Quality People. Building Solutions.

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

Date: 5/2/2024
Return Request: 5/12/2024
Project: Little Rock West High School
Supplier: Airetech
Manufacturer: Greenheck
Submittal: VAV Packaged Units
Submittal Number: 23 00 00-05
Drawing # and Installation: Mechanical Drawings

ARCHITECT
Lewis Architects Engineers
11225 Huron Lane, Suite 104
Little Rock, AR 72211
501-223-9302

ENGINEER
Lewis Architects Engineers
11225 Huron Lane, Suite 104
Little Rock, AR 72211
501-223-9302

GENERAL CONTRACTOR
Baldwin & Shell
1000 W. Capitol Ave.
Little Rock, AR 72201
501-374-8677

MECHANICAL SUBCONTRACTOR
Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

chowell@comfortar.com

SUBMITTAL DATA

EQUIPMENT: Greenheck Single Zone VAV Packaged Units

SPEC SECTION:

TAGS: RTUG-1,2 ; RTUA-1,2 ; RTUM-1; RTUD-1,2

PROJECT: Little Rock West High School

LOCATION: Little Rock, AR

ENGINEER:

CONTRACTOR:

DATE: 4/15/2024

SUBMITTED BY: Nick Moore
nick.moore@airetechcorp.com

GREENHECK
Building Value in Air.

Printed Date: 04/06/2024
Job: LR West Highschool
Mark: RTUA-1,2
Model: RVE-85-52C-CW-2-G1

RVE-85-52C-CW-2-G1

Unit Performance

Design Conditions

Elevation (ft)	Summer		Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
	DB (F)	WB (F)					
256	98.0	80.2	17.2	6,500	2,550	3,950	2,450

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing
2	3,764 (+/- 5%)	Chilled Water	Hot Water Coil	Outdoor	UL\cUL 1995/ 60335-2-40

Configuration

Outdoor Air		Exhaust Air	
Intake	Discharge	Intake	Discharge
End	Bottom	Bottom	Side

Energy Recovery Performance

Design Condition	Temperature (F)								Capacity Reduction (BTU/h)
	Outdoor Air		Supply Air		Return Air		Exhaust Air		
	DB	WB	DB	WB	DB	WB/RH	DB	WB	
Summer	98.0	80.2	79.1	66.8	75.0	62.5/50	94.4	77.5	143,438.0
Winter	17.2	14.1	59.5	47.6	70.0	54.3/35	25.2	22.4	116,494.0

Cooling Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	35.7	6.5	234.0	175.6	42.0	56.0	76.6 / 64.2	52.0 / 51.9

Heating Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	32.3	2.8	305.9	160.0	140.0	65.9	109.3

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	1	4.84	7-1/2	ODP	PE	1770
Exhaust	1	1.11	1-1/2	ODP	PE	1170

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	15.8	25.0	13.3	0.683

*Fan Power (W/CFM) = (Supply BHP + Exhaust BHP) / Supply CFM

Construction Features And Accessories

Unit	
Unit Installation - Outdoor	Std
Unit Construction - Double Wall	Std
Insulation - 2 inch 2.4# R13 foam	Std
Corrosion Resistant Fasteners	Std
Hinged Access	Std
Factory Wired Non-Fused Disconnect Switch	
Direct Drive Plenum Blower & Motor Assemblies	Std
Factory Wired VFDs	Std
Unit Finish - Permatector, Concrete Gray (RAL 7023)	X
Stainless Steel Condensate Drain Pan and Connection	Std
Condensate Drain Trap	Std
Short Circuit Current - 5 kA	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std
Controls	
Unit Controls - Control by Others	Std
Internally Mounted Control Center with 24 VAC control transformer(s)	Std
BMS Protocol - None	
BMS Monitoring Points	
Supply Fan Control - 0-10VDC By Others	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control	
Exhaust Fan Only Power	
Web-Based User Interface	
Energy Wheel Economizer Control - VFD Signal By Others	X
Energy Wheel Rotation Sensor	Std
Damper Control - 2-10VDC By Others	X
Unoccupied Recirc Mode	
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air, Exhaust Air, Supply Air	X
Room Thermostat	
Phase/Brownout Protection	X
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - VFD Signal By Others	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper - Low Leakage	X
Roof Curb - GKD - 61.6/156.6-G14	X
Supply Air Filters - 2" Merv 8	Std
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters	
Exhaust Discharge Gravity Backdraft Damper	
ElectroFin Coil Coating	
Motor Shaft Grounding	
Bipolar Ionization	
Smoke Detector(s)	X
Barometric Relief Damper	
UV Lights	
Return Air Filters - 2" Merv 8, 4-16x25x2	Std
Outdoor Air Filters - 2" Merv 8, 4-16x25x2	Std
Furnace Control	
Spare Energy Wheel Belt	
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
Energy Wheel Warranty - 5 Yrs Less Motor	Std
Furnace HX Warranty - 25 Yrs.	Std

Standard Option	Std
Not Included	
Included	X

Notes
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A
Return Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

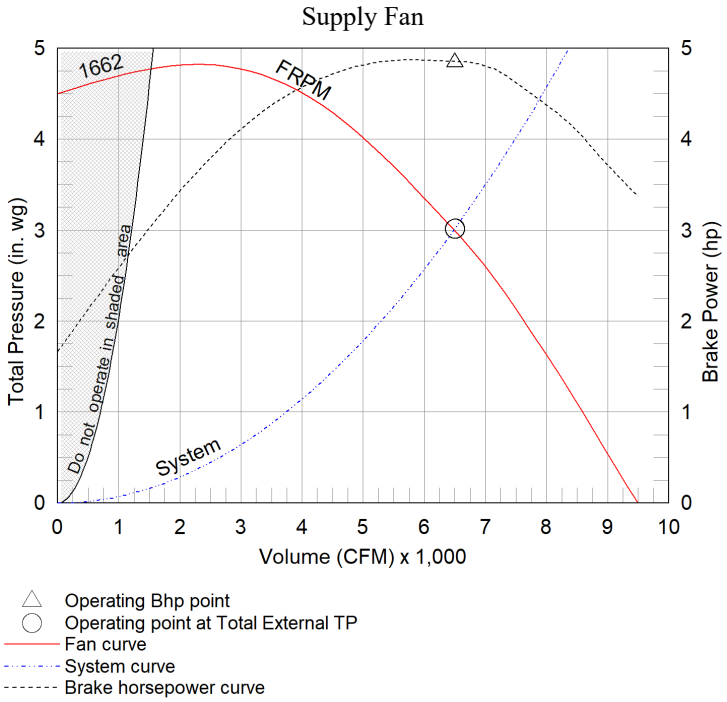
Supply Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (hp)	Qty	Type	Drive-Type
6,500	1	3.017	1662	N/A	1	7-1/2	1	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.04	0.16	0.07	0.531	0.081	1	0.53	3.017

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
89	88	96	84	80	73	71	68	90	78	29

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 OA filter



Exhaust Fan Charts And Performance

Exhaust Fan Performance

Mode	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
						Qty	Size (hp)	Qty	Type	Drive-Type
Normal	2,450	1	1.729	1054	1.11	1	1-1/2	1	Plenum	Direct

Pressure Drop (in. wg)

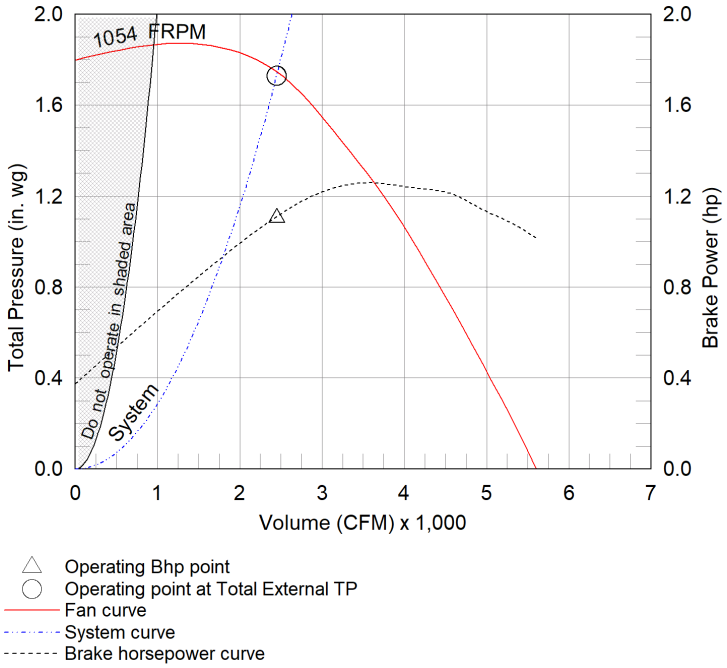
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.01	-	0.025	-	-	1	0.54	1.729

Sound Performance in Accordance with AMCA

Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	91	77	72	65	59	58	56	63	71	60	13

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 return air filter

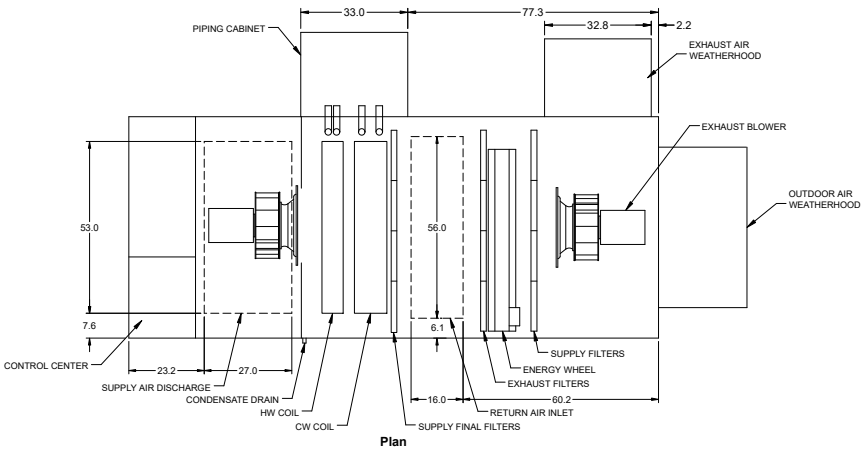
Exhaust Fan



Radiated Sound

Position C

Dimensional Overview



Position D **Position B**

Position A

Supply Air Flow Nominal

Radiated Sound Levels										
Plane	Octave Bands (Lw)								Plane Lw	Plane LwA
	1	2	3	4	5	6	7	8		
A	84	88	90	85	85	81	80	79	95	90
B	79	81	88	78	77	75	74	71	90	84
C	81	78	80	74	72	69	64	61	85	78
D	74	79	79	73	70	66	64	61	83	77
E	79	87	87	84	81	77	76	73	92	87
Total	88	91	94	88	87	84	82	80	98	93

AMCA 320-07 - Laboratory Methods of Sound Testing of Fans Using Sound Intensity
Tests conducted in accordance with this standard.
Free field measurement plane created 1 foot from unit on all sides and top.
Sound Intensity measured in Watts/m^2.
Sound data converted to Sound Power (Lw) for the chart above.
A-Weighted Sound Power was determined using AMCA Standard 301-90 Clause 9.1.
Plane E sound data was measured above the top plane of the unit.

Cooling Performance

Cooling Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	35.7	6.5	234.0	175.6	42.0	56.0	76.6 / 64.2	52.0 / 51.9

Coil Information

CW Coil Model	Fins Per Inch	Rows Deep	Face Vel. (ft/min)	Coil PD (in. wg)	Connection Size (in.)
CW58S06H10-54x50-RH	10	6	347	0.531	1.5

Unit Details

Coil control valves must be field provided by others
Copper tube, aluminum fin coil construction
Coil freeze protection is to be provided by others
Stainless steel double sloped drain pan

Heating Performance

Heating Specifications									
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	32.3	2.8	305.9	160.0	140.0	65.9	109.3

Coil Information					
HW Coil Model	Fins Per Inch	Rows Deep	Face Velocity (ft/min)	Coil Pressure Drop (in. wg)	Connection Size (in.)
HW12C02H10-50x50-RH	10	2	374	0.081	2

Unit Details
Copper tube, aluminum fin coil construction
Coil control valves must be field provided by others
Coil freeze protection is to be provided by others
Unit controller maximum allowable supply discharge air set point is 100F (37.8C)

Energy Recovery Summer Performance

Outdoor Air		Supply Air	
Dry Bulb (F)	98.0	Dry Bulb (F)	79.1
Wet Bulb (F)	80.2	Wet Bulb (F)	66.8
Specific Humidity (gr/lb)	129	Specific Humidity (gr/lb)	79
Enthalpy (BTU/lb)	43.9	Enthalpy (BTU/lb)	31.4
Exhaust Air		**Return Air**	
Dry Bulb (F)	94.4	Dry Bulb (F)	75.0
Wet Bulb (F)	77.5	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	116	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	40.9	Enthalpy (BTU/lb)	28.2

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
76.6	64.2	71	29.5

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,550	79.6	2,450	81

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
180,158.0	15.01	36,720.0	3.06	11.95

