omega
HEAT PUMPS

OMEGA VSHYe SERIES

Product Guide

Vertical Stacked
Hybrid Heating & Cooling
w/ Integrated ERV
High Efficiency (HE)

MODEL: VSHYe

DEV. F

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TABLE OF CONTENTS

1. GENERAL DESIGN
1.1 Product Overview 1
1.2 Key Features 2
2. PRODUCT DETAILS
2.1 Standard & Optional Features 4
2.2 Assembly View 6
2.3 Noise Attenuation Features 7
3. CABINET DIMENSIONS & CONFIGURATIONS
3.1 VSHYe Series Cabinet 8
3.2 ERV Configurations 9
4. RISER & HOSE KITS
4.1 Riser Handing Conventions 10
4.2 Riser Sizing Reference & Hose Kit Details 11
5. RETURN AIR PANELS
5.1 Acoustic Front Return Air Panel 12
5.2 Acoustic Panel Cabinet Base Height Calculation 13
5.3 Acoustic Panel Furring Details - Plan View 14
5.4 Acoustic Panel Furring Details - Front View 15
6. PERFORMANCE & ELECTRICAL DATA
6.1 ISO Performance Data 16
6.2 Electrical Data 16
6.3 Expanded Heating Performance Table 17
6.4 Design Limits 18
7. FAN & MOTOR DATA
8.1 Expanded Fan Data Table - ECM 19
8.2 ERV Fan Data 19
8. ELECTRICAL SCHEMATICS & CONTROL WIRING
9.1 Wiring Diagram—Standard EC (ECM) Motor 20
9.3 Thermostat Wiring Details 21
9. SPECIFICATIONS 22

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1. GENERAL DESIGN

1.1 Product Overview

All Omega Vertical Stack Cooling Unit with Hydronic Heat & Integral ERV (VSHYe Series) are engineered for quiet and reliable year round operation.

Reliability

Omega water-source heating and cooling systems provide reliable year round heating and cooling operation. Each unit features an advanced microprocessor controller for ensuring reliable, safe, and energy efficient heating and cooling comfort. The integrated ERV module is powered by a smart microprocessor controller for optimized fresh air exchange and energy recovery.

Serviceability

Omega VSHYe units feature a slide out chassis and a blower assembly which are easily accessible through the front return air panel. For servicing or repairs, a spare replacement chassis can be temporarily swapped in allowing for uninterrupted operation. Integrated ERV is accessible through an easily removable front access panel. Lightweight ERV core slides out to simplify routine maintenance. The unique design allows for access to all components and sensors without the need to slide out and disassemble bulky ERV module as found in other equipment.

Energy Efficient

A hybrid system can transfer energy to different zones in a building. During moderate weather, solar heat gain on the south side of a building may require cooling while the north side requires heating. Fresh air introduction is done through the integral ERV to recover energy that would be otherwise lost.

Customizable

Omega units can be customized to meet the specific requirements of any project. Some options include: choice of supply discharge air locations and sizes, ERV port and fresh air duct locations, and remote thermostat control.

Two Phase Installation

The equipment is shipped to site in two stages for integration with the phases of construction. This avoids potential issues with storage, and on-site damage and allows mechanical units to be installed in acceptable environmental conditions.

Phase 1

- During the initial stages of construction, the cabinets are installed. As construction progresses, they become part of the interior wall structure.

Phase 2

- The hybrid chassis is shipped as required and installed into the cabinet after riser loop commissioning and majority of construction is completed. Riser loop must be cleaned and flushed and chemically treated prior to installing chassis units.

Testing & Quality

To maintain the highest level of quality control, each hybrid chassis is factory charged and tested before being shipped to the job site. The chassis production and testing line features a computer controlled 6-step quality control (QC) system to ensure that every stage of chassis production is tested and re-tested. Units are performance tested in Omega's state-of-the-art in-house test facility to ensure unit performance and reliability meets or exceeds industry standards. Each unit is ETL listed.

1.2 Key Features

Energy Efficient Design

- High efficiency compressors and blower motors
- High efficient ERV and DC fan motors.
- Air Coil is an Integrated Hybrid Coil design optimizing heating and cooling performance.
- Refrigerant metering thermal expansion valves
- Low pressure drop and industry leading high efficient heat exchanger coaxial coils.
- Energy Efficiency Ratio (EER) exceeds ASHRAE 90.1

Quiet Operation

- High density sound insulated cabinet
- Noise attenuating return air panels
- Double isolated chassis base
- Compressor mounted on vibration isolators

Space Considerations

- Compact footprint
- Quiet operation
- Fire and mould resistant insulation
- Heavy duty cabinet construction
- Architectural supply grilles and return air panels
- Durable, long life gasketing on chassis
- Convenient room side, front access to the air filter
- Choice of discharge air opening configurations and ERV port configurations
- Riser mounting location flexibility

Acoustical Design Features—Standard Silver Series

- 1 inch high density sound insulation throughout
- Double isolated chassis base to isolate the refrigeration chassis from the cabinet
- Compressor elastomeric isolation mounts
- Unit base with closed cell foam isolation pads
- Optimized design of refrigerant piping for reduced compressor noise
-

Reliability

- Factory tested and charged with R-410A
- Industry leading rotary and scroll compressors
- Modern components and microprocessor controlled safety protection devices

Environment

- Eco-friendly refrigerant (R-410A)
- Recyclable materials used in unit construction
- Energy efficient EC fan motors
- High-efficient Hybrid and Heat Exchanger coils

Service

- Slide-out chassis for easy removal and servicing
- Slide out ERV Core for maintenance and cleaning
- Easily serviceable ERV components and sensors
- All control components in one location
- Plug-n-play harnesses
- Capacitor in front of unit
- Easy disconnecting water connections
- Refrigerant service access ports
- Simple LED diagnostics on control board
- Plug-n-play laptop Web browser diagnostics
- Test-mode for quick troubleshooting

Certification

All Omega products are listed by ETL (Intertek) Omega products conform to UL STD 1995 and certified to CSA C22.2 NO. 236.

2. PRODUCT DETAILS

2.1 Standard & Optional Features

STANDARD FEATURES

Cabinet

The galvanized 20 gauge sheet metal cabinet is designed for structural rigidity, installation flexibility, and serviceability. Cabinet heights of up to 120” are available. Cabinet interior is lined with 1” thick acoustic, thermal, mould and fire resistant insulation rated to meet NFPA 90.

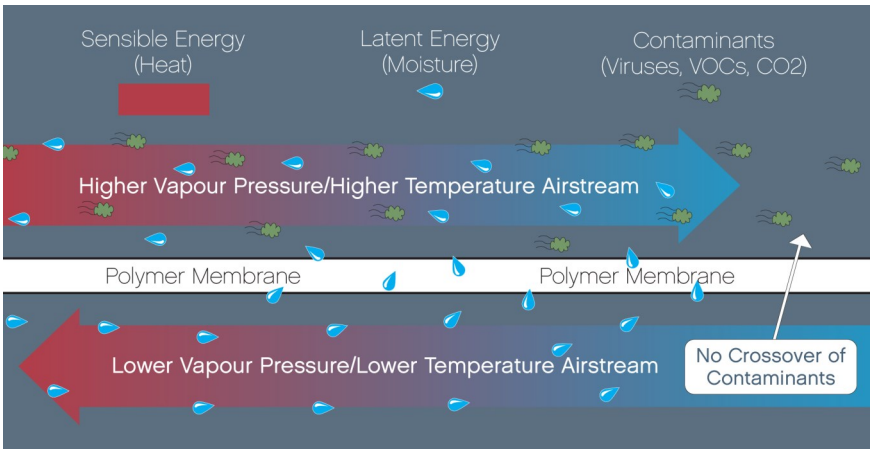
Control Panel with Advanced Microprocessor

All controls and contactors are mounted in the electrical box connected with quick connect plugs. Each unit features an advanced microprocessor controller. Unit comes with four standard temperature sensors for quick diagnostics capability: entering and leaving water temperature sensors (WLST & WLDT), suction freeze-stat sensor (RST), and leaving air temperature (LAT) sensor. All controls are accessible from the front of the unit for easy service and troubleshooting.

Integral ERV (Energy Recovery Ventilator)

ERV module is located above electrical panel inside discharge plenum. The CORE Energy Recovery Ventilation Solutions polymer core and all controls and sensors are easily accessible through the front return air panel.

ERV Microprocessor is located in the unit electrical box. ERV Core is made of a polymer membrane and transfers both heat and humidity (sensible and latent energy transfer) for one air stream to another while preventing the transfer of odors, gases, VOCs and contaminants. ERV sensible effectiveness is rated at 60%.



ERV Core is water washable and accessible at the front of the unit via ERV service cover panel. All components, filters and sensors are accessible through the front panel.

ERV controller and logic modulate air stream to maintain fresh air introduction temperatures above 50F into the unit supply discharge to prevent dumping of cold air into occupied space. ERV is powered by dual DC fan motors with fan speed control located in the electrical box for balancing OA (Outdoor Air) and BE (Bathroom Exhaust). During bathroom exhaust fan operation ERV bathroom timer will send signal to unit to operate ERV fans on high speed mode. During normal fresh air circulation, ERV fans operate on low fan speed.

Blower Fan & Motor

A centrifugal forward curved double width double inlet (DWDI) blower with a direct drive motor assembly with easy removal and servicing provides air delivery. Multi-speed EC motors (ECM) are standard for improved fan operating efficiency and fan performance across a wider operating range over traditional PSC motors. Includes Omega's "Whisper Mode" fan-on operation capability for ultra quiet continuous air circulation.

Field Selectable Supply Air Discharge

Cabinets feature our standard "Knockout" style supply discharge openings for field selectable supply air openings in Left, Right, Front, Back, and/or Top configurations. Openings are available on the same side as mounted risers or added flexibility.

Hybrid Coil

The integrated hydronic and refrigeration air coils are multi-row with copper tubes and enhanced aluminum fins. Coil fins are mechanically bonded to the tubes. The coils are fully cased with a handy grip point for chassis removal.

Compressors

High efficient R-410A compressors are standard, rotary type 1/2 to 1.5 Ton (VSHYe 030-060) and scroll type 2 to 3 Ton (VSHYe 080-120). Compressors are mounted to the chassis frame with elastomer vibration isolators to minimize vibration transmission. Additionally the compressor chassis is mounted on a double isolated base for enhanced noise attenuation to prevent vibration transmission into the occupied space.

Auto Shut-Off Control Valve

Factory installed 2-way automatic shut-off control valves control water flow direction depending on cooling or heating requirements. The control valves minimize water pressure drop across water circuit. Water flow shall be directed through either the coaxial condenser coil during a call for cooling, or through hydronic heating coil during a call for heating This reduces pumping loads and power consumption in variable speed or staged pumping applications.

Coax-Coil

The water to refrigerant coaxial coil is tube in tube with a convoluted inner copper tube design. The coaxial coil is selected for minimum water pressure drop and low fouling characteristics.

Stainless Steel Drain Pan

Standard stainless steel drain pan provides corrosion resistance. Drain pan is positively sloped, externally insulated with a 7/8 inch O.D. connection and factory mounted p-trap condensate hose.

Thermostatic Expansion Valve (TXV)

All units come with a thermostatic expansion valve (TXV). TXV is precision machined brass assembly providing precise refrigerant flow metering during cooling operation.

Air Filter
Unit comes with standard 1 inch disposable media filters.

