EMBEDDED) (10) 1/2 SIMPSON TITEN HD EVENLY SPACED CENTER ON CURB FINANCE 8" MIN SPACING (6) EACH LONG SIDE, (4) EACH SHORT SIDE</p>	<p>DATE 05/2009 DRAWN BY: JD WEIGHT 313318343 MEETS SEISMIC REQUIREMENTS FOR FOLLOWING CODES 2007 CBC 2006 IBC</p>
<p>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MICROMETL CORPORATION. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF MICROMETL CORPORATION IS PROHIBITED.</p>				