Summer Conditions

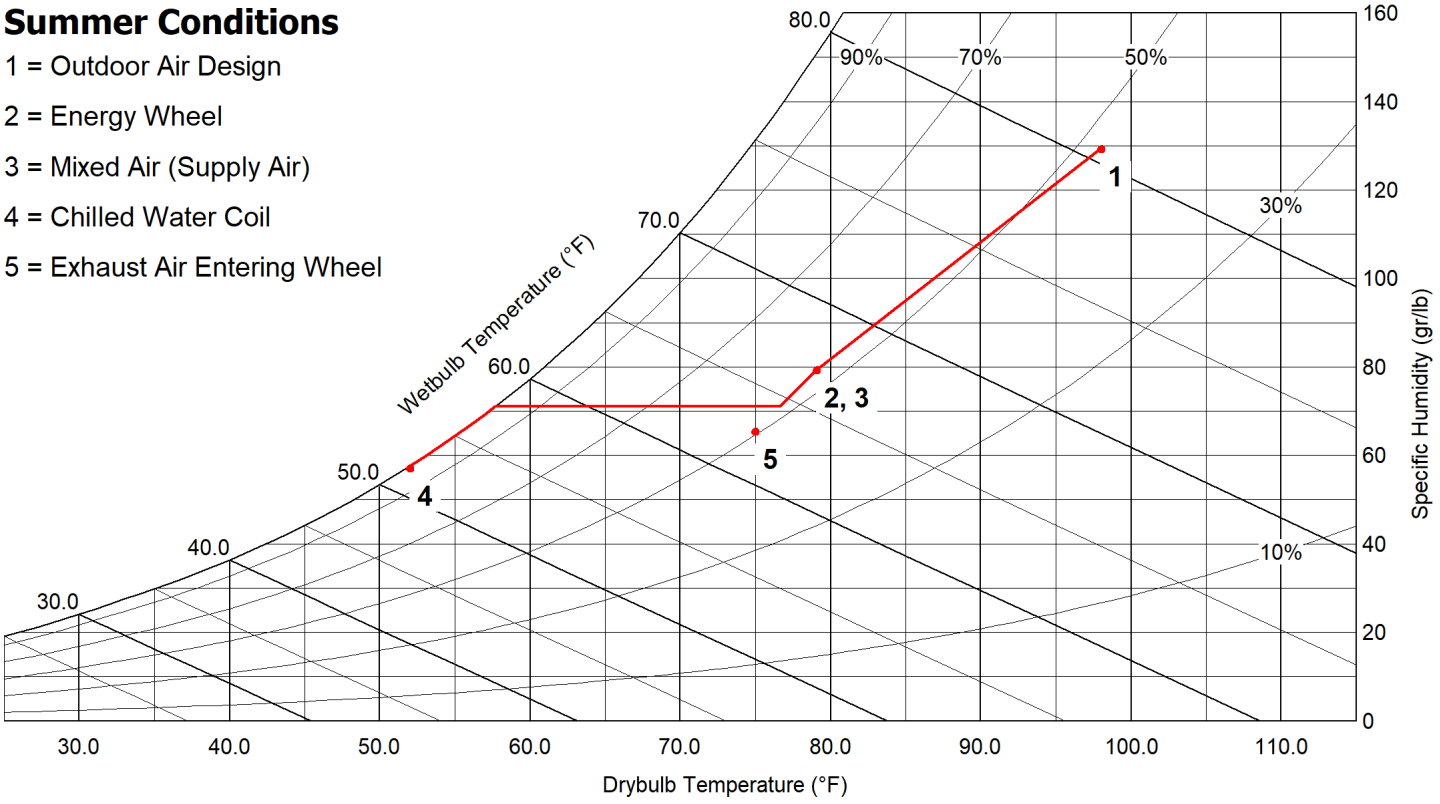
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Chilled Water Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	17.2	Dry Bulb (F)	59.5
Wet Bulb (F)	14.1	Wet Bulb (F)	47.6
Specific Humidity (gr/lb)	7	Specific Humidity (gr/lb)	31
Enthalpy (BTU/lb)	5.1	Enthalpy (BTU/lb)	19.0
Exhaust Air		**Return Air**	
Dry Bulb (F)	25.2	Dry Bulb (F)	70.0
Wet Bulb (F)	22.4	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	13	Specific Humidity (gr/lb)	39
Enthalpy (BTU/lb)	8.0	Enthalpy (BTU/lb)	22.8

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
76.6	64.2	71	29.5

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
2,550	78.7	2,450	82.8

Outdoor Air Heating Reduction

OA Load w/o Energy Recovery (BTU/h)	OA Load with Energy Recovery (BTU/h)	Equipment Reduction (BTU/h)	Sensible Effectiveness (%)
145,411.0	28,917.0	116,494.0	84.3

Winter Conditions

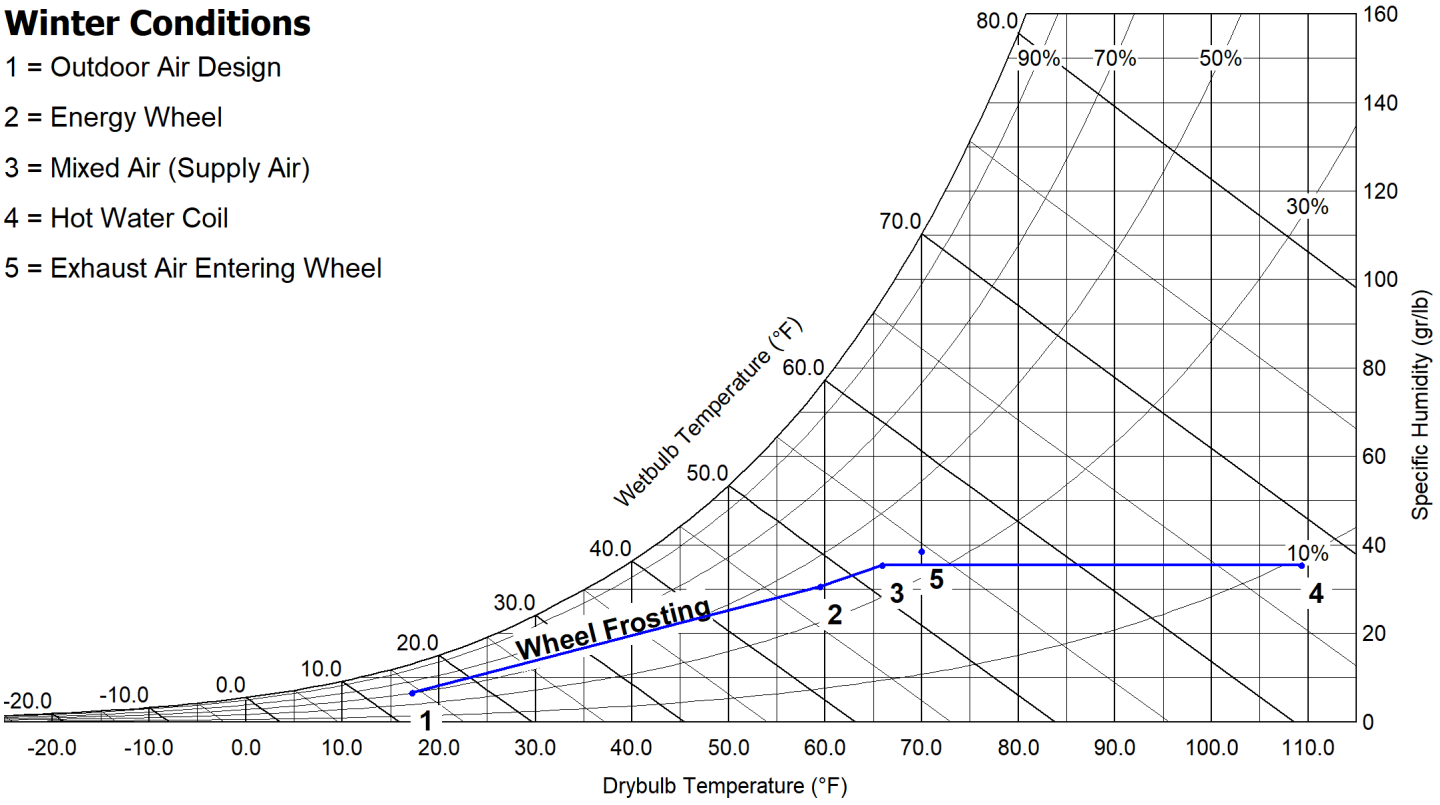
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Hot Water Coil

5 = Exhaust Air Entering Wheel



AHRI Performance Ratings

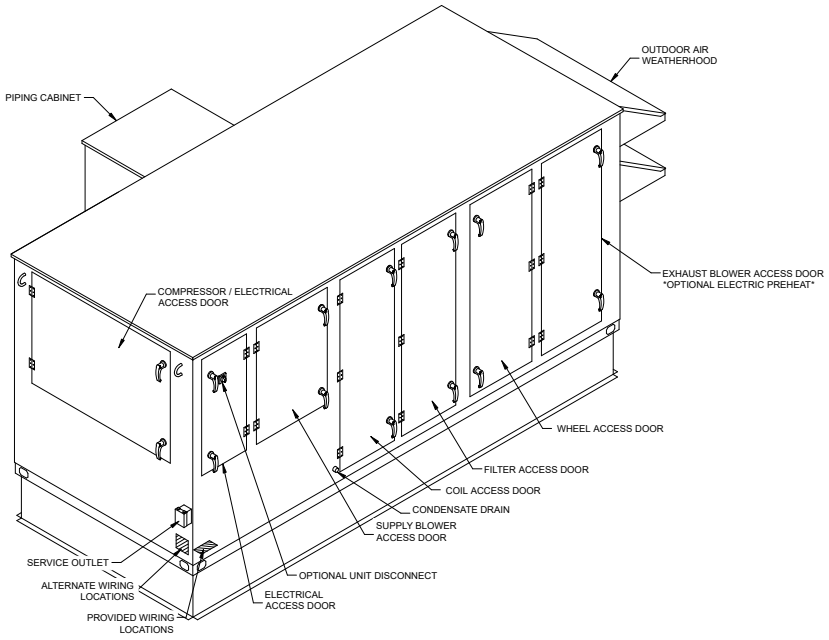
Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)							
Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
2,462	2606	2706	5.8	1.02	0.56	0.53	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
79.6	78.7	84	84.3	79.2	79.4	81	82.8

Note(s)
Summer Design Conditions: Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.
Winter Design Conditions: Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

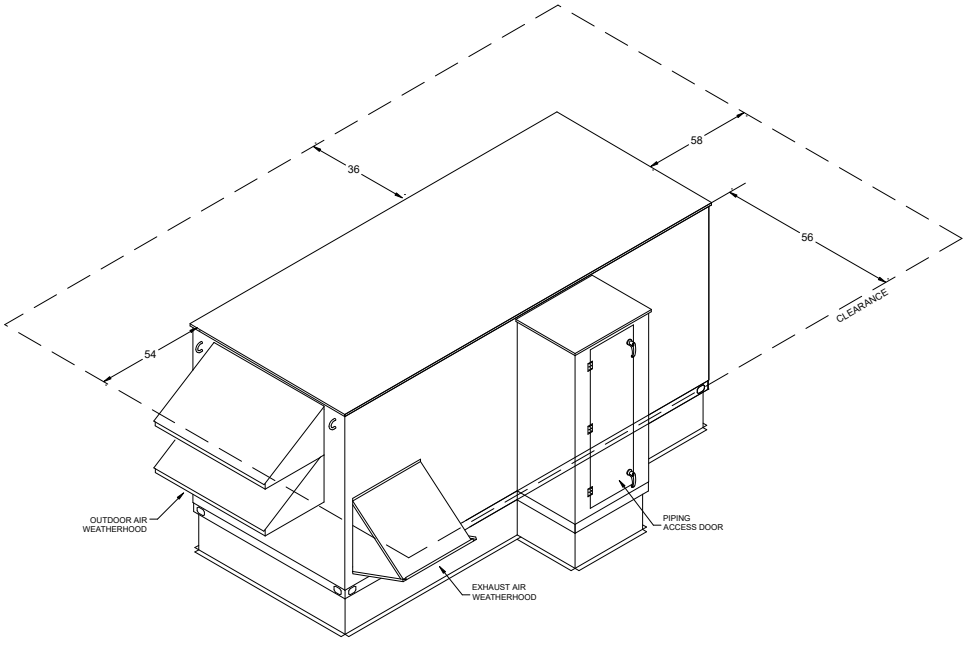
Isometric Drawings

Component Layout



Back Right Isometric

Service Clearances

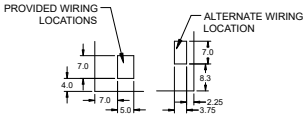


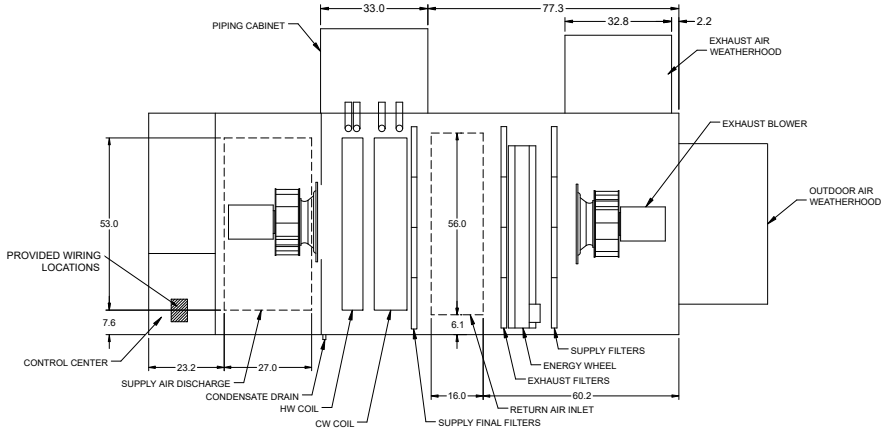
Front Left Isometric

Overview Drawings

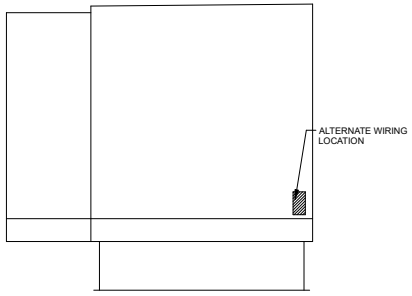
Dimensional Overview

Electrical Connections

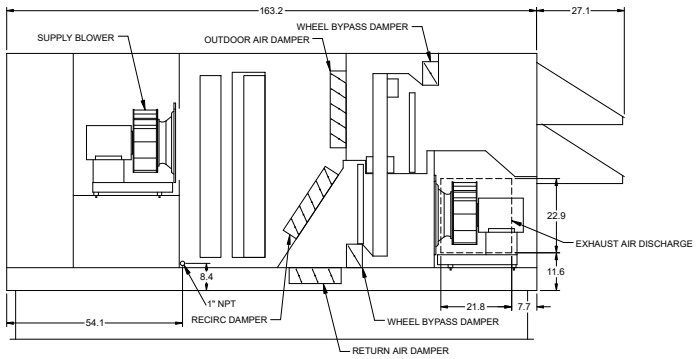




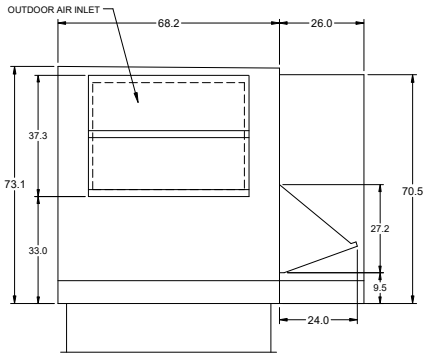
Plan



Left End



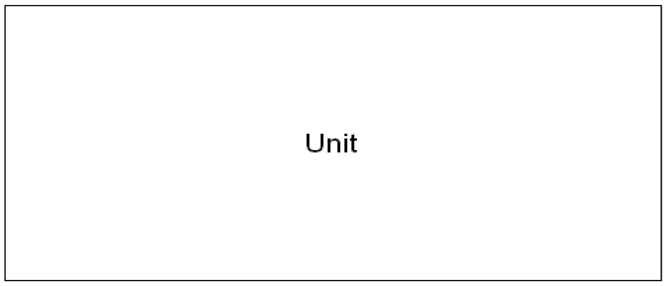
Elevation



Right End

Unit Corner Weights

872 lb 1,016 lb



867 lb 1,010 lb

Note

Estimated corner weights are shown looking down on unit and the outside air intake will be on the right. Weights are applied at the base of the unit. Images not drawn to scale.