OPTIONAL FEATURES

Automatic Balancing Valve
Optional automatic balancing valves are factory installed for automatically limiting water flow through the unit to the nominal rated flow rate by providing constant flow (±10% of rated GPM) over a large differential pressure range of 2-80 psig (3-80 psig for sizes 080 to 120 units).

Condensate Overflow Switch (COFS)
Condensate overflow switch (float switch or electronic) is mounted to the unit drain pan for detecting overflow conditions such as a clogged condensate drain. If condensate switch is tripped compressor operation is stopped.

Epoxy Coated Hybrid Air Coil
Air coils are epoxy coated to aid in the prevention against premature corrosion from environmental factors. Epoxy coating meets 1000 hours of salt spray ASTM B117 protection.

Cupro-Nickel Coaxial Condenser
Copper nickel alloy coaxial condensers provide enhancement protection against cavitation and corrosion where loop water quality contamination may occur.

Y-Strainer
Optional 20 mesh y-strainer installed on the water circuit.

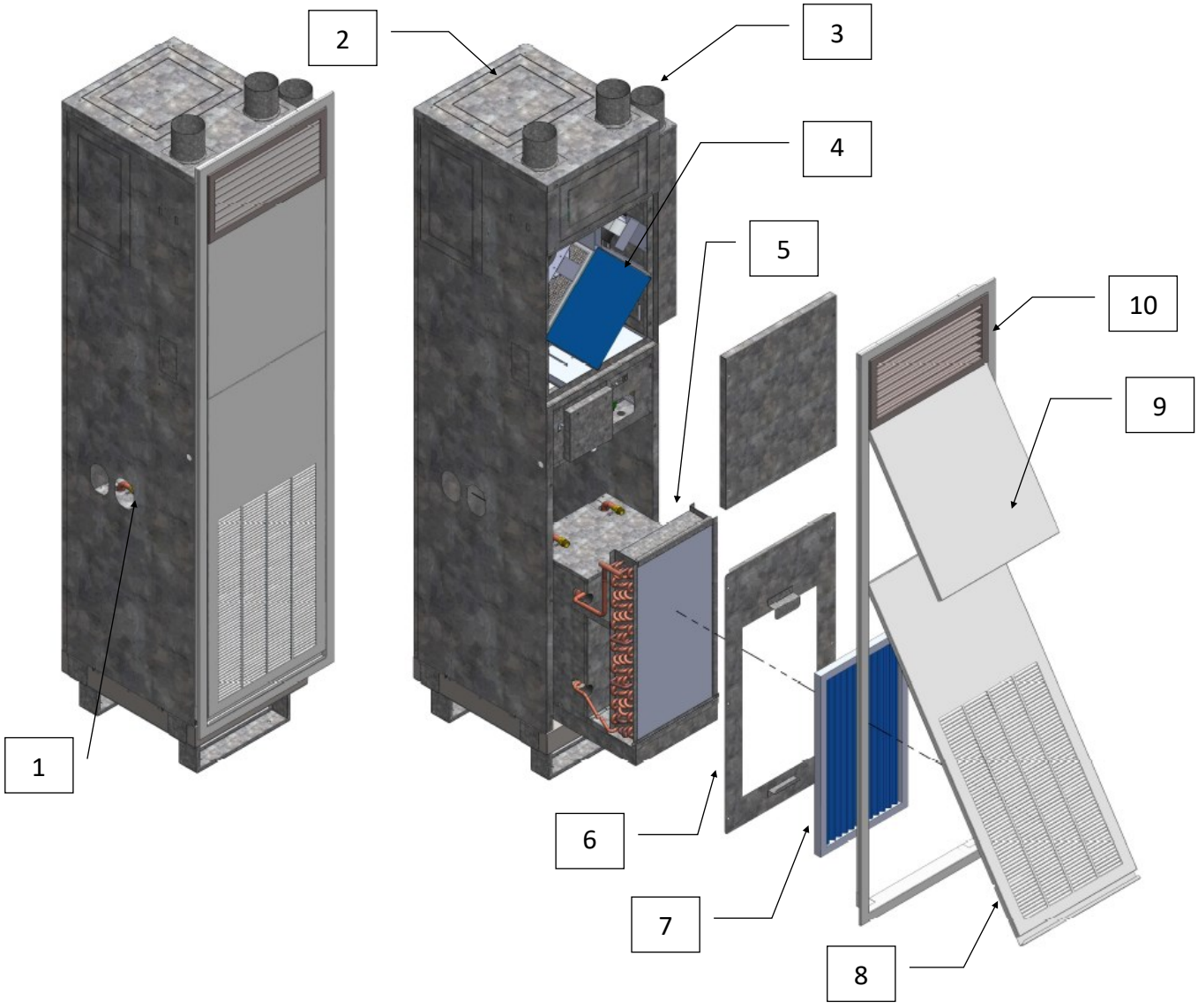
Return Air Panel
Omega offers an **Acoustic** and a **Perimeter** style ERV panel. Acoustic is a stamped blade style, top hinging removable panel. Panel comes with three removable sections: lower section allows access to compressor, blower section and electrical box; middle panel accesses ERV core and sensors; and upper panel serves as either a discharge grille or blank panel, both of which allow access to modulating damper. All panels are easily removed for quick servicing.

Supply, Return & Condensate Risers
Risers are available in Type M and Type L copper. Factory supplied risers come standard with manual shut-off isolation ball valves soldered to the riser tee. Risers can be ordered swaged or as straight pipe.

MERV 13 Air Filter
Unit comes with a low pressure drop 2-inch MERV 13 disposable media filter for superior air filtration and performance.

2.2 VSHYe Assembly View

1. Supply, return and condensate riser field “knockouts”.
2. Field “knockout” supply air openings (Front/Back/Side/Top) with 1-1/2” duct flange.
3. ERV Ports—Bathroom Exhaust, Exhaust Air, Outside Air.
4. Removable ERV core.
5. Hybrid chassis (VSHP chassis shown).
6. Chassis service cover panel.
7. 1” air filter.
8. Acoustic return air (R/A) panel for chassis, blower and electrical compartments.
9. ERV service panel.
10. Removable optional supply discharge grille panel.



2.3 Noise Attenuation Features

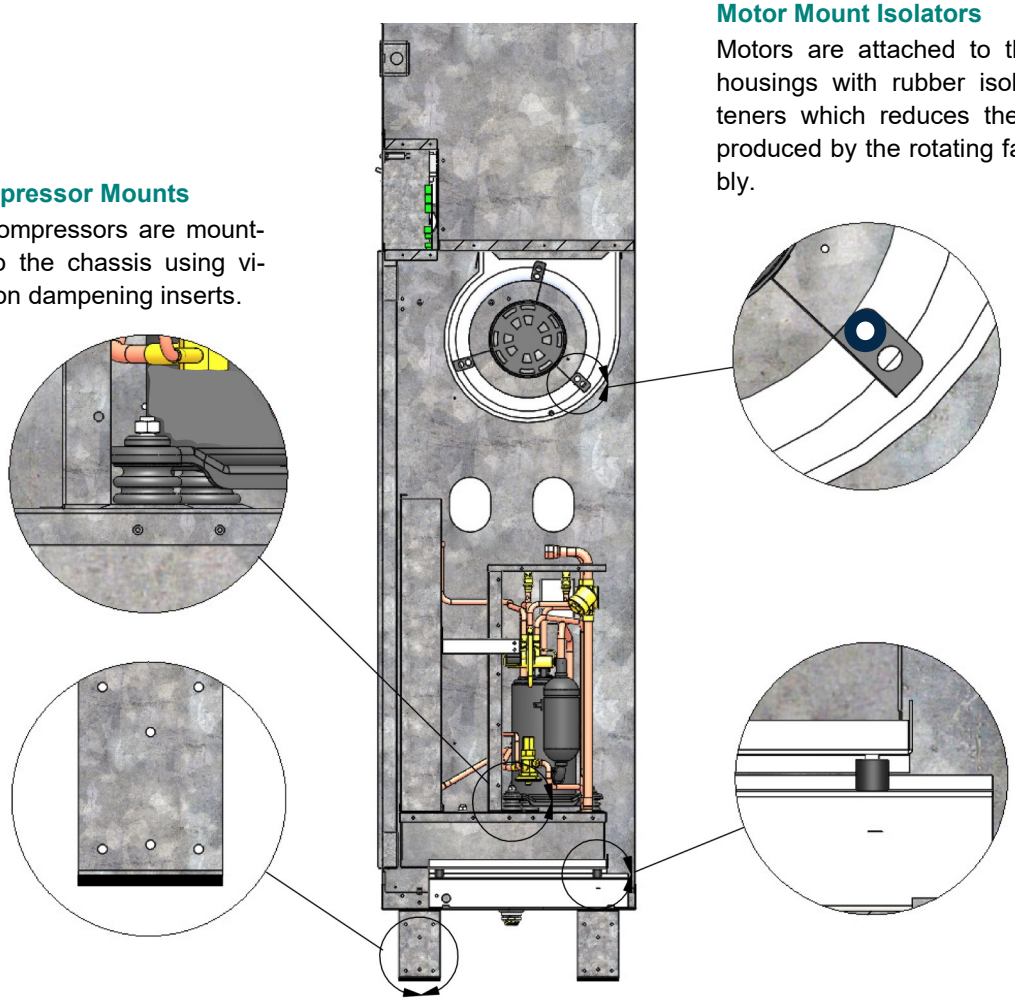
Omega Heat Pump VSHYe units offer 4 separate methods of vibrational isolation (Shown below).

Motor Mount Isolators

Motors are attached to the blower housings with rubber isolation fasteners which reduces the vibration produced by the rotating fan assembly.

Compressor Mounts

All compressors are mounted to the chassis using vibration dampening inserts.



Unit Foot Insulation

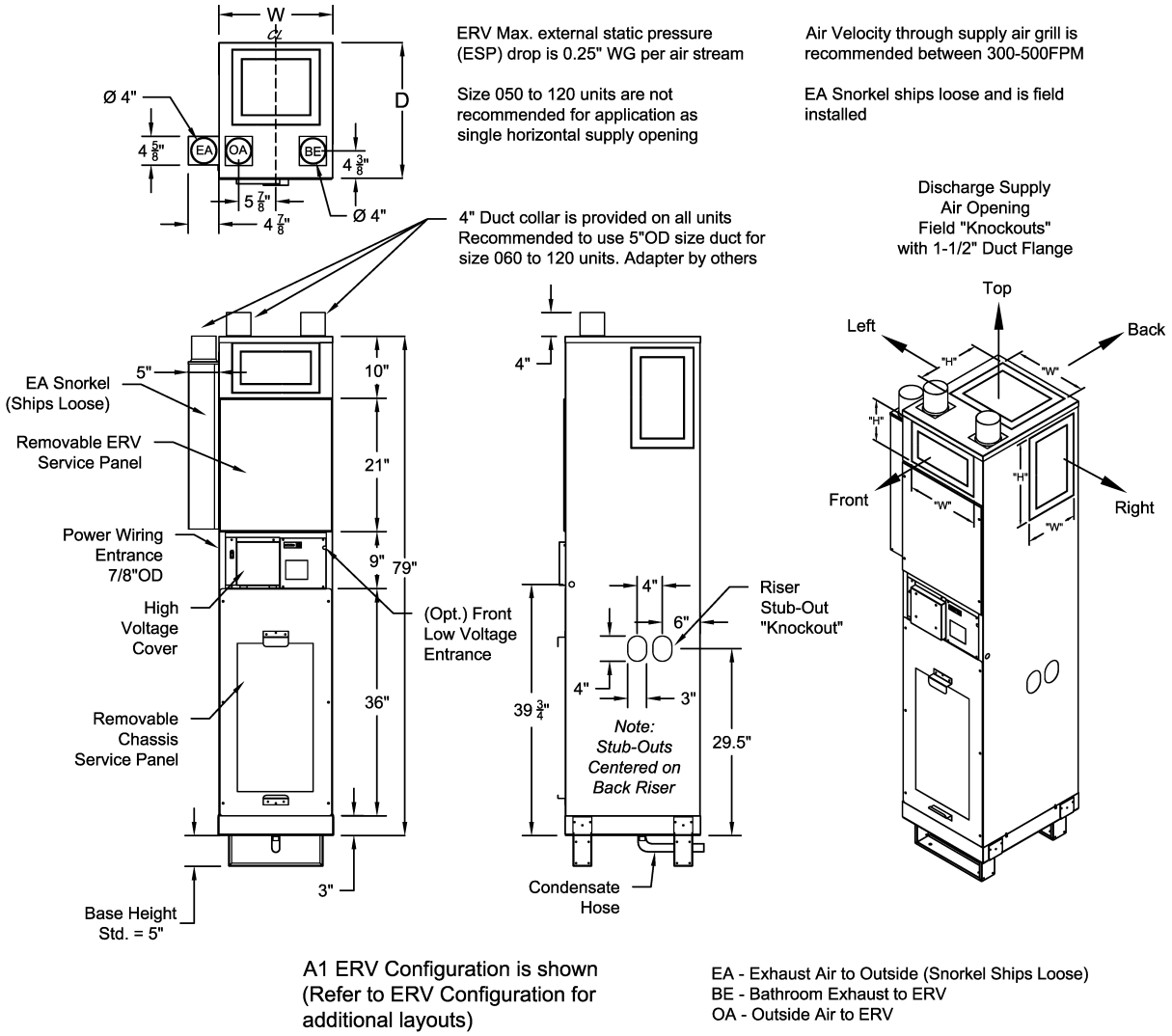
3/8” Closed cell pads, factory provided as standard, are field installed under the cabinet base to isolate the unit from the floor surface.

Vibrational Rail

The refrigeration chassis is mounted on a double isolated base with rubberized dampeners to isolate the chassis from the cabinet to minimize noise

3. CABINET DIMENSIONS & CONFIGURATIONS

3.1 VSHYe Series Cabinet



A1 ERV Configuration is shown (Refer to ERV Configuration for additional layouts)

EA - Exhaust Air to Outside (Snorkel Ships Loose)
BE - Bathroom Exhaust to ERV
OA - Outside Air to ERV

Table 1 VSHYe Cabinet Dimensions

Model	Capacity (Tons)	Cabinet Size	Dimensions (in)		VSHPe Supply Discharge Opening ("W" X "H") inches			
			W	D	Front	Back	Right/Left	Top
VSHYe 030	3/4	Y	18	21.5	14 x 8	8 x 14	10 x 12	12 x 12
VSHYe 040	1				14 x 8	8 x 14	10 x 14	12 x 12
VSHYe 050	1 1/4				14 x 8	8 x 14	10 x 16	14 x 12
VSHYe 060	1 1/2				14 x 8	8 x 14	10 x 16	14 x 12
VSHYe 080	2	Z	22	25.5	18 x 8	8 x 18	14 x 18	14 x 14
VSHYe 100	2 1/2				18 x 8	8 x 18	14 x 20	16 x 14
VSHYe 120	3				18 x 8	8 x 18	14 x 20	16 x 14

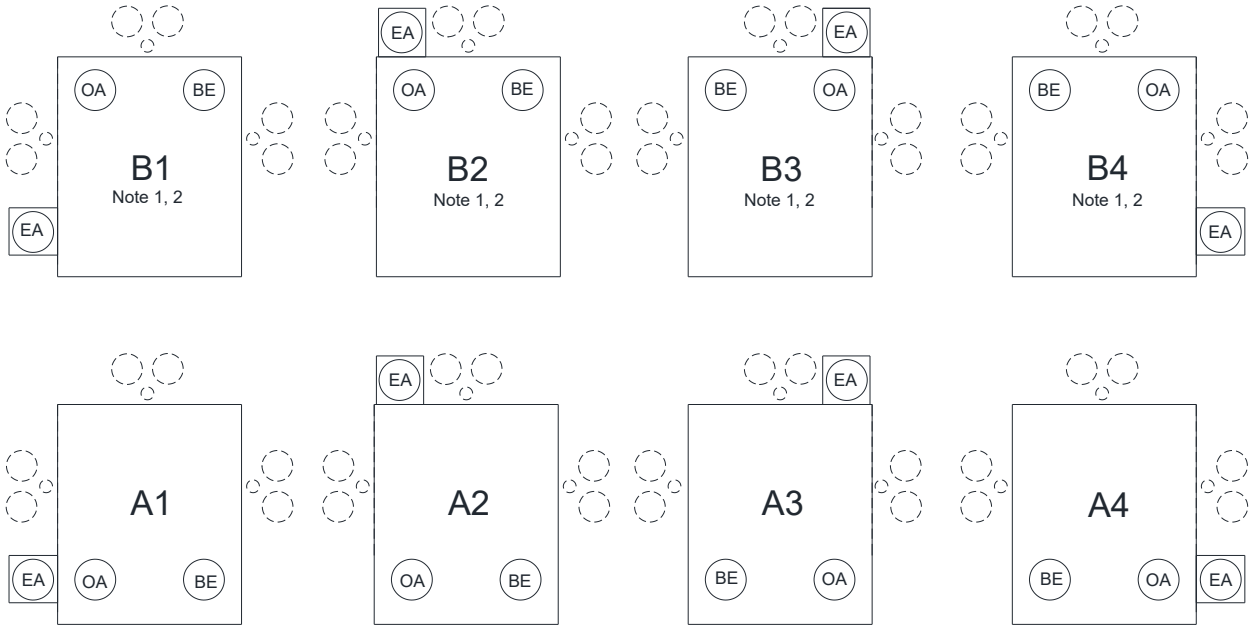
3.2 ERV Configurations (Top View)

Omega VSHYe cabinet features up to 8 ERV Port configurations. Left Hand (Type A1) and Right Hand (Type A4) are our standard ERV port configurations. Additional special order configurations are available as shown below. See note below for more details.

Note:

TYPE A1 and A4 are standard ERV configurations.

TYPE A2, A4, and TYPE B are special ERV configurations.



Acceptable Riser Locations:

EA - Exhaust Air to Outside
BE - Bathroom Exhaust to ERV
OA - Outside Air to ERV

Note:
1 - Left supply air discharge option not available
2 - Right supply air discharge option not available