Warranty Statement for Dedicated Outdoor Air Systems (DOAS)

Unit Warranty

Greenheck warrants the equipment to be free from defects in material and workmanship for a period of 30 months from ship date. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Greenheck.

Energy Wheel Warranty

The energy recovery wheel is warranted to be free from defects in material and workmanship for a period of 5 years from the shipment date. This warranty applies to all parts and components in the energy recovery cassettes with the exception of the motor.

Warranty Notes

Any component which proves defective during the warranty period will be repaired or replaced at Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

RVE-150-74C-CW-2-G1

Unit Performance

Design Conditions

Elevation (ft)	Summer		Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
	DB (F)	WB (F)					
256	98.0	80.2	17.2	14,000	3,500	10,500	3,400

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing
1	5,998 (+/- 5%)	Chilled Water	Hot Water Coil	Outdoor	UL\cUL 1995/ 60335-2-40

Configuration

Outdoor Air		Exhaust Air	
Intake	Discharge	Intake	Discharge
End	Bottom	Bottom	End

Energy Recovery Performance

Design Condition	Temperature (F)								Capacity Reduction (BTU/h)
	Outdoor Air		Supply Air		Return Air		Exhaust Air		
	DB	WB	DB	WB	DB	WB/RH	DB	WB	
Summer	98.0	80.2	78.4	65.9	75.0	62.5/50	95.0	78.1	206,325.0
Winter	17.2	14.1	61.4	49.0	70.0	54.3/35	23.9	21.1	167,076.0

Cooling Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	65.8	5.9	431.8	347.8	42.0	56.0	75.8 / 63.4	53.2 / 52.8

Heating Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	61.1	8.5	578.0	160.0	140.0	67.8	106.0

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	2	5.56	7-1/2	ODP	PE	1770
Exhaust	2	0.69	1	ODP	PE	1150

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	26.7	35.0	24.2	0.666

*Fan Power (W/CFM) = (Supply BHP + Exhaust BHP) / Supply CFM

Construction Features And Accessories

Unit	
Unit Installation - Outdoor	Std
Unit Construction - Double Wall	Std
Insulation - 2 inch 2.4# R13 foam	Std
Corrosion Resistant Fasteners	Std
Hinged Access	Std
Factory Wired Non-Fused Disconnect Switch	
Direct Drive Plenum Blower & Motor Assemblies	Std
Factory Wired VFDs	Std
Unit Finish - Permatector, Concrete Gray (RAL 7023)	X
Stainless Steel Condensate Drain Pan and Connection	Std
Condensate Drain Trap	Std
Short Circuit Current - 5 kA	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std
Controls	
Unit Controls - Control by Others	Std
Internally Mounted Control Center with 24 VAC control transformer(s)	Std
BMS Protocol - None	
BMS Monitoring Points	
Supply Fan Control - 0-10VDC By Others	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control	
Exhaust Fan Only Power	
Web-Based User Interface	
Energy Wheel Economizer Control - VFD Signal By Others	X
Energy Wheel Rotation Sensor	Std
Damper Control - 2-10VDC By Others	X
Unoccupied Recirc Mode	
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air, Exhaust Air, Supply Air	X
Room Thermostat	
Phase/Brownout Protection	X
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - VFD Signal By Others	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb - GKD - 91.4/194.9-G18	X
Supply Air Filters - 2" Merv 8, 8-20x20x2, 4-16x20x2	Std
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters	
Exhaust Discharge Motorized Damper	
ElectroFin Coil Coating	
Motor Shaft Grounding	
Bipolar Ionization	
Smoke Detector(s)	X
Barometric Relief Damper	
UV Lights	
Return Air Filters - 2" Merv 8, 8-20x24x2	Std
Outdoor Air Filters - 2" Merv 8, 8-20x24x2	Std
Furnace Control	
Spare Energy Wheel Belt	
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
Energy Wheel Warranty - 5 Yrs Less Motor	Std
Furnace HX Warranty - 25 Yrs.	Std

Standard Option	Std
Not Included	
Included	X

Notes
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

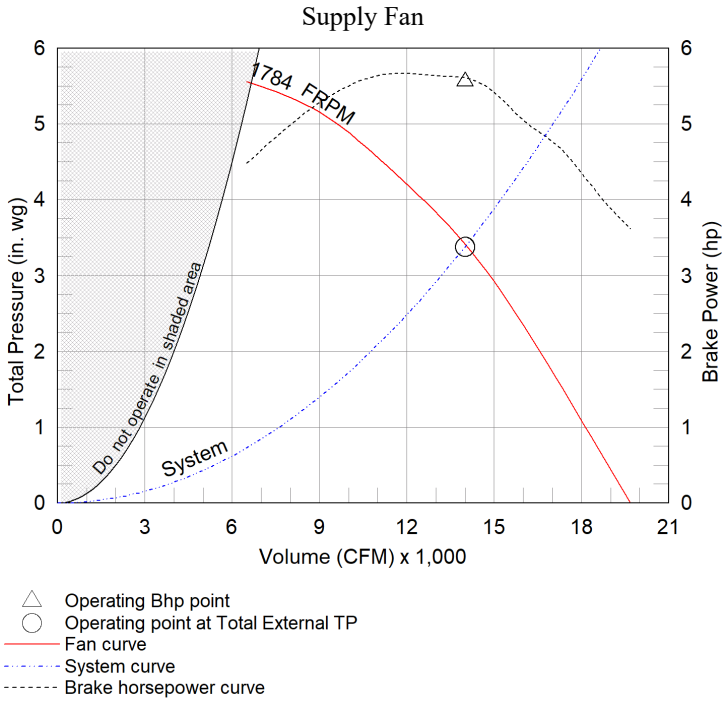
Supply Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (hp)	Qty	Type	Drive-Type
14,000	1	3.382	1784	N/A	2	7-1/2	2	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.02	0.29	0.17	0.667	0.137	1	0.42	3.382

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
89	92	99	90	86	80	81	77	94	83	38

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 OA filter



Exhaust Fan Charts And Performance

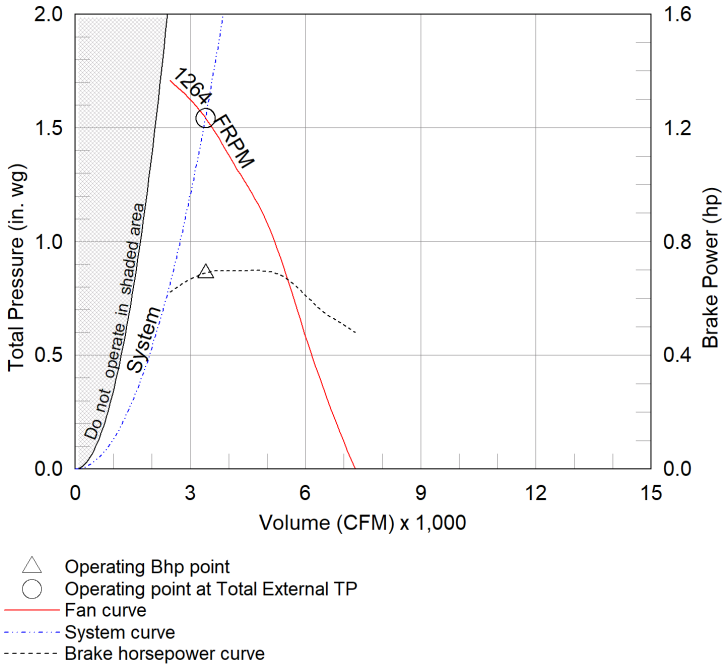
Exhaust Fan Performance										
Mode	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
						Qty	Size (hp)	Qty	Type	Drive-Type
Normal	3,400	1	1.542	1264	0.69	2	1	2	Plenum	Direct

Pressure Drop (in. wg)								
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	-	-	0.007	-	-	1	0.43	1.542

Sound Performance in Accordance with AMCA											
Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	73	78	69	65	62	61	66	57	71	60	11

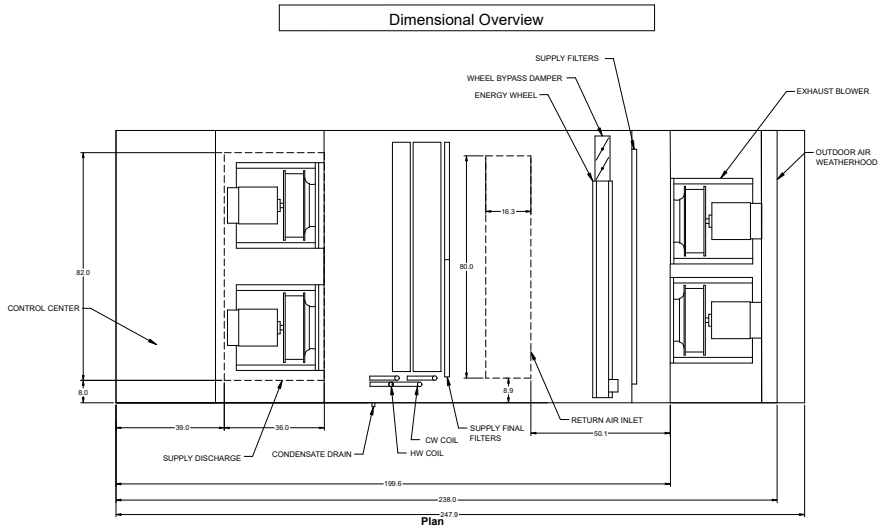
*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 return air filter

Exhaust Fan



Radiated Sound

Position C



Position D

Position B

Position A

Supply Air Flow Nominal

Radiated Sound Levels										
Plane	Octave Bands (Lw)								Plane Lw	Plane LwA
	1	2	3	4	5	6	7	8		
A	89	88	90	87	87	79	74	71	95	90
B	92	88	93	91	93	87	80	77	99	96
C	90	89	92	87	86	80	75	71	96	91
D	83	80	80	77	72	65	59	53	86	76
E	95	95	87	84	85	79	72	68	99	89
Total	98	97	97	94	95	89	83	79	104	98

AMCA 320-07 - Laboratory Methods of Sound Testing of Fans Using Sound Intensity
Tests conducted in accordance with this standard.
Free field measurement plane created 1 foot from unit on all sides and top.
Sound Intensity measured in Watts/m^2.
Sound data converted to Sound Power (Lw) for the chart above.
A-Weighted Sound Power was determined using AMCA Standard 301-90 Clause 9.1.
Plane E sound data was measured above the top plane of the unit.

Cooling Performance

Cooling Specifications										
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	65.8	5.9	431.8	347.8	42.0	56.0	75.8 / 63.4	53.2 / 52.8

Coil Information					
CW Coil Model	Fins Per Inch	Rows Deep	Face Vel. (ft/min)	Coil PD (in. wg)	Connection Size (in.)
CW12C06F12-52.5x80.5-LH	12	6	477	0.667	3

Unit Details
Coil control valves must be field provided by others
Copper tube, aluminum fin coil construction
Coil freeze protection is to be provided by others
Stainless steel double sloped drain pan

Heating Performance

Heating Specifications									
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	61.1	8.5	578.0	160.0	140.0	67.8	106.0

Coil Information					
HW Coil Model	Fins Per Inch	Rows Deep	Face Velocity (ft/min)	Coil Pressure Drop (in. wg)	Connection Size (in.)
HW12C02H10-55x69-LH	10	2	531	0.137	2.5

Unit Details
Copper tube, aluminum fin coil construction
Coil control valves must be field provided by others
Coil freeze protection is to be provided by others
Unit controller maximum allowable supply discharge air set point is 100F (37.8C)

Energy Recovery Summer Performance

Outdoor Air		Supply Air	
Dry Bulb (F)	98.0	Dry Bulb (F)	78.4
Wet Bulb (F)	80.2	Wet Bulb (F)	65.9
Specific Humidity (gr/lb)	129	Specific Humidity (gr/lb)	76
Enthalpy (BTU/lb)	43.9	Enthalpy (BTU/lb)	30.8
Exhaust Air		**Return Air**	
Dry Bulb (F)	95.0	Dry Bulb (F)	75.0
Wet Bulb (F)	78.1	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	118	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	41.4	Enthalpy (BTU/lb)	28.2

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
75.8	63.4	68	28.9

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
3,500	83.8	3,400	84.5

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
371,700.0	30.98	165,375.0	13.78	17.19