4. RISERS & HOSE KITS

S = Supply Riser
C = Condensate Riser
R = Return Riser

4.1 Riser Handing Conventions (Top View)

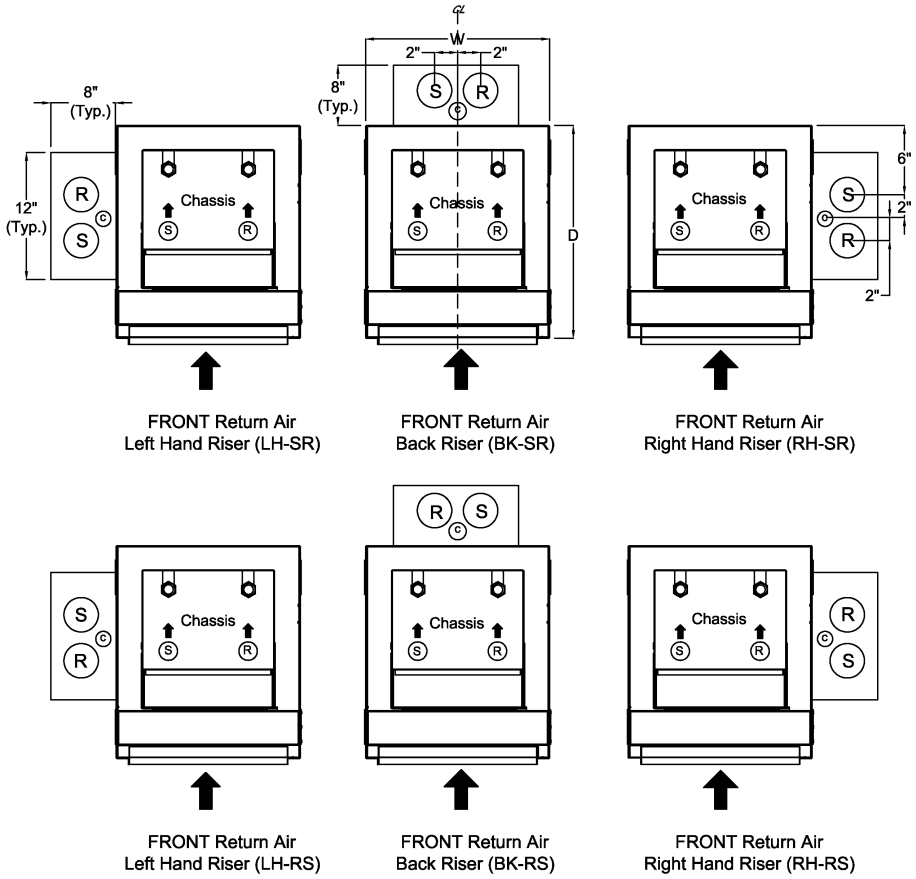


Table 2 Hose Kit Sizes

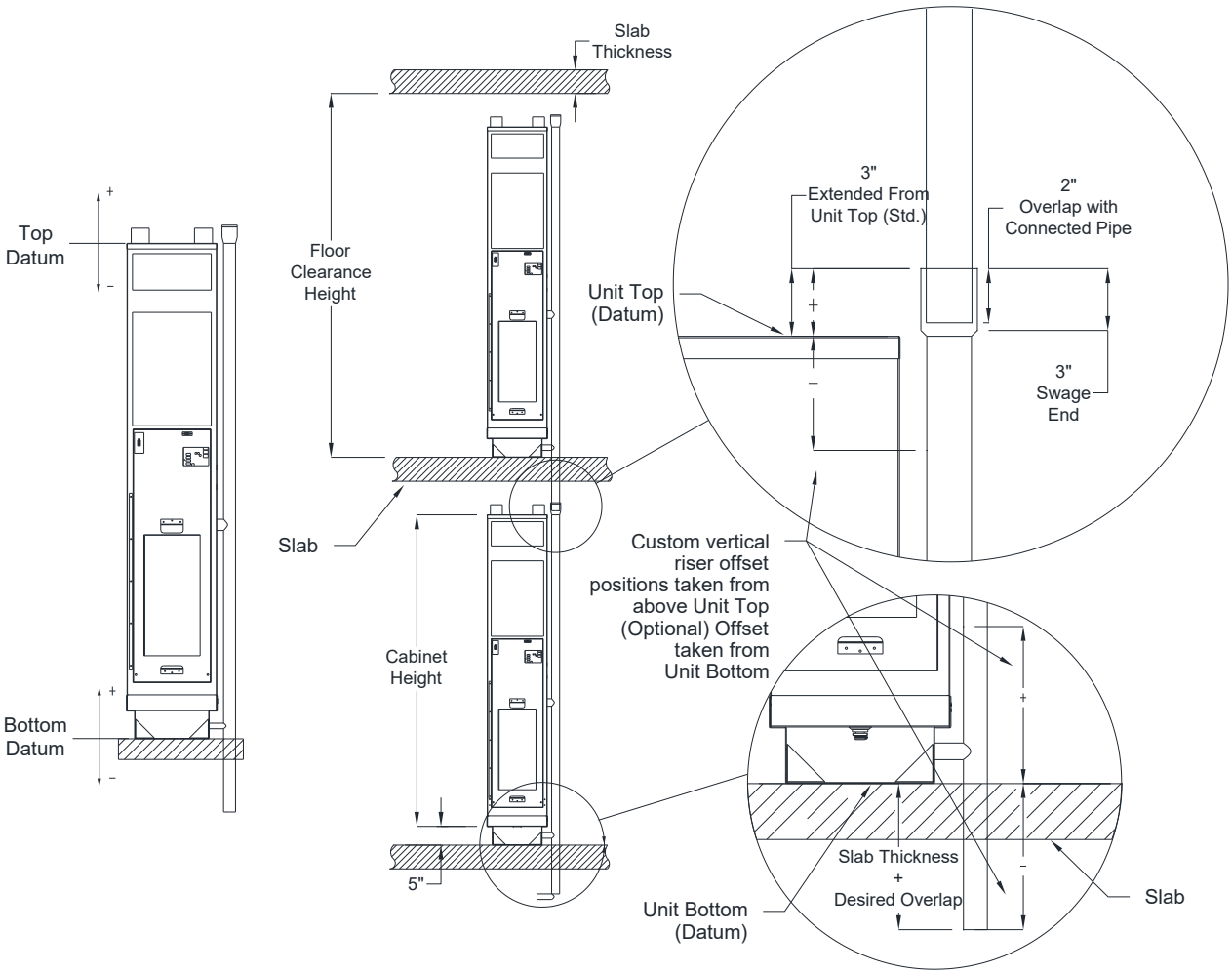
Model	Hose Kit	
	Size (in)	Length (in)
VSHYe 030	1/2	24
VSHYe 040	1/2	24
VSHYe 050	1/2	24
VSHYe 060	1/2	24
VSHYe 080	3/4	30
VSHYe 100	3/4	30
VSHYe 120	3/4	30

Hose kits are supplied with each unit. Hose kit configurations vary by unit size as shown.

Notes:

- As viewed from top, risers can be order in either SR configuration (supply, condensate, return) or RS (return, condensate, supply).
- Optional risers come in Type M or L copper . Risers can be ordered from factory with 3-inch deep swage.
- Riser transition pieces are field provided when joining dissimilar riser sizes. Contact factory for specials requests.
- Risers available in sizes 3/4” to 3”. Consult factory for larger sizes.
- All riser handing determined by facing front of the unit (return air opening).
- Riser chase dimensions are typical. Sleeving and risers covers are not provided.

4.2 Riser Sizing Reference

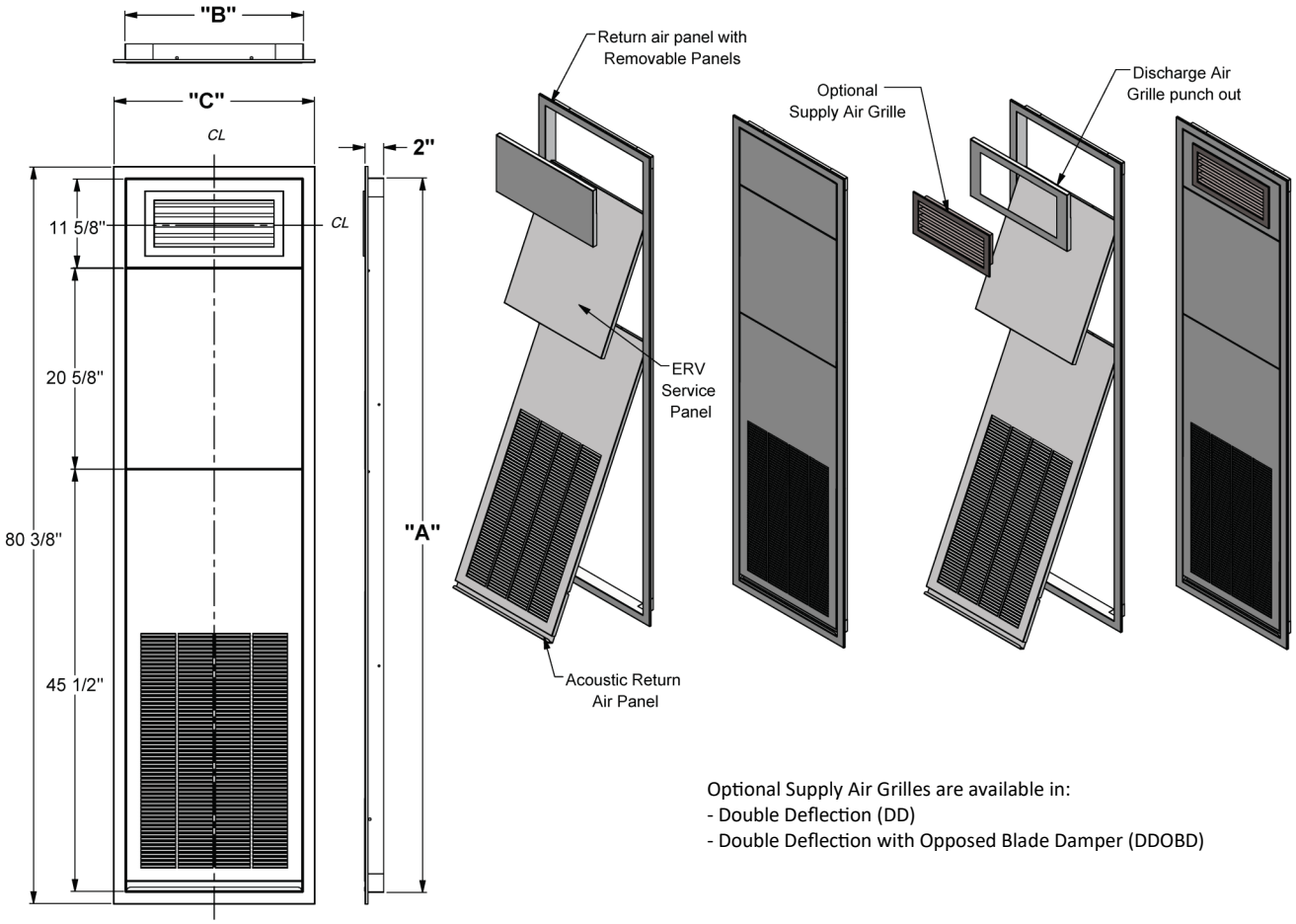


Notes:

- Risers are positioned relative to cabinet using a standard “Top” Datum reference (optional “Base” Datum). Top Datum Offset indicates where the top of riser will be located relative to top of cabinet. A Base Datum indicates where bottom of riser will be located relative to base of unit (floor).
- Risers can be ordered with 3-inch deep swage.
- Risers insert 2-inches into the 3-inch deep swage connection (minimum 1 inch insertion is required)
- Riser Length = Floor Clearance Height + Slab Thickness + 2 inch (overlap) (Rounded up to 120” or 144”).
- Omega supplies two standard riser lengths, 120” (10’) and 144” (12’), to be field cut on-site.
- Extension tailpieces or riser transitions pieces for joining dissimilar piping sizes are field provided. Contact factory for special requests.
- Risers available in Type L and Type M copper.
- Condensate riser are available with optional 3/8-inch closed cell insulation.
- Optional closed cell insulation on supply and return risers is available.

5. RETURN AIR PANELS

5.1 Acoustic Front Return Air Panel



Optional Supply Air Grilles are available in:
- Double Deflection (DD)
- Double Deflection with Opposed Blade Damper (DDOBD)

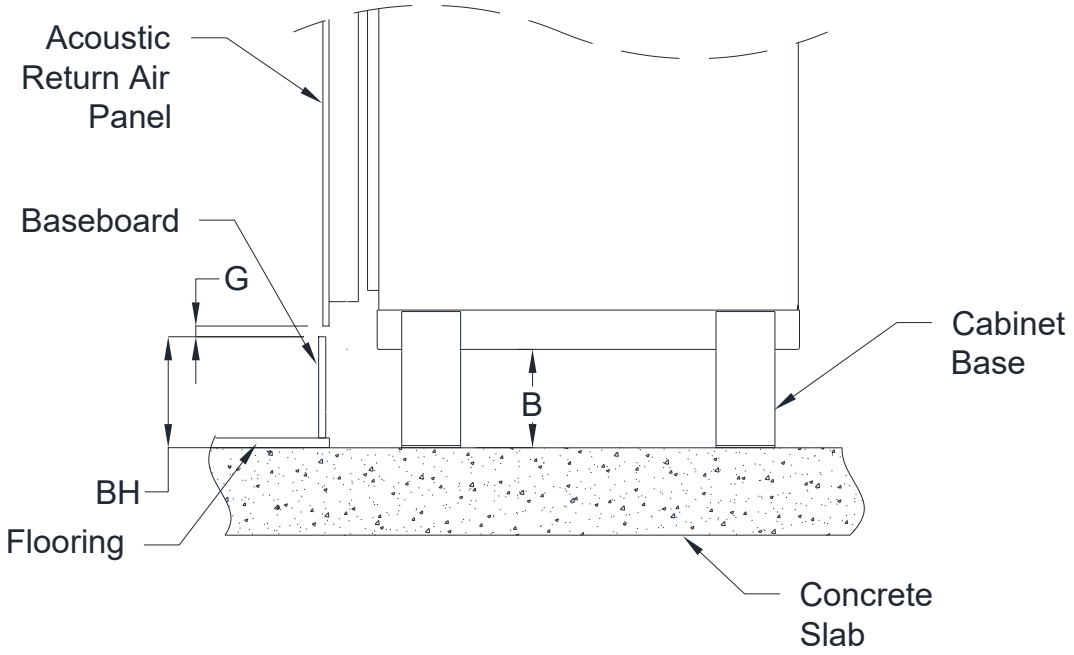
Table 3 Acoustic ERV RA Panel Sizes

Model	Cabinet Size	Acoustic RA Panel Dimensions (inches)		
		A	B	C
VSHYe 030	Y	78	19 5/8	22
VSHYe 040				
VSHYe 050				
VSHYe 060				
VSHYe 080	Z	78	23 5/8	26
VSHYe 100				
VSHYe 120				

Notes:

- Panel is lined with acoustic insulation for enhanced sound attenuation.
- Return air panel supplied in standard powder coat appliance white finish (custom finishes available, contact customer service).
- Version 2 panel shown. Perimeter style panel also available, contact factory for details.

5.2 Acoustic Panel Cabinet Base Height Calculation



Acoustic Panel Cabinet Base Height Calculation

Acoustic ERV Panel Cabinet Base Height Calculation:

BH = Baseboard Height + Finish Floor Height*

G = Gap (recommend min 0.5”) between baseboard and panel.

B = Cabinet Base Height (Min. 5", 1" increments)

B = BH + G - 1”

Note: *Include flooring thickness, underlayment, and any concrete leveling as part of calculation.