Summer Conditions

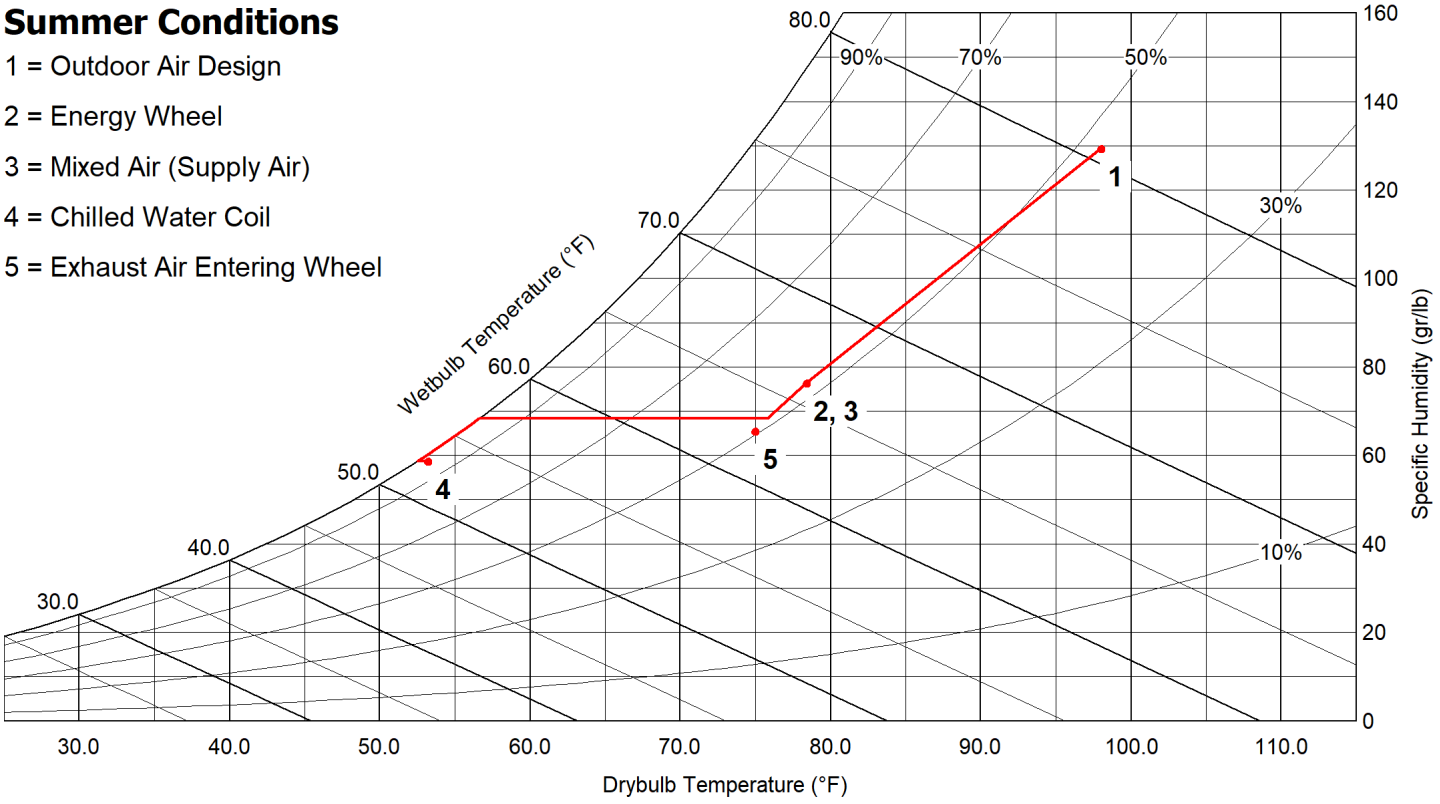
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Chilled Water Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	17.2	Dry Bulb (F)	61.4
Wet Bulb (F)	14.1	Wet Bulb (F)	49.0
Specific Humidity (gr/lb)	7	Specific Humidity (gr/lb)	32
Enthalpy (BTU/lb)	5.1	Enthalpy (BTU/lb)	19.7
Exhaust Air		**Return Air**	
Dry Bulb (F)	23.9	Dry Bulb (F)	70.0
Wet Bulb (F)	21.1	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	12	Specific Humidity (gr/lb)	39
Enthalpy (BTU/lb)	7.5	Enthalpy (BTU/lb)	22.8

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
75.8	63.4	68	28.9

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
3,500	82.7	3,400	85.6

Outdoor Air Heating Reduction

OA Load w/o Energy Recovery (BTU/h)	OA Load with Energy Recovery (BTU/h)	Equipment Reduction (BTU/h)	Sensible Effectiveness (%)
199,584.0	32,508.0	167,076.0	86.8

Winter Conditions

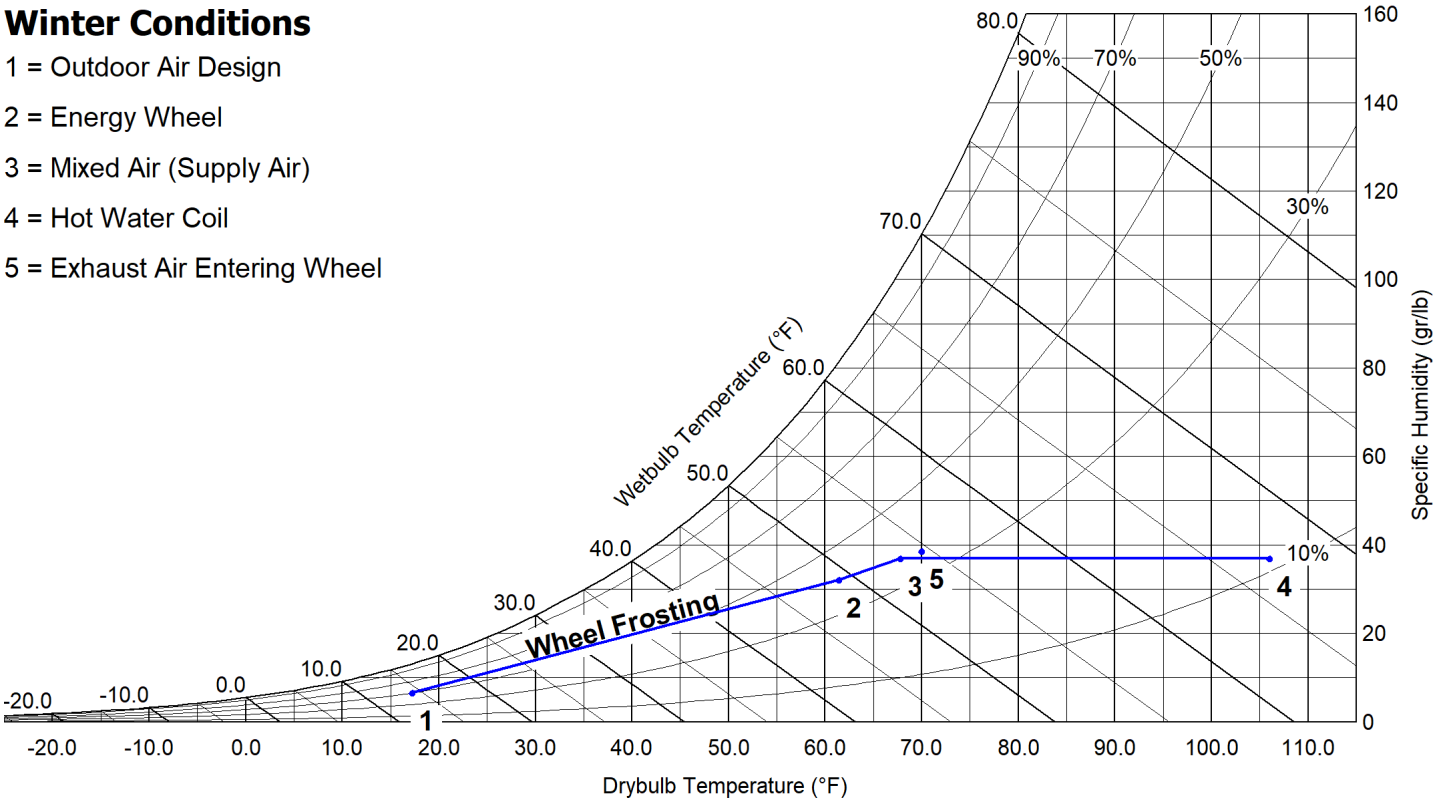
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Hot Water Coil

5 = Exhaust Air Entering Wheel



AHRI Performance Ratings

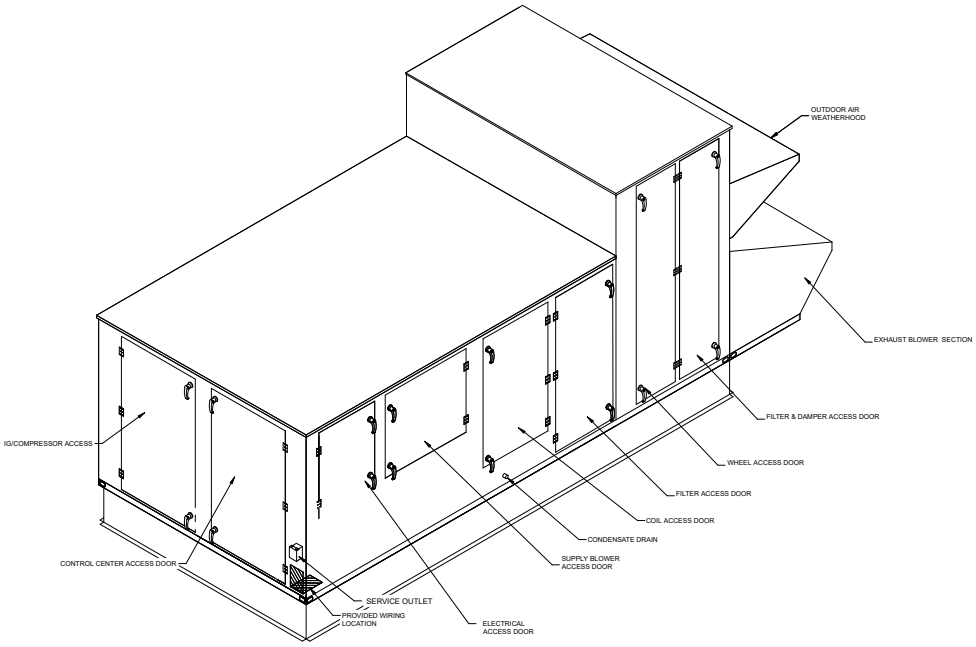
Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)							
Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
3,417	3673	3773	7.2	1.04	0.40	0.39	0

Thermal Effectiveness Ratings							
Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
83.8	82.7	86.5	86.8	83.2	83.4	84.5	85.6

Note(s)
Summer Design Conditions: Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.
Winter Design Conditions: Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

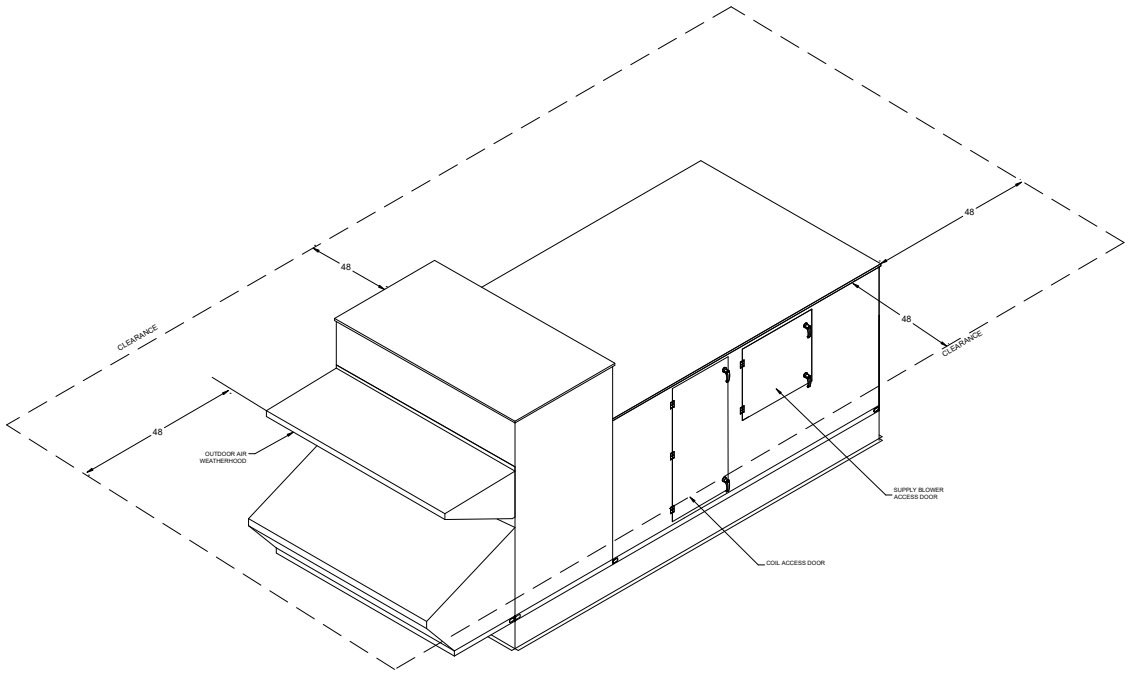
Isometric Drawings

Component Layout



Back Right Isometric

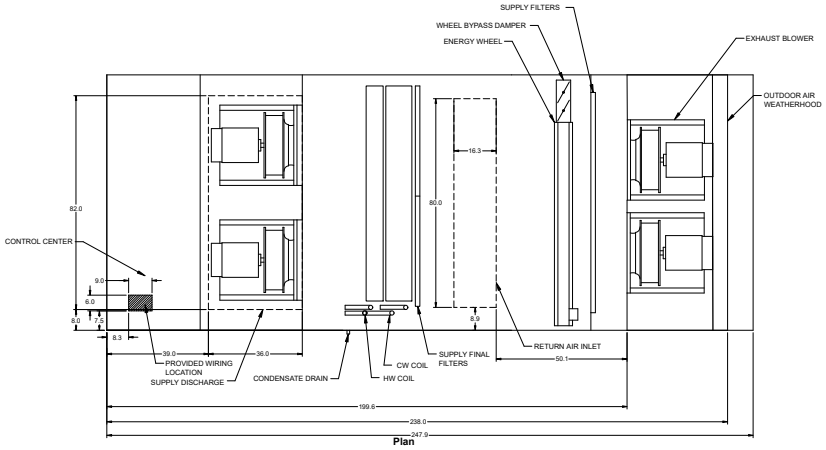
Service Clearances



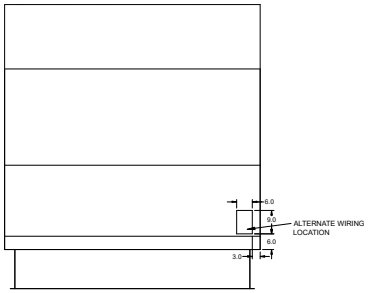
Front Left Isometric

Overview Drawings

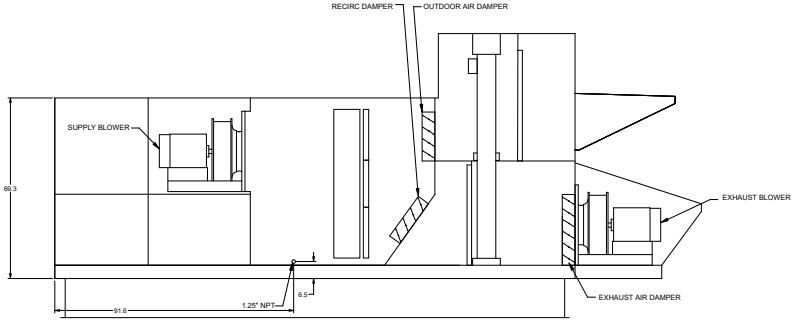
Dimensional Overview



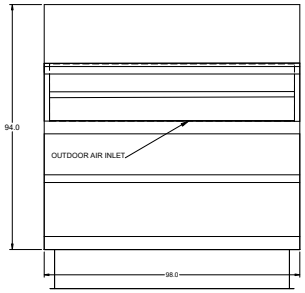
Plan



Left End

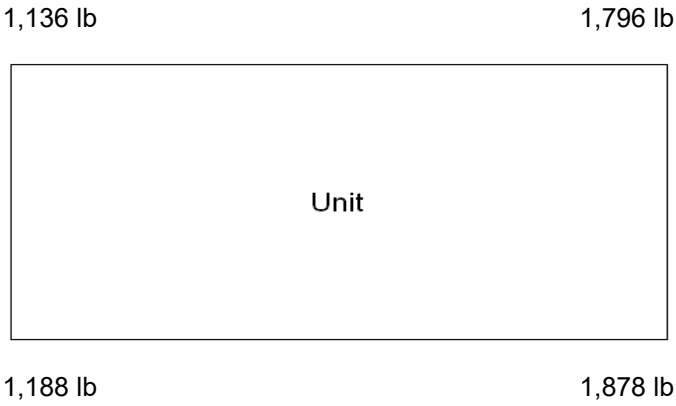


Elevation



Right End

Unit Corner Weights



Note

Estimated corner weights are shown looking down on unit and the outside air intake will be on the right. Weights are applied at the base of the unit. Images not drawn to scale.

Warranty Statement for Dedicated Outdoor Air Systems (DOAS)

Unit Warranty

Greenheck warrants the equipment to be free from defects in material and workmanship for a period of 30 months from ship date. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Greenheck.

Energy Wheel Warranty

The energy recovery wheel is warranted to be free from defects in material and workmanship for a period of 5 years from the shipment date. This warranty applies to all parts and components in the energy recovery cassettes with the exception of the motor.

Warranty Notes

Any component which proves defective during the warranty period will be repaired or replaced at Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

GKD Roof Curb

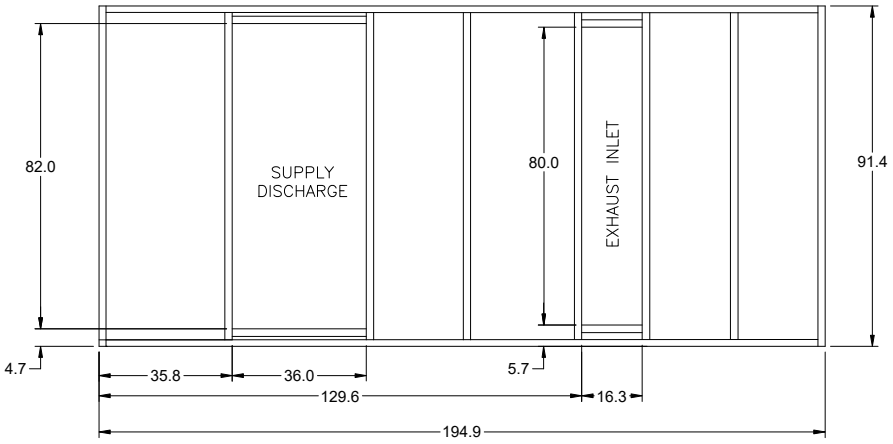
Model: GKD-91.4/194.9-G18

Curb Height (in.)	Curb Length (in.)	Curb Width (in.)	Material	Finish Type	Duct Adapter	Curb Weight (lb)
18	194.9	91.4	Galvanized	Galvanized	Yes	446

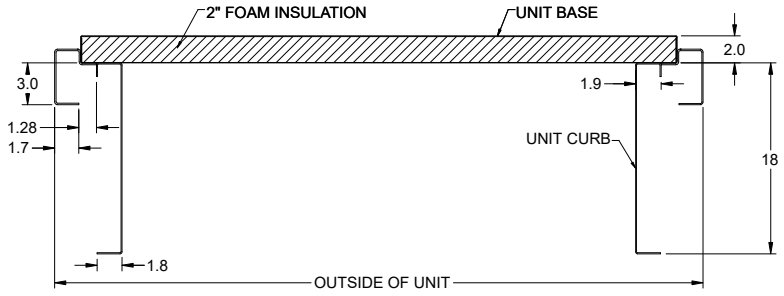
Standard Construction Features:
All dimensions shown are actual and in units of in.'s
If unit is selected with side or end discharge/return, there will not be bottom connections supplied with the curb.
14 gauge galvanized steel (perimeter channels).
14 gauge galvanized steel (interior channels).
Ships knocked down for field assembly.
Curb insulation to be provided by others.

Curb Detail

Top View of Curb



Cross-Section View of Unit on Curb



RVE-85-52C-CW-2-G1

Unit Performance

Design Conditions

Elevation (ft)	Summer		Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
	DB (F)	WB (F)					
256	98.0	80.2	17.2	6,000	3,400	2,600	3,300

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing
2	3,730 (+/- 5%)	Chilled Water	Hot Water Coil	Outdoor	UL\cUL 1995/ 60335-2-40

Configuration

Outdoor Air		Exhaust Air	
Intake	Discharge	Intake	Discharge
End	Bottom	Bottom	Side

Energy Recovery Performance

Design Condition	Temperature (F)								Capacity Reduction (BTU/h)
	Outdoor Air		Supply Air		Return Air		Exhaust Air		
	DB	WB	DB	WB	DB	WB/RH	DB	WB	
Summer	98.0	80.2	79.8	67.3	75.0	62.5/50	93.5	77.0	183,600.0
Winter	17.2	14.1	57.8	46.6	70.0	54.3/35	27.2	24.2	149,084.0

Cooling Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	36.7	6.9	240.5	170.8	42.0	56.0	77.7 / 65.3	51.8 / 51.7

Heating Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	31.8	2.7	300.6	160.0	140.0	63.1	109.4

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	1	4.32	5	ODP	PE	1760
Exhaust	1	1.64	2	ODP	PE	1165

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	12.7	15.0	11.0	0.741

*Fan Power (W/CFM) = (Supply BHP + Exhaust BHP) / Supply CFM

Construction Features And Accessories

Unit	
Unit Installation - Outdoor	Std
Unit Construction - Double Wall	Std
Insulation - 2 inch 2.4# R13 foam	Std
Corrosion Resistant Fasteners	Std
Hinged Access	Std
Factory Wired Non-Fused Disconnect Switch	
Direct Drive Plenum Blower & Motor Assemblies	Std
Factory Wired VFDs	Std
Unit Finish - Permatector, Concrete Gray (RAL 7023)	X
Stainless Steel Condensate Drain Pan and Connection	Std
Condensate Drain Trap	Std
Short Circuit Current - 5 kA	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std
Controls	
Unit Controls - Control by Others	Std
Internally Mounted Control Center with 24 VAC control transformer(s)	Std
BMS Protocol - None	
BMS Monitoring Points	
Supply Fan Control - 0-10VDC By Others	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control	
Exhaust Fan Only Power	
Web-Based User Interface	
Energy Wheel Economizer Control - VFD Signal By Others	X
Energy Wheel Rotation Sensor	Std
Damper Control - 2-10VDC By Others	X
Unoccupied Recirc Mode	
Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air, Exhaust Air, Supply Air	X
Room Thermostat	
Phase/Brownout Protection	X
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - VFD Signal By Others	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper - Low Leakage	X
Roof Curb - GKD - 61.6/156.6-G18	X
Supply Air Filters - 2" Merv 8	Std
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters	
Exhaust Discharge Gravity Backdraft Damper	
ElectroFin Coil Coating	
Motor Shaft Grounding	
Bipolar Ionization	
Smoke Detector(s)	X
Barometric Relief Damper	
UV Lights	
Return Air Filters - 2" Merv 8, 4-16x25x2	Std
Outdoor Air Filters - 2" Merv 8, 4-16x25x2	Std
Furnace Control	
Spare Energy Wheel Belt	
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	X
Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
Energy Wheel Warranty - 5 Yrs Less Motor	Std
Furnace HX Warranty - 25 Yrs.	Std

Standard Option	Std
Not Included	
Included	X

Notes
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A
Return Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

Supply Fan Charts And Performance

Supply Fan Performance

Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (hp)	Qty	Type	Drive-Type
6,000	1	2.9	1598	N/A	1	5	1	Plenum	Direct

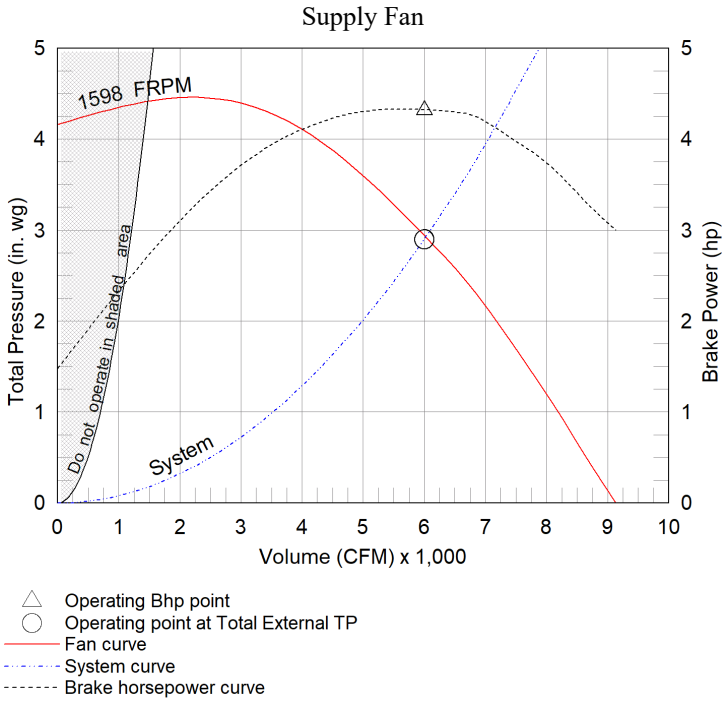
Pressure Drop (in. wg)

Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.06	0.136	0.06	0.483	0.072	1	0.71	2.9

Sound Performance in Accordance with AMCA

Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
89	88	94	82	78	72	70	67	88	76	26

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 OA filter



Exhaust Fan Charts And Performance

Exhaust Fan Performance

Mode	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
						Qty	Size (hp)	Qty	Type	Drive-Type
Normal	3,300	1	1.903	1168	1.64	1	2	1	Plenum	Direct

Pressure Drop (in. wg)

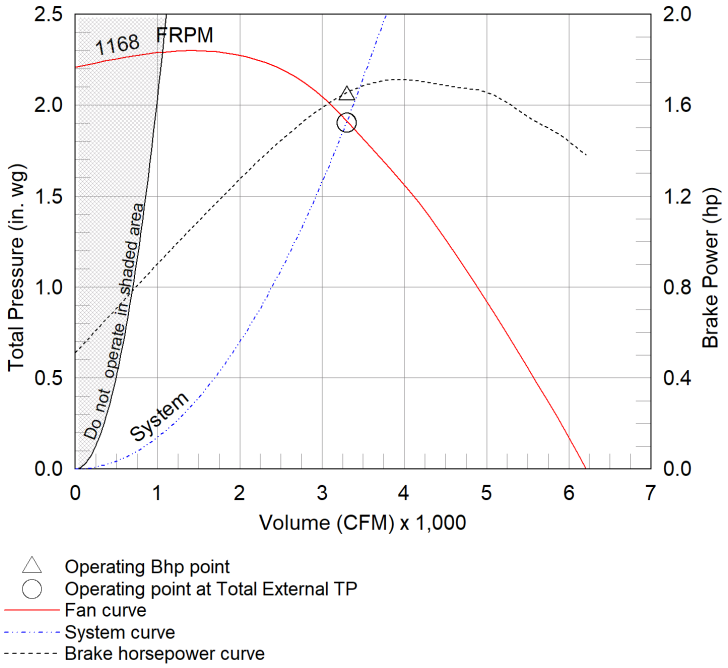
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	0.03	-	0.046	-	-	1	0.73	1.903

Sound Performance in Accordance with AMCA

Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	91	79	75	67	61	60	58	63	72	61	14

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 return air filter

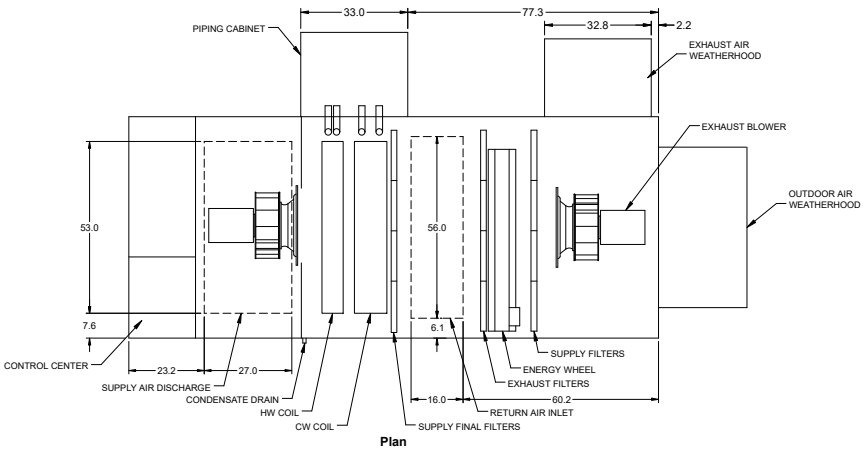
Exhaust Fan



Radiated Sound

Position C

Dimensional Overview



Position D **Position B**

Position A

Supply Air Flow Nominal

Radiated Sound Levels										
Plane	Octave Bands (Lw)								Plane Lw	Plane LwA
	1	2	3	4	5	6	7	8		
A	84	88	90	85	85	81	80	79	95	90
B	79	81	88	78	77	75	74	71	90	84
C	81	78	80	74	72	69	64	61	85	78
D	74	79	79	73	70	66	64	61	83	77
E	79	87	87	84	81	77	76	73	92	87
Total	88	91	94	88	87	84	82	80	98	93

AMCA 320-07 - Laboratory Methods of Sound Testing of Fans Using Sound Intensity
Tests conducted in accordance with this standard.
Free field measurement plane created 1 foot from unit on all sides and top.
Sound Intensity measured in Watts/m^2.
Sound data converted to Sound Power (Lw) for the chart above.
A-Weighted Sound Power was determined using AMCA Standard 301-90 Clause 9.1.
Plane E sound data was measured above the top plane of the unit.