Example:

If using a 6" baseboard, with 1” Finished Flooring height, and 0.5" gap:

B = (6” + 1”) + (0.5”) - 1”

B = 6.5"

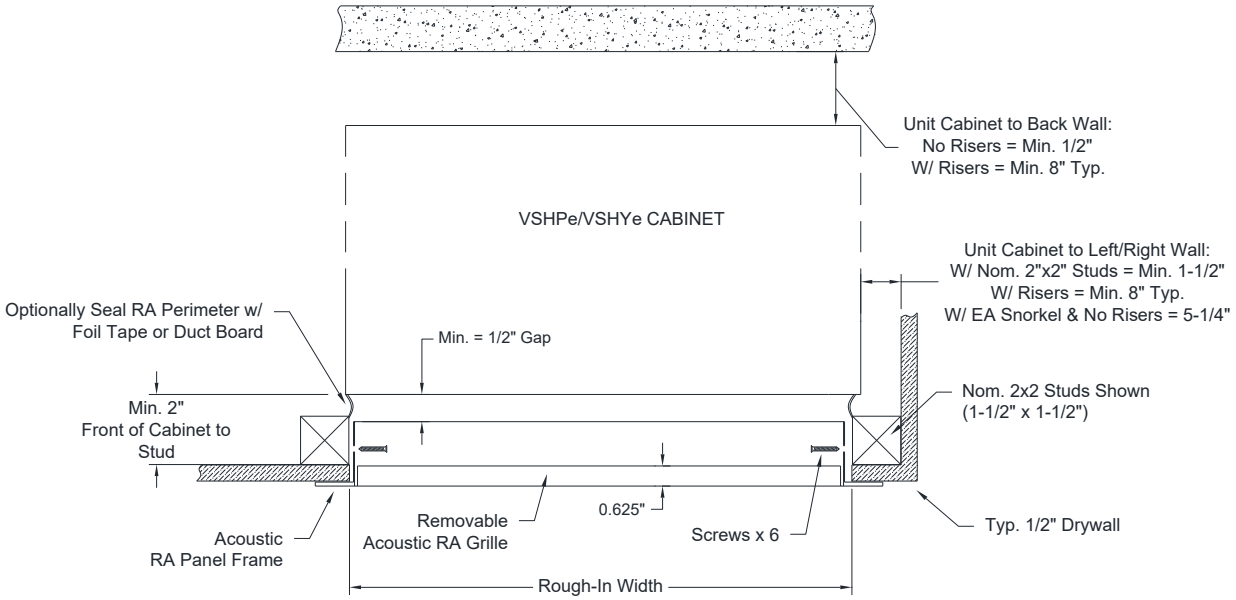
Therefore we round up to a 7” Cabinet Base required.

Example: Baseboard - Base Height

Baseboard Height*	Cabinet Base Height
Up to 4-1/2"	5"
>4-1/2 to 5-1/2"	6"
>5-1/2" to 6-1/2"	7"
>6-1/2" to 7-1/2"	8"

*Includes 1" Total Flooring
*Using gap G= 0.5"
(top of baseboard to return panel flange)

5.3 Acoustic Panel Furring Details - Plan View

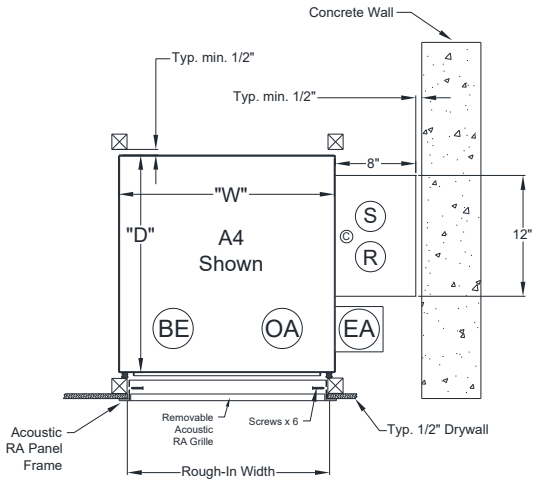


Acoustic Panel Furring Detail—Typ. 2x2 Framing Plan View

Notes:

1) Provide gap min. of 2” from stud to front of cabinet. Allow min. 1/2” clearance between cabinet and Acoustic panel frame.
2) Return air panel should be centered in front of the unit return air opening.
3) At location of risers allow for min. 8” typical clearance.
4) Optional - Insulate the closet cavity with plenum rated acoustical insulation for additional sound attenuation and/or add double thickness drywall.

SIDE RISER

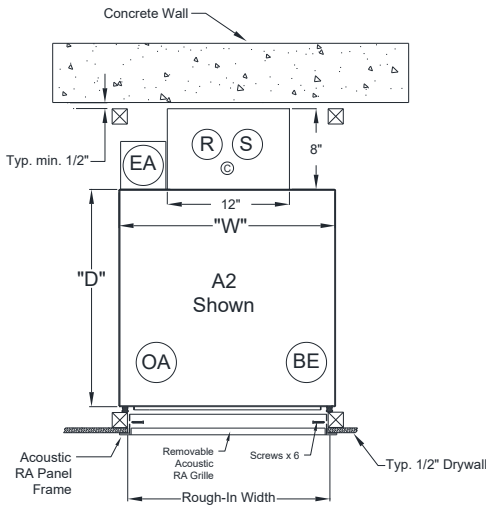


Furring Covers A4, B4, C4 & D4 Configurations

A1, B1, C1 & D1 are Mirrored

EA - Exhaust Air to outside
BE - Bathroom Exhaust to ERV
OA - Outside Air to ERV

BACK RISER



Furring Covers A2, B2, C2 & D2 Configurations

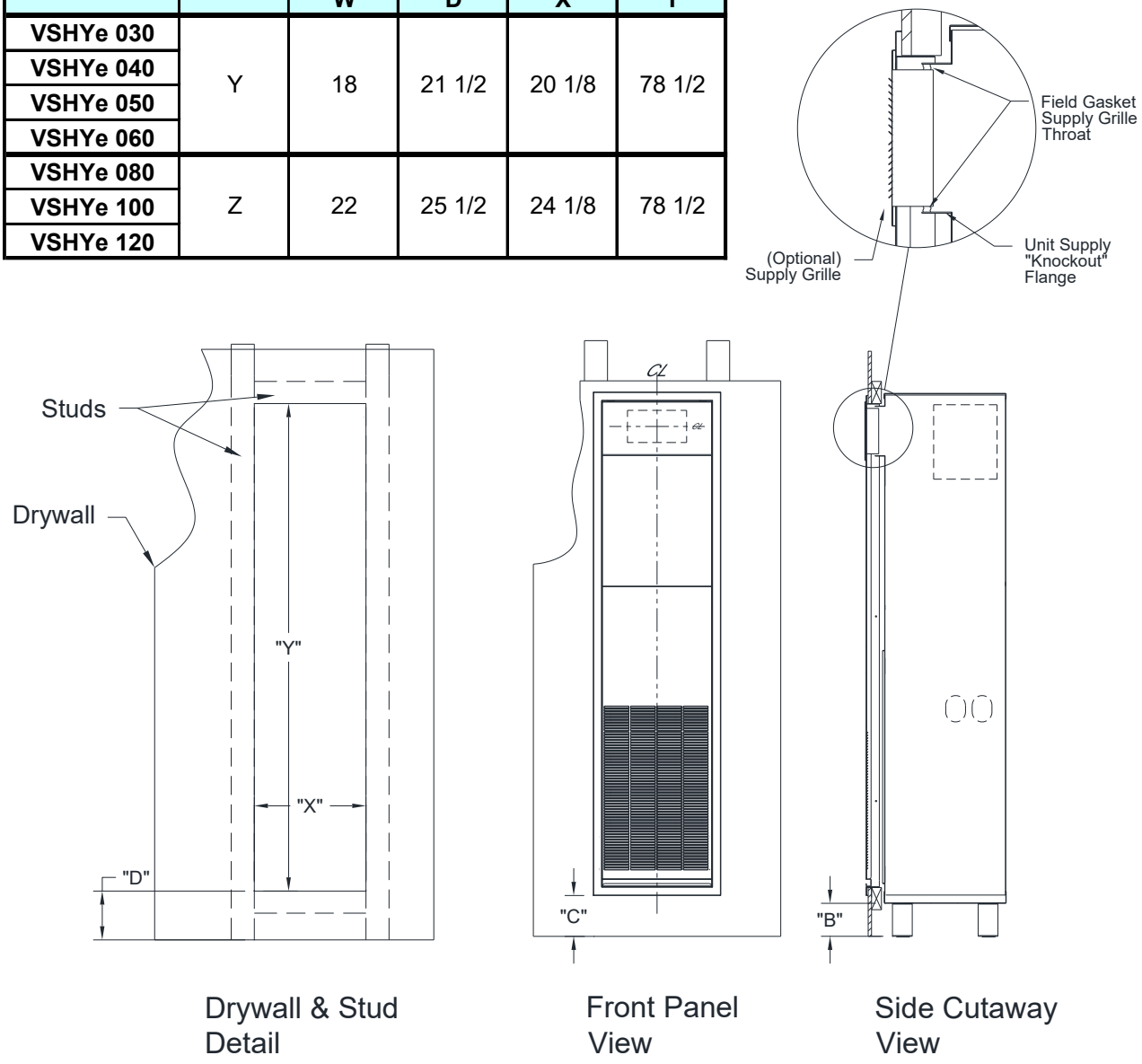
A3, B3, C3 & D3 are Mirrored

R Water Return
© Condensate Drain
S Water Supply

5.4 Acoustic Panel Furring Details - Front View

Table 4 Acoustic RA Panel Furring Sizes

Model	Cabinet Size	Cabinet Dimensions (in)		Rough-In (in)	
		W	D	"X"	"Y"
VSHYe 030	Y	18	21 1/2	20 1/8	78 1/2
VSHYe 040					
VSHYe 050					
VSHYe 060					
VSHYe 080	Z	22	25 1/2	24 1/8	78 1/2
VSHYe 100					
VSHYe 120					



Acoustic Panel Furring Detail—Front & Side View

B = Cabinet Base Height (Min 5", increases in 1" increments)
C = Panel Flange Height from Base of Cabinet (**B** + 1")
D = Rough-In Height from Base of Cabinet (**B** + 2")

NOTES:

- **Center vertically and horizontally RA panel supply opening with unit front "knockout" supply discharge**
- **For optional RA panels with supply grille: apply gasket tape to supply grille when inserting into unit supply flange**

6. PERFORMANCE & ELECTRICAL DATA

6.1 ISO Performance Data

Unit Model	Refrig.	Air Flow (CFM)	Heating (105F EWT)				[2]Cooling (86F EWT)			
			Water Flow (GPM)	*WPD (FT)	LWT (°F)	[1]Capacity (BTUH)	[3]Capacity (BTUH)	EER	Water Flow (GPM)	[4]WPD (FT)
VSHYe 030	**R-410A**	330	2.25	5.8	95.6	10,500	9,200	12.5	2.5	11.0
VSHYe 040	**R-410A**	400	3.0	5.0	96.3	12,900	12,200	13.5	3.2	11.1
VSHYe 050	**R-410A**	510	3.5	5.5	95.8	16,000	15,000	15.0	3.9	14.3
VSHYe 060	**R-410A**	640	4.5	8.8	96.7	18,600	18,100	14.5	4.7	20.2
VSHYe 080	**R-410A**	830	6.0	6.3	97.1	23,700	23,300	14.5	6.3	10.2
VSHYe 100	**R-410A**	1020	7.5	7.4	97.5	28,000	29,500	14.5	7.7	14.2
VSHYe 120	**R-410A**	1180	9.0	10.6	97.9	31,800	35,900	13.0	9.0	18.4

* Water pressure drop (WPD) through Hydronic coil only. Does not include PD system piping, valves or hoses.