Cooling Performance

Cooling Specifications										
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	36.7	6.9	240.5	170.8	42.0	56.0	77.7 / 65.3	51.8 / 51.7

Coil Information					
CW Coil Model	Fins Per Inch	Rows Deep	Face Vel. (ft/min)	Coil PD (in. wg)	Connection Size (in.)
CW58S06H10-54x50-RH	10	6	320	0.483	1.5

Unit Details
Coil control valves must be field provided by others
Copper tube, aluminum fin coil construction
Coil freeze protection is to be provided by others
Stainless steel double sloped drain pan

Heating Performance

Heating Specifications									
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	31.8	2.7	300.6	160.0	140.0	63.1	109.4

Coil Information					
HW Coil Model	Fins Per Inch	Rows Deep	Face Velocity (ft/min)	Coil Pressure Drop (in. wg)	Connection Size (in.)
HW12C02H10-50x50-RH	10	2	346	0.072	2

Unit Details
Copper tube, aluminum fin coil construction
Coil control valves must be field provided by others
Coil freeze protection is to be provided by others
Unit controller maximum allowable supply discharge air set point is 100F (37.8C)

Energy Recovery Summer Performance

Outdoor Air		Supply Air	
Dry Bulb (F)	98.0	Dry Bulb (F)	79.8
Wet Bulb (F)	80.2	Wet Bulb (F)	67.3
Specific Humidity (gr/lb)	129	Specific Humidity (gr/lb)	81
Enthalpy (BTU/lb)	43.9	Enthalpy (BTU/lb)	31.9
Exhaust Air		**Return Air**	
Dry Bulb (F)	93.5	Dry Bulb (F)	75.0
Wet Bulb (F)	77.0	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	114	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	40.3	Enthalpy (BTU/lb)	28.2

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
77.7	65.3	74	30.3

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
3,400	76.8	3,300	77.4

Outdoor Air Cooling Reduction

OA Load w/o Energy Recovery		OA Load with Energy Recovery		Equipment Reduction (tons)
(BTU/h)	(tons)	(BTU/h)	(tons)	
240,210.0	20.02	56,610.0	4.72	15.30

Summer Conditions

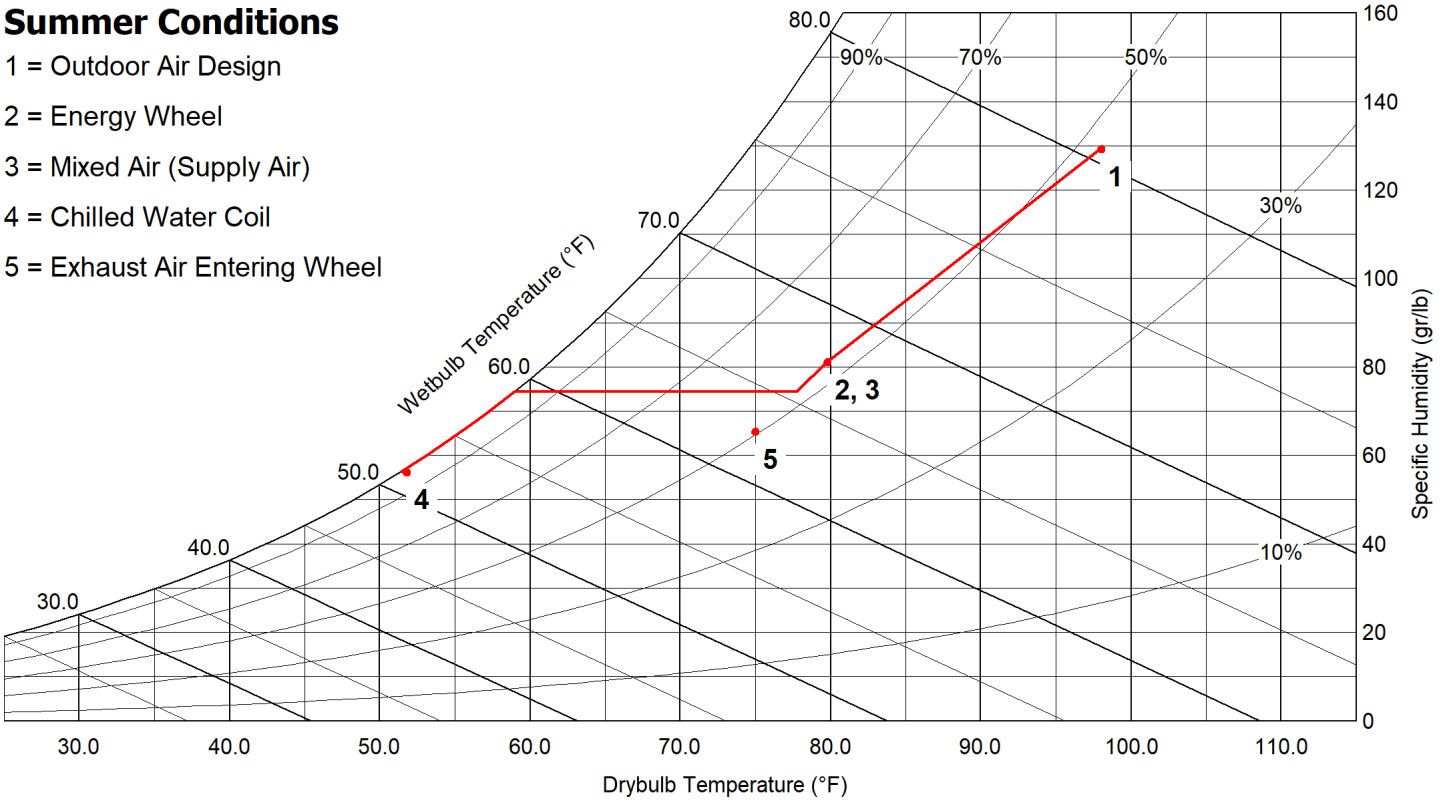
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Chilled Water Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	17.2	Dry Bulb (F)	57.8
Wet Bulb (F)	14.1	Wet Bulb (F)	46.6
Specific Humidity (gr/lb)	7	Specific Humidity (gr/lb)	30
Enthalpy (BTU/lb)	5.1	Enthalpy (BTU/lb)	18.5
Exhaust Air		**Return Air**	
Dry Bulb (F)	27.2	Dry Bulb (F)	70.0
Wet Bulb (F)	24.2	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	14	Specific Humidity (gr/lb)	39
Enthalpy (BTU/lb)	8.7	Enthalpy (BTU/lb)	22.8

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
77.7	65.3	74	30.3

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
3,400	75.6	3,300	79.2

Outdoor Air Heating Reduction

OA Load w/o Energy Recovery (BTU/h)	OA Load with Energy Recovery (BTU/h)	Equipment Reduction (BTU/h)	Sensible Effectiveness (%)
193,882.0	44,798.0	149,084.0	80.7

Winter Conditions

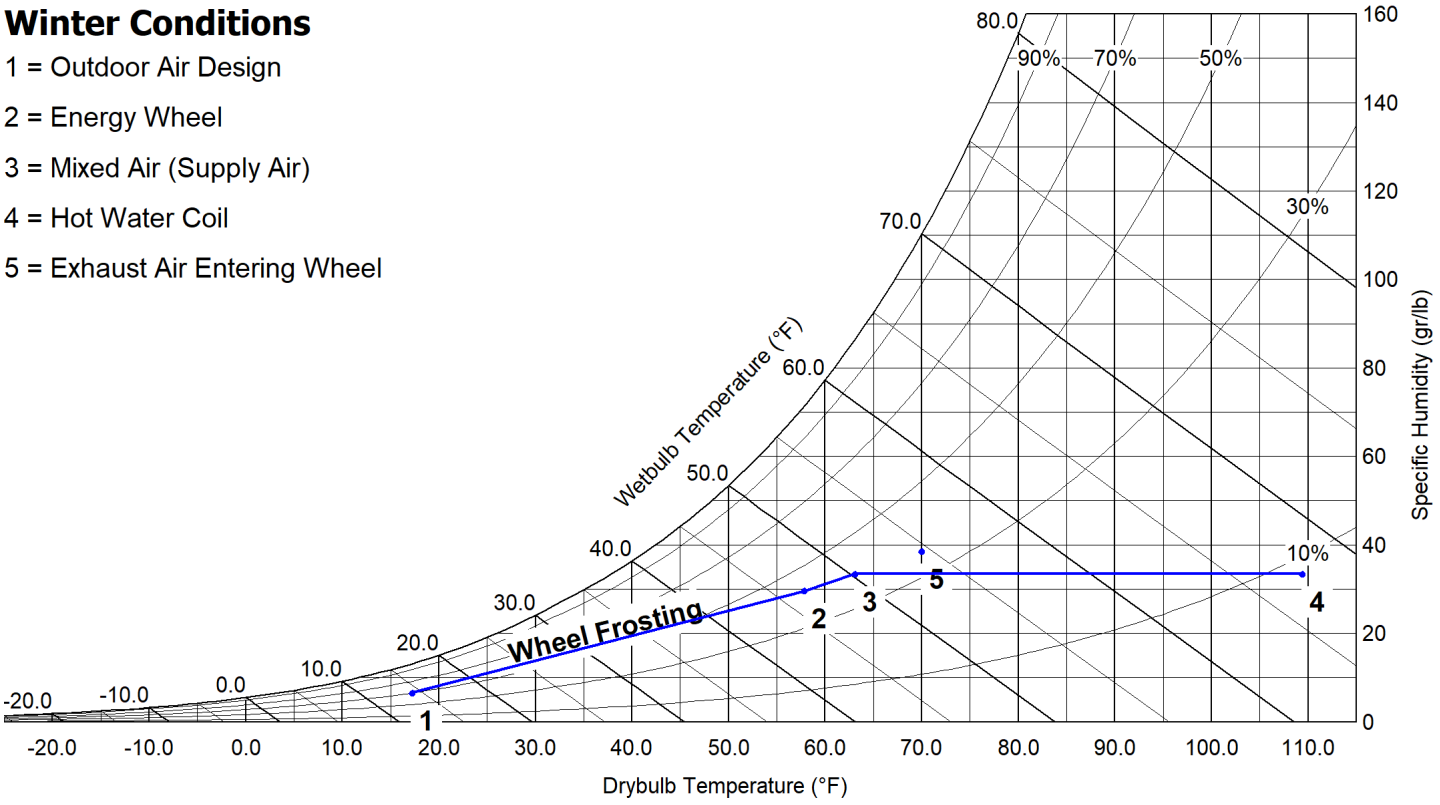
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Hot Water Coil

5 = Exhaust Air Entering Wheel



AHRI Performance Ratings

Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)

Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
3,317	3466	3566	4.7	1.02	0.73	0.71	0

Thermal Effectiveness Ratings

Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
76.8	75.6	80.2	80.7	75.7	76	77.4	79.2

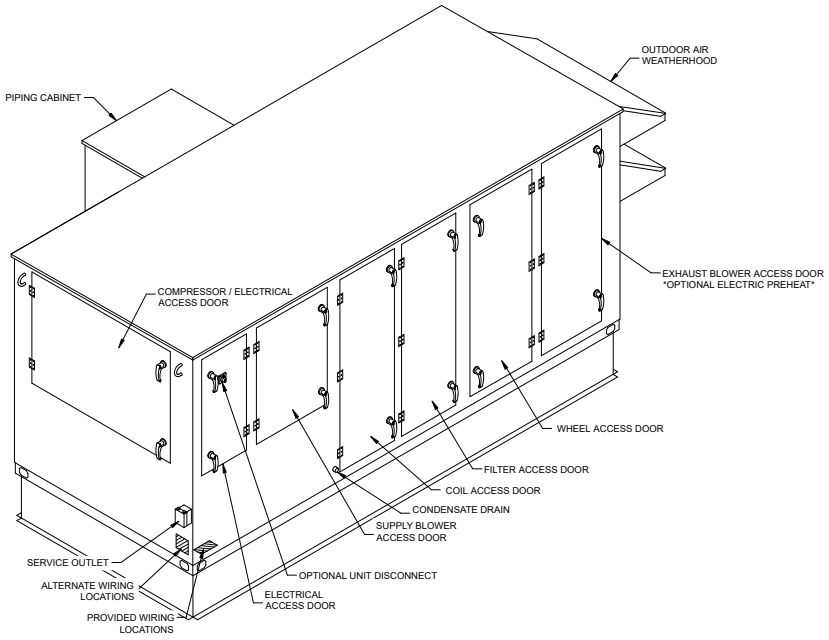
Note(s)