[1] Based on 70F EAT. Heating performance does not include fan motor heat.

[2] Nominal capacity performance based on ARI/ISO 13256-1 Water Loop conditions at 86F EWT Cooling.

[3] Cooling performance shown is for 80.6F DB and 66.2F WB entering air.

[4] Water pressure drop (WPD) through Coaxial Condenser coil. Does not include PD system piping, valves or hoses.

Hybrid heat option available only on units with ECM.

6.2 Electrical Data

Model	Supply Voltage	Compressor				Blower		ERV FLA	Total Unit FLA	MCA	MaxFuse/ Circuit Breaker
		Qty		RLA	LRA	HP	FLA				
VSHYe 030	208-230/1/60	1	@	3.7	22.0	1/4	1.2	1.0	5.9	6.8	15
VSHYe 040	208-230/1/60	1	@	4.7	25.0	1/4	1.3	1.0	7.0	8.2	15
VSHYe 050	208-230/1/60	1	@	5.6	29.0	1/3	2.2	1.0	8.8	10.2	15
VSHYe 060	208-230/1/60	1	@	7.4	33.0	1/3	3.0	1.0	11.4	13.3	20
VSHYe 080	208-230/1/60	1	@	10.9	62.9	1/2	3.0	1.0	14.9	17.6	25
VSHYe 100	208-230/1/60	1	@	13.5	72.5	1/2	4.2	1.0	18.7	22.1	35
VSHYe 120	208-230/1/60	1	@	15.4	83.9	1/2	4.2	1.0	20.6	24.5	35

Minimum voltage 200 V. Operating voltage 208-230 V, single phase
Adhere to all applicable electrical codes
RLA - Rated load amps
LRA - Locked rotor amps
FLA - Full load amps

6.3 Expanded Heating Performance Table

Unit Model	Air Flow CFM	Water Flow GPM	90F EWT		100F EWT		105F EWT		110F EWT		120F EWT	
			LWT (°F)	Capacity (BTUH)	LWT (°F)	Capacity (BTUH)	LWT (°F)	Capacity (BTUH)	LWT (°F)	Capacity (BTUH)	LWT (°F)	Capacity (BTUH)
VSHY020	200	1.00	83.5	3,249	90.1	4,933	93.3	5,793	96.5	6,660	103.0	8,411
		1.25	84.4	3,494	91.5	5,298	95.0	6,209	98.5	7,124	105.5	8,966
		1.50	85.1	3,662	92.6	5,534	96.3	6,478	100	7,425	107.4	9,310
		1.75	85.7	3,776	93.4	5,690	97.3	6,645	101.2	7,602	109.0	9,518
		2.00	86.1	3,850	94.2	5,786	98.2	6,756	102.2	7,728	110.2	9,674
VSHY030	350	1.25	82.4	4,753	88.3	7,247	91.3	8,514	94.2	9,790	100.0	12,370
		1.75	83.8	5,422	90.5	8,206	93.9	9,590	97.3	10,978	104.1	13,763
		2.00	84.4	5,616	91.5	8,454	95.0	9,878	98.6	11,307	105.7	14,172
		2.25	84.9	5,750	92.2	8,654	95.9	10,111	99.6	11,572	107.0	14,502
		2.50	85.3	5,860	92.9	8,818	96.7	10,303	100.5	11,790	108.0	14,773
VSHY040	460	1.50	82.6	5,504	88.6	8,505	91.5	10,046	94.4	11,610	99.4	15,287
		2.00	83.5	6,413	89.9	10,063	93.1	11,802	96.3	13,552	102.7	17,053
		2.50	84.3	7,109	91.4	10,700	94.7	12,499	98.4	14,301	105.5	17,914
		3.00	85.1	7,359	92.6	11,066	96.3	12,925	100	14,787	107.5	18,519
		3.50	85.7	7,541	93.5	11,338	97.4	13,241	101.3	15,147	109.0	18,967
VSHY050	530	2.25	83.2	7,657	89.5	11,671	92.7	13,701	95.9	15,748	102.1	19,880
		2.75	84.0	8,246	90.8	12,506	94.2	14,655	97.7	16,776	104.5	21,035
		3.25	84.7	8,634	91.9	12,998	95.6	15,190	99.2	17,386	106.4	21,794
		3.50	85.0	8,760	92.4	13,186	96.1	15,407	99.8	17,634	107.2	22,102
		4.00	85.5	8,970	93.2	13,497	97.0	15,770	100.9	18,047	108.6	22,615
VSHPY060	630	2.50	83.0	8,706	89.3	13,250	92.4	15,551	95.6	17,871	101.8	22,516
		3.25	84.1	9,534	91.1	14,359	94.6	16,784	98.1	19,215	105.0	24,096
		4.00	85.0	9,963	92.4	15,000	96.2	17,529	99.9	20,065	107.3	25,153
		4.50	85.4	10,181	93.1	15,324	97.0	17,906	100.8	20,494	108.4	25,686
		5.00	85.8	10,360	93.7	15,591	97.6	18,216	101.6	20,847	109.4	26,124
VSHY080	820	3.50	83.9	10,687	90.5	16,556	93.7	19,577	96.5	23,463	102.8	29,710
		4.00	84.2	11,482	90.8	18,254	94.2	21,439	97.6	24,648	104.2	31,122
		5.00	84.8	12,892	92.1	19,542	95.8	22,874	99.4	26,175	106.7	32,794
		6.00	85.5	13,433	93.2	20,203	97.1	23,599	100.9	27,001	108.6	33,822
		7.00	86.1	13,743	94.0	20,666	98.0	24,137	102	27,613	110.0	34,582
VSHY100	1000	4.00	84.4	11,203	91.4	17,139	94.8	20,318	98.1	23,618	104.6	30,429
		5.50	85.2	13,158	92.6	20,307	96.2	23,932	99.9	27,598	107.1	35,047
		6.50	85.6	14,143	93.3	21,617	97.1	25,421	100.9	29,263	108.5	36,859
		7.50	86.0	14,838	93.9	22,542	97.9	26,369	101.9	30,212	104.5	37,938
		8.00	86.2	15,119	94.2	22,821	98.3	26,692	102.7	30,910	110.3	38,393
VSHPY120	1200	4.50	84.4	12,634	91.2	19,707	94.5	23,393	97.8	27,167	104.3	34,796
		6.00	85.0	14,877	92.3	22,899	95.9	26,976	99.5	31,107	106.7	39,499
		7.00	85.4	15,894	93.0	24,285	96.8	28,561	100.6	32,740	108.1	41,145
		8.00	85.8	16,641	93.7	25,144	97.6	29,419	101.5	33,713	109.3	42,352
		9.00	86.2	17,064	94.2	25,747	98.2	30,119	102.3	34,509	110.3	43,338

Heating capacity is based on 70ºF DB entering air.

6.4 Design Limits

Air Limits	Cooling		Heating
	DB	WB	DB
Std. Entering Air Temperature (EAT)	75°F	63°F	68°F
Min. Entering Air Temperature (EAT)	65°F	55°F	50°F
Max. Entering Air Temperature (EAT)	85°F	71°F	85°F

Fluid Limits	Standard Range	
	Cooling	Heating
Std. Entering Water Temperature (EWT)	85°F	105°F
Min. Entering Water Temperature (EWT)	50°F	90°F
Max. Entering Water Temperature (EWT)	120°F	120°F

CFM Limits	
Min. CFM/Ton	300
Design CFM/Ton	400
Max. CFM/Ton	450

Fluid GPM Limits	
Min. GPM/Ton	2
Design GPM/Ton	3
Max. GPM/Ton	4

CAUTION

Design limits can not be combined. Combining maximum or minimum limits is not allowed. This could exceed the operation and design limits of the unit.

For example: It is not allowed to combine maximum entering air temperature (EAT) limits with maximum entering water temperature (EWT) limits.

7. FAN & MOTOR DATA

7.1 Expanded Fan Data Table - ECM

Unit Size	EC Motor Speed	Minimum SCFM	Rated SCFM	External Static Pressure (in w.g.)													
				0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6
				SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
030	WHISPER* MODE	N/A	N/A	225	210	195	175	160	145	130	115	100	85	70	-	-
	MED	220	350	350	340	335	325	315	305	295	285	275	265	255	245	235
	HIGH			-	-	365	355	350	340	330	320	310	305	295	285	275
040	WHISPER* MODE	N/A	N/A	250	230	225	205	180	160	145	125	110	90	75	-	-
	MED	300	460	460	450	445	440	430	425	415	405	395	385	375	365	355
	HIGH			-	-	-	-	470	465	455	445	435	430	420	410	400
050	WHISPER* MODE	N/A	N/A	450	430	410	390	370	350	320	300	270	250	220	-	-
	MED	375	530	-	-	550	540	520	505	485	470	450	430	410	390	375
	HIGH			-	-	-	-	-	-	555	540	525	510	490	475	460
060	WHISPER* MODE	N/A	N/A	450	430	410	390	370	350	320	300	270	250	220	-	-
	MED	450	630	640	620	610	595	580	565	555	540	525	510	490	475	460
	HIGH			-	-	675	670	655	650	640	620	610	595	580	565	550
080	WHISPER* MODE	N/A	N/A	620	580	560	520	480	440	410	380	340	300	260	-	-
	MED	600	820	880	860	840	820	800	780	750	720	700	670	650	625	600
	HIGH			-	-	-	-	895	880	860	820	805	795	780	770	760
100	WHISPER* MODE	N/A	N/A	620	580	560	520	480	440	410	380	340	300	260	-	-
	MED	750	1010	1080	1060	1040	1010	990	970	950	930	900	880	860	840	820
	HIGH			-	-	-	-	1110	1090	1070	1060	1040	1020	990	980	960
120	WHISPER* MODE	N/A	N/A	620	580	560	520	480	440	410	380	340	300	260	-	-
	MED	900	1200	1230	1200	1185	1170	1150	1130	1110	1095	1080	1055	1040	1020	1000
	HIGH			1320	1290	1275	1260	1240	1225	1205	1190	1175	1160	1140	1120	1100

Note: All airflow ratings are taken at lowest voltage rating of dual rating (ie. 208 volt).
Airflow ratings include resistance of dry coil, Return Air panel and clean MERV8 air filters.
*Standard “Whisper” mode is Fan On, Compressor Off mode for constant fresh air circulation. LOW Fan Speed tap is not available with Whisper mode.