Summer Design Conditions:
Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

Winter Design Conditions:
Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

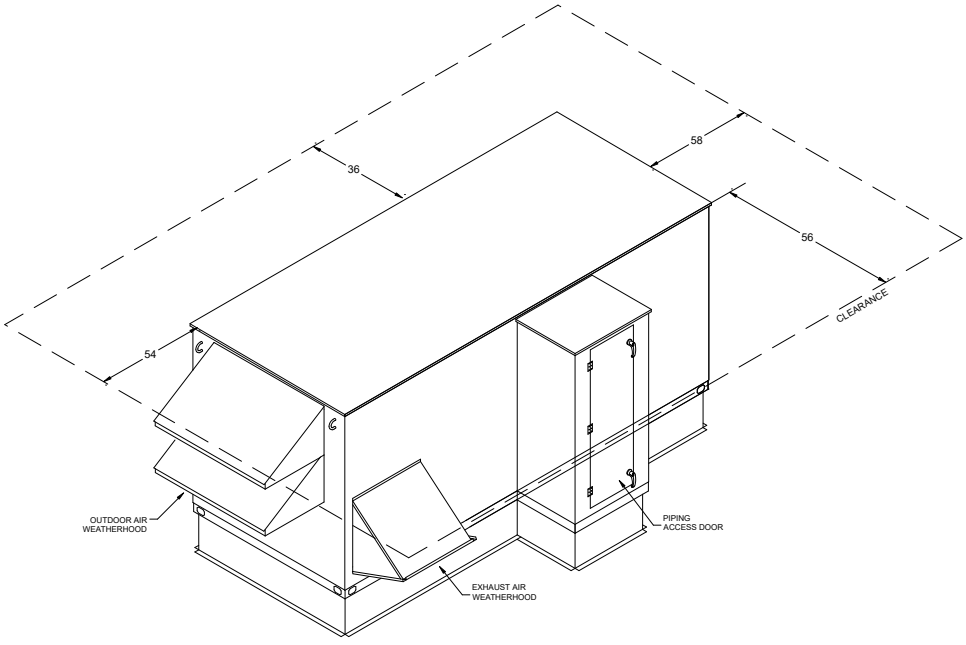
Isometric Drawings

Component Layout



Back Right Isometric

Service Clearances

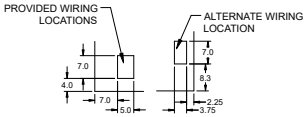


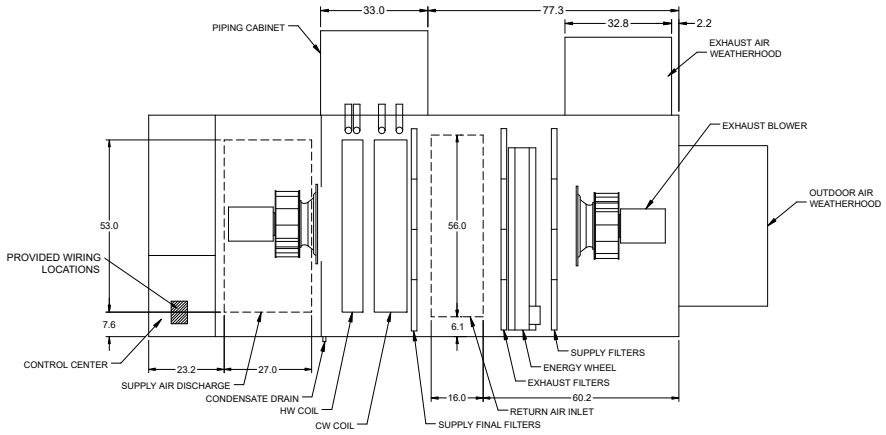
Front Left Isometric

Overview Drawings

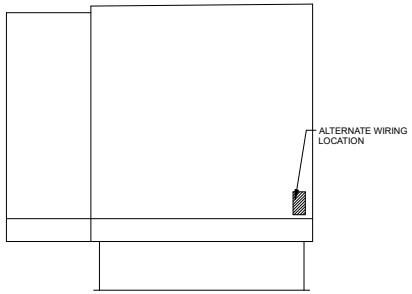
Dimensional Overview

Electrical Connections

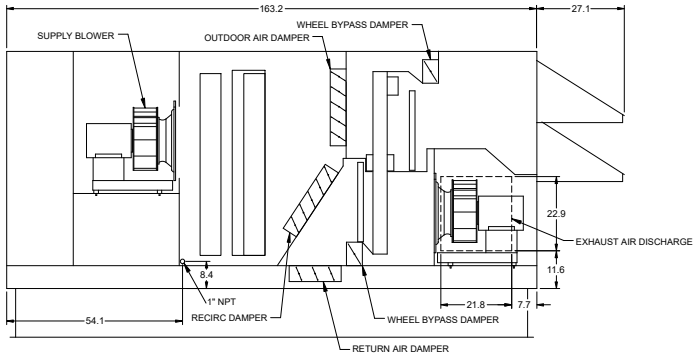




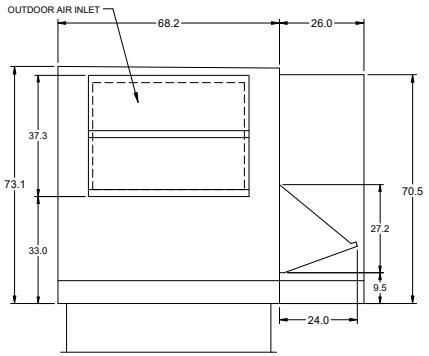
Plan



Left End



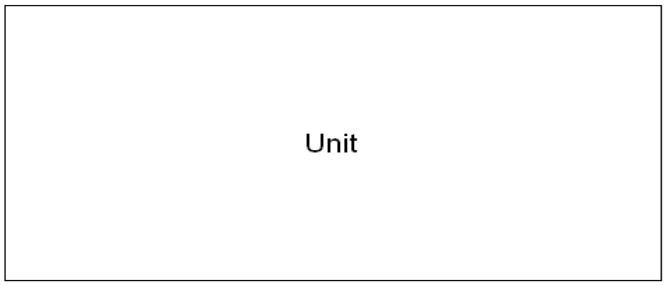
Elevation



Right End

Unit Corner Weights

853 lb 1,016 lb



850 lb 1,012 lb

Note

Estimated corner weights are shown looking down on unit and the outside air intake will be on the right. Weights are applied at the base of the unit. Images not drawn to scale.

Warranty Statement for Dedicated Outdoor Air Systems (DOAS)

Unit Warranty

Greenheck warrants the equipment to be free from defects in material and workmanship for a period of 30 months from ship date. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Greenheck.

Energy Wheel Warranty

The energy recovery wheel is warranted to be free from defects in material and workmanship for a period of 5 years from the shipment date. This warranty applies to all parts and components in the energy recovery cassettes with the exception of the motor.

Warranty Notes

Any component which proves defective during the warranty period will be repaired or replaced at Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

RVE-180-81D-CW-2-G2

Unit Performance

Design Conditions

Elevation (ft)	Summer		Winter DB (F)	Supply (CFM)	Outdoor Air (CFM)	Recirc Air (CFM)	Exhaust Air (CFM)
	DB (F)	WB (F)					
256	98.0	80.2	17.2	17,500	9,300	8,200	8,370

Unit Specifications

Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing
2	8,434 (+/- 5%)	Chilled Water	Hot Water Coil	Outdoor	UL\cUL 1995

Configuration

Outdoor Air		Exhaust Air	
Intake	Discharge	Intake	Discharge
End	Bottom	Bottom	Side

Energy Recovery Performance

Design Condition	Temperature (F)								Capacity Reduction (BTU/h)
	Outdoor Air		Supply Air		Return Air		Exhaust Air		
	DB	WB	DB	WB	DB	WB/RH	DB	WB	
Summer	98.0	80.2	82.2	69.5	75.0	62.5/50	92.3	75.9	426,870.0
Winter	17.2	14.1	52.6	43.1	72.0	55.8/35	31.0	28.1	355,557.0

Cooling Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	84.7	3.9	555.7	427.8	42.0	56.0	78.9 / 66.3	56.6 / 56.1

Heating Specifications

Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	81.4	6.7	769.8	160.0	140.0	61.7	102.3

Motor Specifications

Motor	Qty	Operating Power (hp)	Size (hp)	Enclosure	Efficiency	RPM
Supply	2	12.38	15	ODP	PE	1750
Exhaust	2	2.32	3	ODP	PE	1750

Electrical Specifications

Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	FLA (A)	Fan Power (W/CFM)*
Unit	460/60/3	61.8	70.0	49.5	1.253

*Fan Power (W/CFM) = (Supply BHP + Exhaust BHP) / Supply CFM

Construction Features And Accessories

Unit	
Unit Installation - Outdoor	Std
Unit Construction - Double Wall	Std
Insulation - 2 inch 2.4# R13 foam	Std
Corrosion Resistant Fasteners	Std
Hinged Access	Std
Factory Wired Non-Fused Disconnect Switch	
Direct Drive Plenum Blower & Motor Assemblies	Std
Factory Wired VFDs	Std
Unit Finish - Permatector, Concrete Gray (RAL 7023)	X
Stainless Steel Condensate Drain Pan and Connection	Std
Condensate Drain Trap	Std
Short Circuit Current - 5 kA	Std
Energy Recovery Device - Polymer Wheel w/ Silica Gel Desiccant	Std

Controls	
Unit Controls - Control by Others	Std
Internally Mounted Control Center with 24 VAC control transformer(s) and control circuiting fusing	Std
BMS Protocol - None	
BMS Monitoring Points	
Supply Fan Control - 0-10VDC By Others	X
Exhaust Fan Control - 0-10VDC By Others	X
Economizer Control	
Exhaust Fan Only Power	
Web-Based User Interface	
Energy Wheel Economizer Control - VFD Signal By Others	X
Energy Wheel Rotation Sensor	Std
Damper Control - 2-10VDC By Others	X
Unoccupied Recirc Mode	

Control Accessories	
Remote Display	
Dirty Filter Sensor(s) - All	X
Airflow Monitor - Outdoor Air, Exhaust Air, Supply Air	X
Room Thermostat	
Phase/Brownout Protection	X
Economizer Fault Detection Diagnostics	

Accessories	
Frost Control ModulatingWheel - VFD Signal By Others	X
Outdoor Air Damper - Low Leakage	X
Return Air Damper	
Roof Curb	
Supply Air Filters - 2" Merv 8, 6-20x24x2, 6-20x20x2	Std
Service Outlet - Factory mounted and wired	X
Piping Vestibule	
Service Lights	
Condensate Overflow Switch	X
Spare Filters	
Exhaust Discharge Gravity Backdraft Damper	
ElectroFin Coil Coating	
Motor Shaft Grounding	
Bipolar Ionization	
Smoke Detector(s)	X
Barometric Relief Damper	
UV Lights	
Return Air Filters - 2" Merv 8, 6-20x24x2, 2-20x20x2	Std
Outdoor Air Filters - 2" Merv 8, 9-20x24x2, 3-20x20x2	Std
Furnace Control	
Spare Energy Wheel Belt	
Spare Energy Wheel Segments	
Energy Wheel Bypass Damper	

Warranty Options	
Unit Warranty - 2.5 Yrs. (1 Yr. Extended)	X
Energy Wheel Warranty - 5 Yrs Less Motor	Std
Furnace HX Warranty - 25 Yrs.	Std

Standard Option	Std
Not Included	
Included	X

Notes
Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft^2 @ 1 in. wg), Class 1A

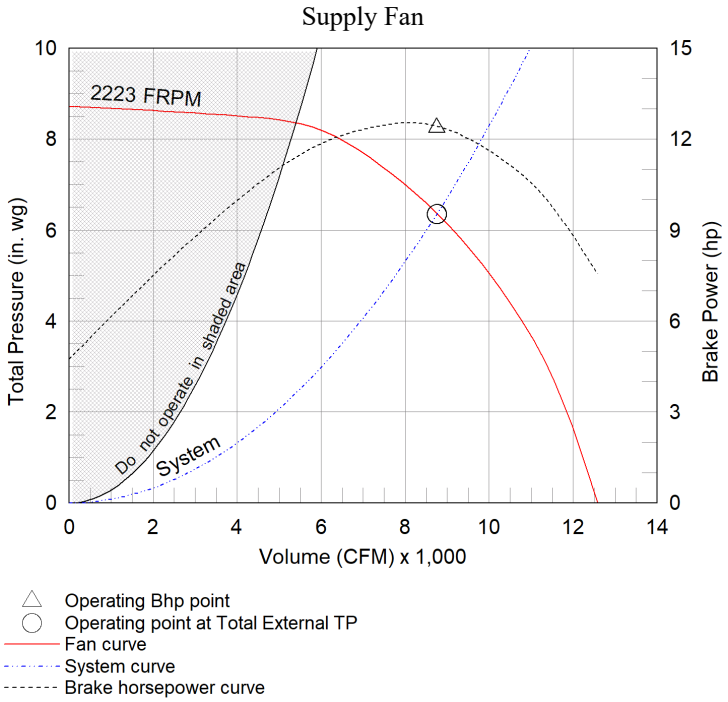
Supply Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (hp)	Qty	Type	Drive-Type
17,500	1.5	6.349	2223	N/A	2	15	2	Plenum	Direct

Pressure Drop (in. wg)							
Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
0.05	0.748	-	0.889	1.061	1.5	0.51	6.349

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
89	88	98	97	96	90	89	84	100	89	55

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 OA filter



Exhaust Fan Charts And Performance

Exhaust Fan Performance

Mode	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
						Qty	Size (hp)	Qty	Type	Drive-Type
Normal	8,370	1.5	2.504	1542	2.32	2	3	2	Plenum	Direct

Pressure Drop (in. wg)

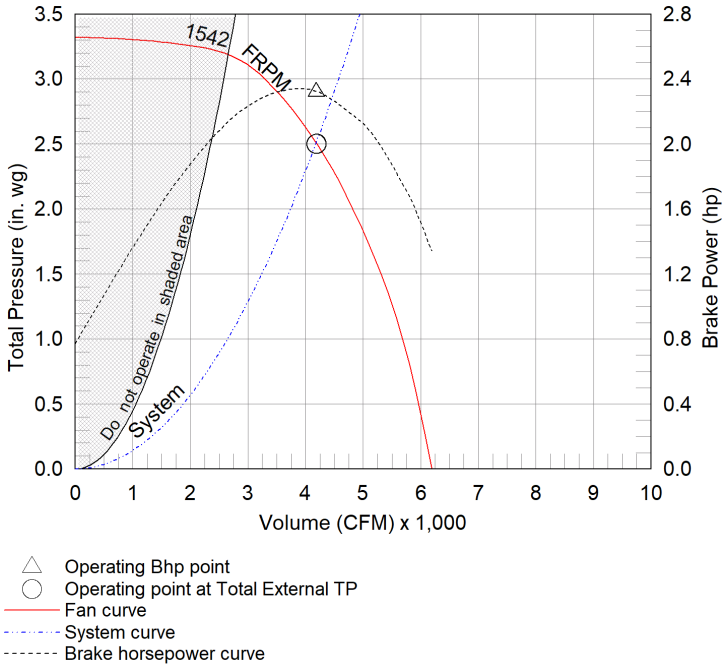
Mode	Weatherhood	Filter	Damper	Cooling	Heating	External	Energy Wheel	Total
Normal	-	-	-	-	-	1.5	0.85	2.504

Sound Performance in Accordance with AMCA

Mode	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Normal	75	85	78	73	68	67	64	61	77	65	15

*Energy Wheel pressure drop shown in above table also accounts for pressure drop across MERV8 return air filter

Exhaust Fan



Cooling Performance

Cooling Specifications										
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)		Fluid Conditions		Performance (DB/WB)	
	Type	%			Total	Sensible	EWT (F)	LWT (F)	EAT (F)	LAT (F)
Chilled Water	Ethylene	20	84.7	3.9	555.7	427.8	42.0	56.0	78.9 / 66.3	56.6 / 56.1

Coil Information					
CW Coil Model	Fins Per Inch	Rows Deep	Face Vel. (ft/min)	Coil PD (in. wg)	Connection Size (in.)
CW12C06O12-57.5x80-RH	12	6	548	0.889	2.625

Unit Details
Coil control valves must be field provided by others
Copper tube, aluminum fin coil construction
Coil freeze protection is to be provided by others
Stainless steel double sloped drain pan

Heating Performance

Heating Specifications									
Type	Fluid Type		Flow Rate (GPM)	Fluid PD (ft wg)	Capacity (MBH)	Fluid Conditions		Performance	
	Type	%				EWT (F)	LWT (F)	EAT (F)	LAT (F)
Hot Water	Ethylene	20	81.4	6.7	769.8	160.0	140.0	61.7	102.3

Coil Information					
HW Coil Model	Fins Per Inch	Rows Deep	Face Velocity (ft/min)	Coil Pressure Drop (in. wg)	Connection Size (in.)
HW58S02H14-75x34-RH	14	2	988	1.061	2.125

Unit Details
Copper tube, aluminum fin coil construction
Coil control valves must be field provided by others
Coil freeze protection is to be provided by others
Unit controller maximum allowable supply discharge air set point is 100F (37.8C)
Hot water coil face velocity is greater than 750 FPM. Consider selecting a different hot water coil with a lower face velocity. Contact the factory for a custom coil if necessary.