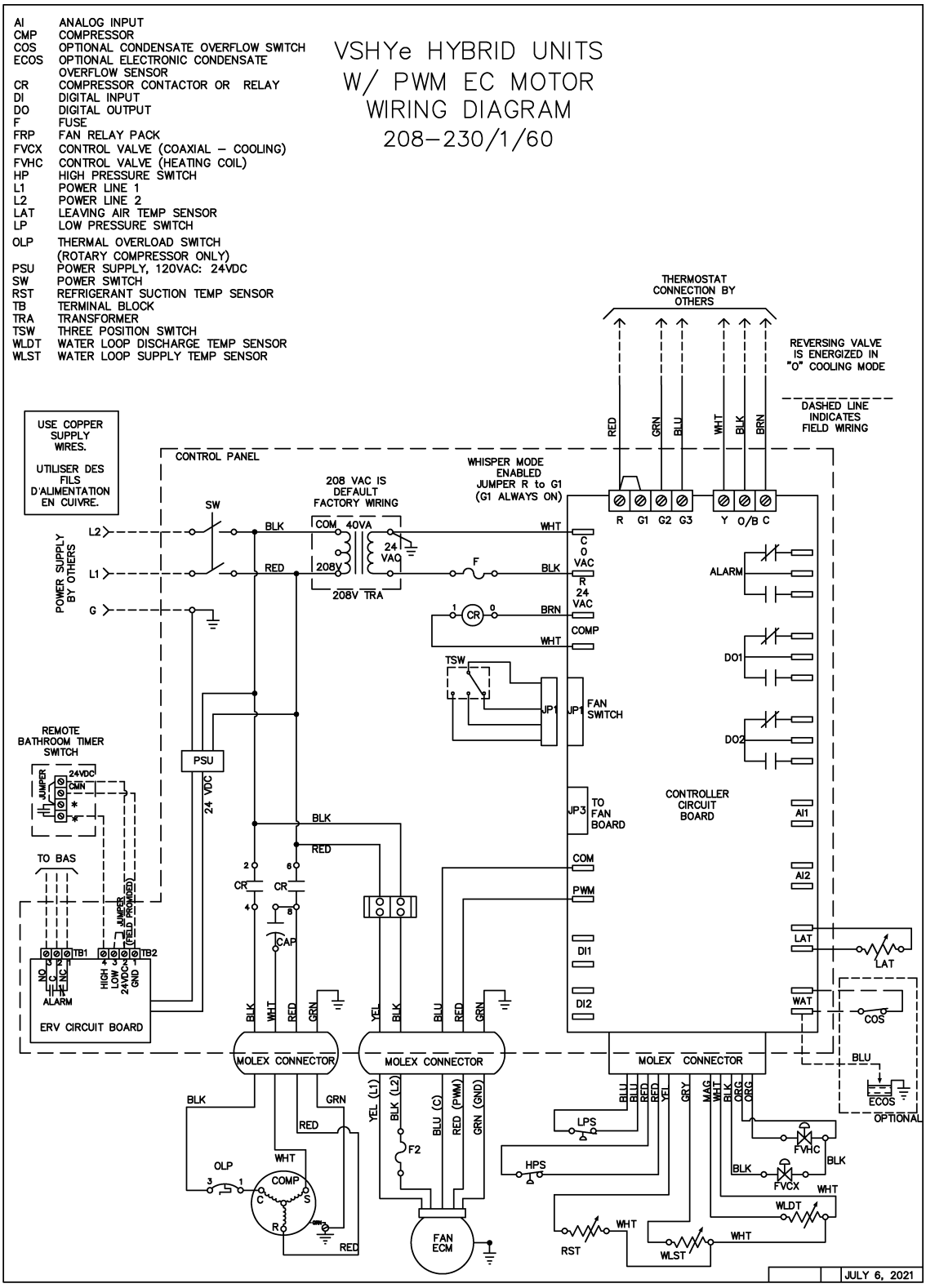
7.2 ERV Fan Data

% PWM Signal / Power	Potentiometer Dial Setting	ESP (External Static) inwg										
		0.00	0.025	0.05	0.075	0.10	0.15	0.20	0.25	0.30	0.40	0.50
25% Speed @ 6 Watts	10 O'clock	43	34	28	22	18	12	-	-	-	-	-
37% Speed @ 13 Watts	11 O'clock	70	54	43	34	27	15	7	-	-	-	-
45% Speed @ 18 Watts	12 O'clock	85	67	55	44	35	23	15	-	-	-	-
57% Speed @ 30 Watts	1 O'clock	111	95	83	74	68	54	45	37	30	21	15
69% Speed @ 43 Watts	2 O'clock	139	124	114	106	104	91	82	73	63	53	44
82% Speed @ 61 Watts	3 O'clock	168	155	150	141	139	127	119	107	96	85	72
95% Speed @ 82 Watts	4 O'clock	187	172	166	157	156	145	137	124	115	105	91

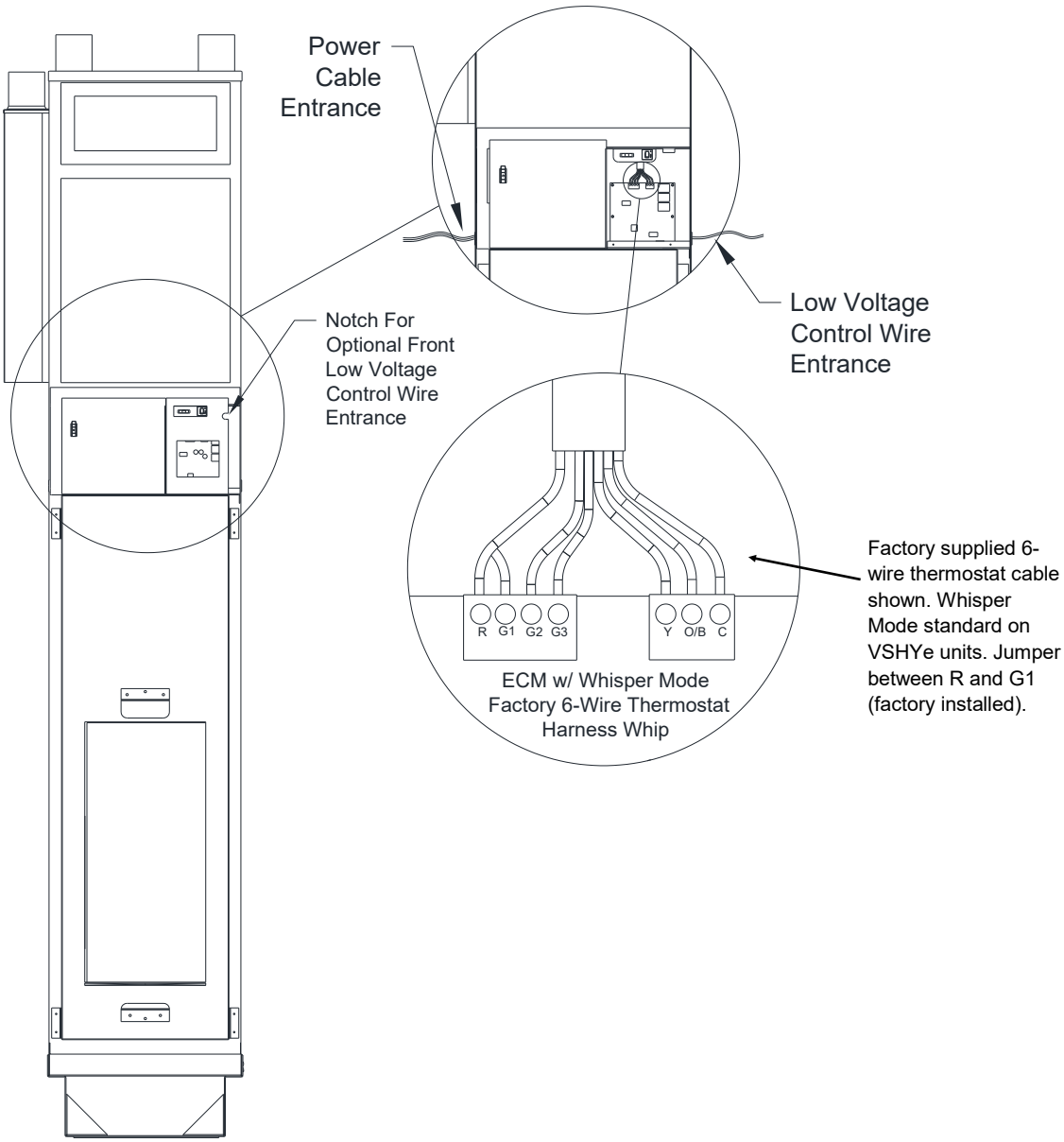
Notes:
- All airflow ratings are taken at lowest voltage rating of dual rating (ie. 208 volt).
- ERV external static setting is based on exhaust duct run.
- ESP capability shown per fan.
- Recommended ERV fan speeds are field set to match duct static. Default factory settings may not match site conditions and requirements.
- Watts includes both ERV fans.
- Internal Manual OA Slider Damper may be used to control OA introduction in the event of variable OA conditions (i.e. wind stack effect)

8. ELECTRICAL SCHEMATICS & CONTROL WIRING

8.1 Wiring Diagram - Standard ECM (208-230/277V/1Ph/60Hz)



8.2 Thermostat Wiring Details



Note: Factory supplied 6-wire 24 inch thermostat cable coiled up in low-voltage compartment of electrical box for field wiring to thermostat.

Heat/Cool Thermostat Connection Detail:

R = 24VAC
G1 = Whisper Mode (Continuous Fan On)
G2 = Fan Speed 2 (Medium Speed)
G3 = Fan Speed 3 (High Speed)
Y = Compressor On (Cooling)
O/B = Call for Heating
C = Common (Optional)

9. SPECIFICATIONS

1 GENERAL

Vertical stacked hybrid heat pump units shall be Omega VSHYe Series with integrated ERV. Units shall provide scheduled capacities at the ampacity and voltage shown on the drawings. Specified airflow shall be at the scheduled external static pressure and shall include the effects of a wet coil and clean filter.

Each unit shall be factory tested and ship factory-charged with R-410A refrigerant. All units from 1/2 to 3 Tons shall be tested and certified by ASHRAE/ANSI/AHRI/ ISO 13256-1 and ETL listed for United States and Canada. Each unit shall have factory affixed label showing ASHRAE/ANSI/AHRI/ISO and ETL logos. Cabinets and refrigeration chassis shall be factory wired and pre-piped.

2 CABINET

2.1 The vertical stacked heat pump units shall be Omega with an integrated ERV. Units shall provide scheduled capacities at the ampacity and voltage specified.

2.2 The cabinet shall be 20-gauge galvanized steel with riveted internal components for rigidity. Cabinet shall have internal surfaces insulated with 1 inch thick, 3.5 lbs. high-density, mould resistant, thermal and acoustic insulation. Insulation shall meet NFPA 90, UL-181, and ASTM-C1071 standards and insulation shall have a flame spread of less than 25, and a smoke developed classification of less than 50 per ASTM E-84 and UL 723.

2.3 Physical dimensions of each unit shall be accommodated within furring / ceiling-slab spaces provided as shown on the architectural drawings

2.4 A removable inner chassis service panel allowing service access to the fan and compressor compartment shall be provided with each unit.

2.5 A removable inner ERV service panel allowing front service access to the ERV, ERV fans and filters shall be provided with each unit. ERV mounted in the back of the cabinet or on the side of the unit is not accepted.

2.6 The drain pan shall be 16-gauge stainless steel. The drain pan shall come standard with a condensate overflow switch. The drain pan outlet shall be readily accessible for cleaning with a 7/8 inch OD copper drain connection. Unit shall be provided with a flexible p-trap condensate hose for connection to the condensate riser.

2.7 Factory installed supply and return risers shall be (Type L) (Type M) copper, with (factory) (field) mounted shut-off ball valves on each supply and return riser. Valves shall be brass and rated for 400 psig. A (Type M/DWV) condensate riser shall be (factory) (field) installed. Risers sizes shall be installed according to building plans.

2.8 Risers shall have optional factory provided 3-inch deep swage. Transition pieces, couplings, anchors, and compensators shall be field supplied.

2.9 Unit cabinet shall come with supply discharge opening “knockouts”. All cabinet discharge openings shall include 1-1/2 inch drywall flange around the full opening perimeter. Supply discharge “knockouts” are cut and field selected.

2.10 Supply ducts shall not be rigidly attached to the cabinet and shall be acoustically isolated from cabinet using flexible canvas connections. Contractor shall install flex connection on all discharge openings. There shall be no rigid connection to supply-air discharge grilles or supply ducts.

2.11 Each unit shall have a sectionalized removable Acoustic Return Air panel. The panels shall be easily removable without tools. The lower panel section shall have access to the filter, chassis compartment, blower assembly, and service disconnect. The upper panel shall provide access to the ERV section, including a removable ERV core, fans and sensors.

2.12 **(Optional)** Perimeter Return Air Panel shall be provided. Return air panel is sectionalized into 3 sections and all panels removable without tools.

2.13 **(Optional)** Front supply discharge grille shall be provided that integrates with ERV Return Air Panel. Supply discharge grille shall be provided as double deflection or with optional opposed blade dampers.

2.14 Each ERV shall be factory configured for the handing specified on the room schedule. Each ERV shall be factory installed in the Vertical Stack cabinet and factory wired. ERV’s that ship loose and/or are not configured, installed, and wired at factory and/or require field installation are not accepted. ERV power supply shall be factory wired to main unit disconnect. Single source power is required for entire heat pump and ERV. Units requiring separate external power feed for ERV module are not accepted.

2.15 ERV casing shall be constructed with 22GA galvanized steel. The cabinet shall be fully insulated with 1” foil faced fiberglass insulation. Cabinet is furnished with 4-inch diameter duct connections. Field Outdoor Air, Bathroom Exhaust and Exhaust Air duct diameters shall be 5 inches in diameter. ERV shall be integral to the cabinet and is factory installed in the fan cabinet section.

2.16 Heat Exchanger (HX) core material shall be Polymeric membrane with sensible and latent recovery. ERV core shall have no odor crossover (AHRI 1060 certified for <0.5% crossover), mold and bacteria resistant (certified to ISO 846) , and water washable. Cellulose (paper), plastic, aluminum, or HRV cores shall not be accepted.

2.17 Each of the two air streams shall have independent MERV 6 washable filter media. Each filter shall have a face area of no less than 80 square inches.

2.18 ERV shall be fitted with a modulating outside air damper controlled by an electronic actuator that will modulate outside air (OA) as required to maintain fresh air introduction and shut-off if required by the freeze protection sequence.

2.19 (**Optional)** Provide each unit with 2-inch thick MERV 13 pleated filters.

3 FAN & BLOWER

SPECIFICATIONS (CONT'D)

3.1 Each unit shall include a factory mounted forward curved, double inlet double width centrifugal direct drive fan and motor assembly with internal overload protection. The blower fan assembly shall be positioned horizontally from a sheet metal blower deck. Single inlet fans are not accepted.

3.2 Units shall be supplied with an ECM fan motor as standard. Fan motors speeds shall be field selectable by wiring thermostat to required fan speed terminals.

3.3 ERV unit shall be fitted with two Backward Inclined (BI) DC fans. Fan motor speed shall be fully controllable via internal signal. Fan power shall be limited to 45 watts per fan.

3.4 ERV compartment shall have an additional back-up manual slide damper to be used to further control Outdoor Air (OA) introduction into the chassis compartment supply air stream.

3.5 ERV unit shall provide heat exchange when bathroom exhaust is activated at all times. ERVs that have bathroom air bypass ERV heat exchanger are not acceptable.

4 REFRIGERATION CHASSIS

4.1. Provide high temperature and pressure rated water hoses for connection of the risers to the chassis. The hoses supplied shall be constructed with an inner core of rubber, a stainless-steel metal braid, and rubber outer covering. Fittings shall be brass construction. Hoses shall carry a pressure rating of 600 psig.

4.2. The compressor chassis shall be mounted and vibrationally isolated on 12-gauge slide rails using a double isolated base. Compressor shall have an acoustical enclosure ensuring compressor noise is isolated from air stream. Provide plug type electrical connections for chassis control and power connections allowing for easy removal of the chassis from the front of the cabinet.

4.3 The refrigeration circuit shall have two service valves, for measuring high and low refrigerant pressure, in the chassis compartment enclosure. The refrigerant circuit shall contain a thermal expansion valve (TXV) refrigerant metering device and a reversing valve.

4.4 Chassis shall employ two 2-way valves mounted in the chassis compartment to minimize water pressure drop across water circuit. Water flow shall be directed through either the coaxial condenser coil during a call for cooling, or through hydronic heating coil during a call for heating. During a no demand situation, controls valves can be closed to reduce pumping power requirements. Units with 3-way valves are not accepted.

4.5 The hydronic heating coil shall be integral to the refrigeration coil. Units with separate heating and cooling coils are not accepted. Integrated hybrid coil shall minimize air pressure drop and maintain efficient fan performance. The Air side coils shall have copper tubes mechanically bonded to aluminum fins. Coils shall be sized to meet scheduled performance for cooling and heating.

4.6 Compressor shall be hermetically sealed type with internal thermal overload protection. Compressor shall be mounted on rubber vibration isolators.

4.7 Water side condenser heat exchanger shall be coaxial type with steel outer tube and copper inner tube. Condenser shall be rated at 500 psig water side and 650 psig refrigerant side.

4.8 **(Optional)** The chassis shall employ optional autoflow balancing valve mounted in the chassis compartment to maintain specified unit water flow rate over 2-80 psig differential water pressure. Auto flow balancing valve shall be field serviceable.

4.9 **(Optional)** Air coil shall be epoxy coated to aid in the prevention of premature corrosion (formicary, environmental) with minimum 1000 hour salt spray ASTM B117 protection.

5 CONTROLS

5.1 Each unit shall be factory wired with all necessary controls. Each unit shall come standard with a microprocessor controller mounted in the electrical box. Electrical box shall contain compressor and fan motor contactor, 24 volt control power transformer, terminal block for low voltage field wiring connection, and terminal block for main power electrical connection, (optional) unit mounted service disconnect switch.

5.2 The operating and safety controls shall be monitored by the microprocessor controller. Sensor parameters and timers shall be field adjustable to meet site conditions. Controller shall have the following safety switches and sensors:

- Low Pressure Safety Switch
- High Pressure Safety Switch
- (**Optional**) Condensate Overflow Switch
- Entering Water Temperature sensor
- Leaving Water Temperature sensor
- Suction line "freeze-stat" temperature sensor
- Supply Air Temperature sensor
- Compressor Anti-Short Cycle timer
- Water Valve Open and Closed timer
- Low-pressure bypass timer
- Random wait time on unit power up
- Fan-On and Fan-Off timer

5.3 Microprocessor controller shall have Web browser based test and diagnostic mode capability for quick servicing and troubleshooting on site. Controller shall have data logging with stored alarm states, supply and leaving water temperature, suction line temperature, and supply air temperature readings. Access to controller status and data log shall be available through a smart phone device, tablet or laptop.

5.4 Microprocessor controller shall have 'future proof' feature to accept software updates. Microprocessor board shall be capable of being field updated with newer software patches or custom software as needed.

5.5 Thermostats shall be remote mounted. Unit will come

SPECIFICATIONS (CONT'D)

with a standard 24-inch thermostat whip factory wired to the controller board terminals.

5.6 Fan operation shall have an ultra low fan speed "whisper mode" for air circulation when there is no call for compressor to circulate Outdoor Fresh Air. Whisper mode shall occupy the Low fan speed terminal G1. Field selectable Medium (G2) and High (G3) fan speeds are available.

5.7 ECM speed settings are field configurable using the imbedded Web based interface to meet site CFM and static requirements.

5.8 (**Optional)** Units shall come with a SmartOne compatible RS-485 communication add-on board and remote temperature sensor.

6 ERV CONTROLS

6.1 ERV shall be integrated into the Vertical Stack cabinet and configured, full wired at factory. Units that require field installation, field configuration and / or field wiring of ERV are not accepted.

6.2 The built-in ERV control algorithm shall operate to equalize outside air (OA) and exhaust air (EA) flow, which may vary considerably depending on stack effect. ERV shall be controlled with an on-board microprocessor controller. ERV shall measure 6 temperature sensors: Outside Air (OA), Mixed Air (MA), Supply Air (SA), Discharge Air (DA), Bathroom Exhaust Air (BA), and Exhaust Air (EA).

6.3 **Air Flow:** ERV shall contain two speed tap CFM settings, high and low speed modes. Fan speeds are field configured to meet design ERV CFM conditions in Low and High ERV fan speed requests.

6.4 **Defrost Mode:** ERV unit shall contain modulating dampers for tempering outside air. Manual outside air dampers are not accepted. ERV unit shall enter defrost mode once OA temperatures are below 14°F (-10°C), running in 40-minute cycles to modulate damper to maintain supply air (SA) temperature above 50°F (10°C).

6.5 **Supply Air Temperature:** Recirculation damper shall modulate to temper outside air (OA) to maintain a MINIMUM supply air (SA) temperature of 50°F (10°C) to protect against dumping of cold air into the conditioned space.

6.6 **Whisper Mode** constant air circulation shall distribute the Outdoor Fresh Air throughout the occupied space and not allow dumping of coil air into the unit return air opening. Units without constant fresh air circulation are not accepted.

6.7 ERV shall provide bathroom exhaust requirements without the need for additional field installed bathroom exhaust fan and wiring. Units that require bathroom fan to be field installed are not accepted.

6.8 ERV shall operate continuously even when unit heating and cooling demand is not required. Units that do not have continuous ERV fan on capability shall not be accepted.

7 TESTING & WARRANTY

7.1 Each chassis unit shall be factory tested using a multi-step computer controlled testing equipment to prevent operator error during factory testing.

7.2 Warranty shall be for parts, 1 year not to exceed 18 months from date of shipment. (Optional) Provide 5 year compressor replacement parts warranty only.

8 EXECUTION

8.1 Units shall be installed neat and level on isolation pads, supplied by heat pump manufacturer, and secured to floor.

8.2 Flush the system per manufacturer instructions before connecting chassis. Contractor shall join supply and return riser flexible hoses together, at the top/bottom on every riser and at the farthest point from the pump for flushing purposes.

8.3 Installing contractor shall install risers and install riser transition piece connections where riser sizes change.

8.4 The hoses shall be installed in the field by the contractor. The flare fittings on the hoses shall be connected according to industry standard (Finger tighten then tighten with wrench while always using back-up wrench).

8.5 Flush the system per manufacturer instructions before connecting chassis. The riser system shall be flushed, cleaned and commissioned before connecting chassis units to the riser system.

8.6 Contractor shall make all necessary provisions to bring in ducts for "outside air", "bathroom exhaust", and "bathroom air to outside" and field connect each duct to unit mounted take-offs.

8.7 Contractor shall provide duct and grille canvas connections on all single piece units.

8.8 Start-up of units shall be supervised by trained representatives of the equipment manufacturer.

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