Energy Recovery Summer Performance

Outdoor Air		Supply Air	
Dry Bulb (F)	98.0	Dry Bulb (F)	82.2
Wet Bulb (F)	80.2	Wet Bulb (F)	69.5
Specific Humidity (gr/lb)	129	Specific Humidity (gr/lb)	89
Enthalpy (BTU/lb)	43.9	Enthalpy (BTU/lb)	33.7
Exhaust Air		**Return Air**	
Dry Bulb (F)	92.3	Dry Bulb (F)	75.0
Wet Bulb (F)	75.9	Rel. Humidity (%)	50
Specific Humidity (gr/lb)	109	Specific Humidity (gr/lb)	66
Enthalpy (BTU/lb)	39.3	Enthalpy (BTU/lb)	28.2

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
78.9	66.3	78	31.1

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
9,300	65.4	8,370	70.6

Summer Conditions

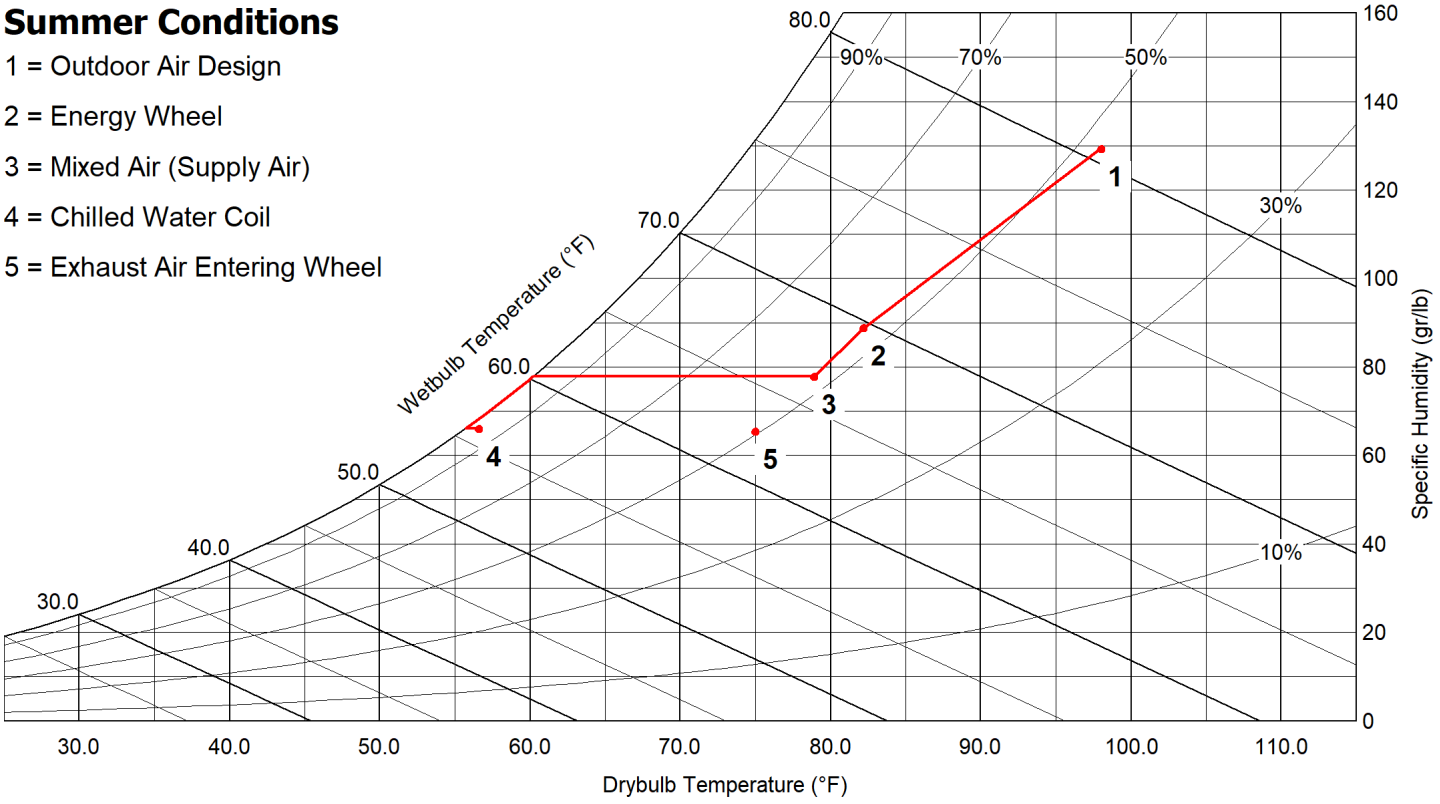
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Chilled Water Coil

5 = Exhaust Air Entering Wheel



Energy Recovery Winter Performance w/out Preheater

Outdoor Air		Supply Air	
Dry Bulb (F)	17.2	Dry Bulb (F)	52.6
Wet Bulb (F)	14.1	Wet Bulb (F)	43.1
Specific Humidity (gr/lb)	7	Specific Humidity (gr/lb)	27
Enthalpy (BTU/lb)	5.1	Enthalpy (BTU/lb)	16.7
Exhaust Air		**Return Air**	
Dry Bulb (F)	31.0	Dry Bulb (F)	72.0
Wet Bulb (F)	28.1	Rel. Humidity (%)	35
Specific Humidity (gr/lb)	18	Specific Humidity (gr/lb)	41
Enthalpy (BTU/lb)	10.2	Enthalpy (BTU/lb)	23.7

ENERGY WHEEL

Mixed Air Conditions

Dry-bulb (F)	Wet-bulb (F)	Specific Humidity (gr/lb)	Enthalpy (BTU/lb)
78.9	66.3	78	31.1

Design Air Flow Conditions

OA Volume (CFM)	ASHRAE 90.1 OA Enthalpy Recovery Ratio	EA Volume (CFM)	EA Wheel Effectiveness
9,300	62.5	8,370	71.5

Winter Conditions

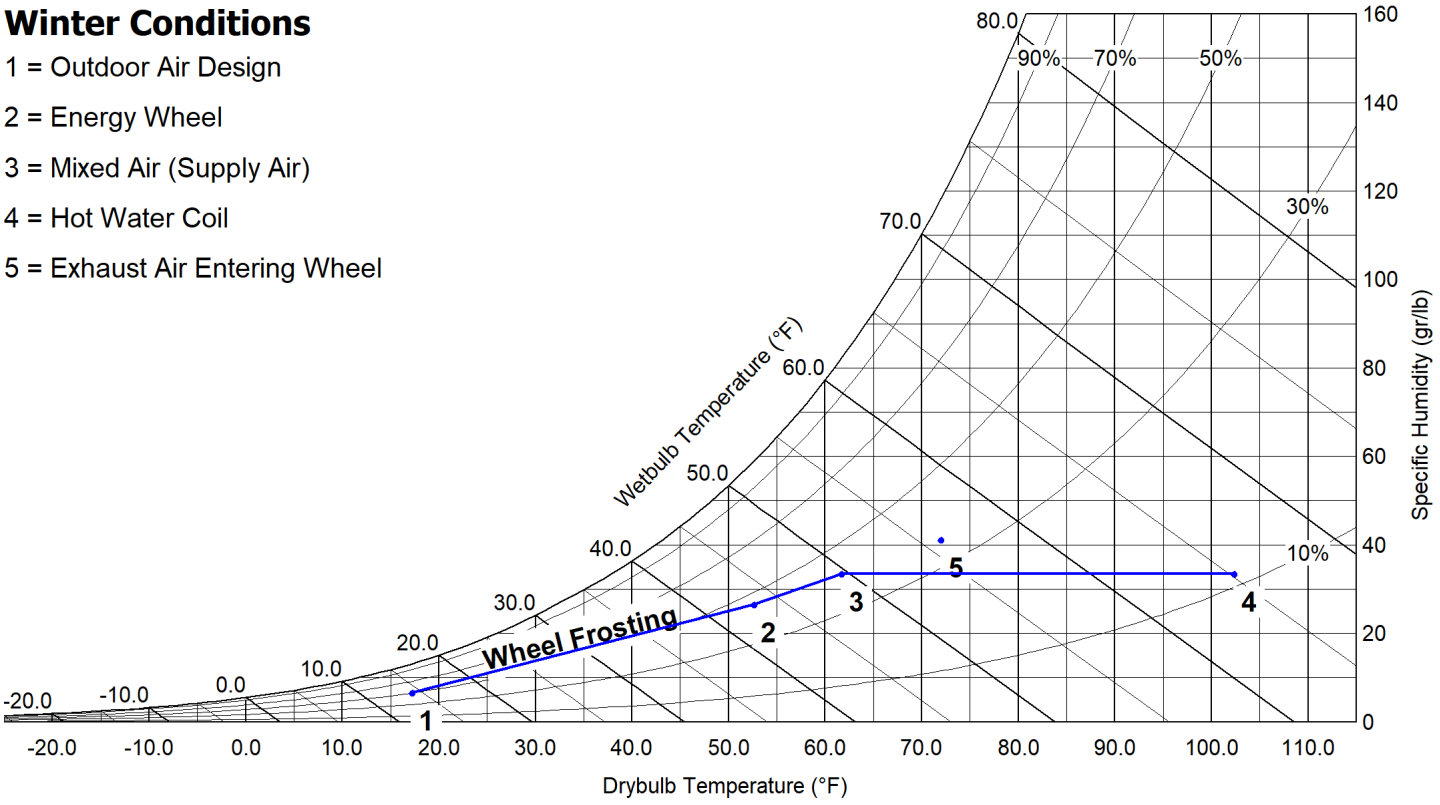
1 = Outdoor Air Design

2 = Energy Wheel

3 = Mixed Air (Supply Air)

4 = Hot Water Coil

5 = Exhaust Air Entering Wheel



AHRI Performance Ratings

Energy Recovery Performance Rating in accordance with AHRI Standard 1060 (I-P)

Rated Airflow (SCFM)		Net Supply Airflow (SCFM)	EATR (%)	OACF	Pressure Drop (in. wg)		Purge Angle (degrees)
Leaving Supply	Entering Exhaust				Supply	Exhaust	
8,412	8694	9624	3.4	1.02	0.59	0.52	0

Thermal Effectiveness Ratings

Enthalpy Recovery		Sensible Effectiveness		Latent Effectiveness		Total Effectiveness	
Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
65.4	62.5	74.5	74	68.1	66	70.6	71.5

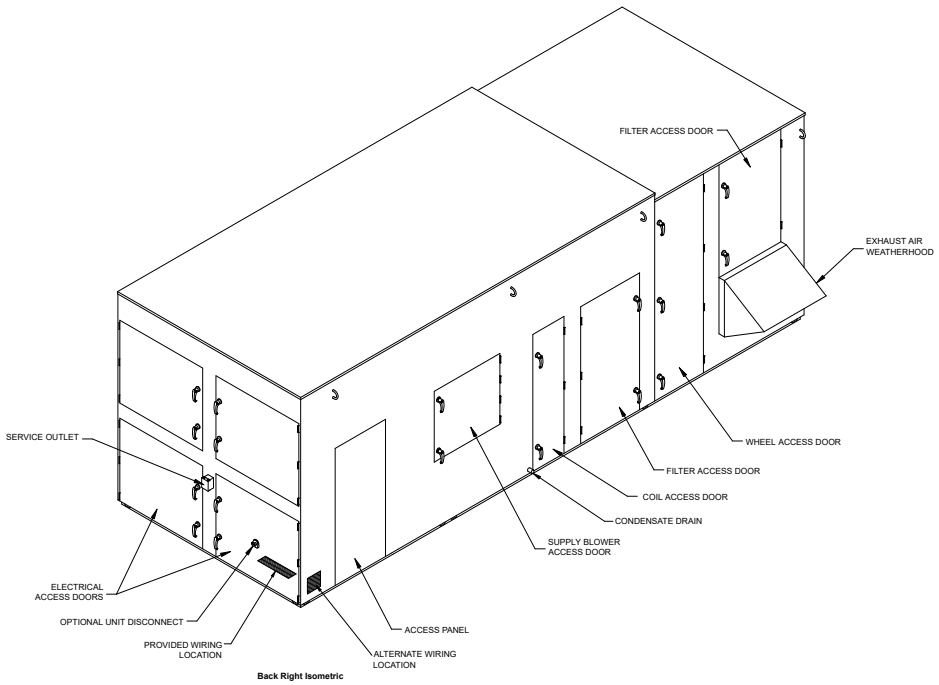
Note(s)

Summer Design Conditions:
Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

Winter Design Conditions:
Application Rating is outside the scope of the AHRI ERV certification Program but is rated in accordance with AHRI Standard 1060.

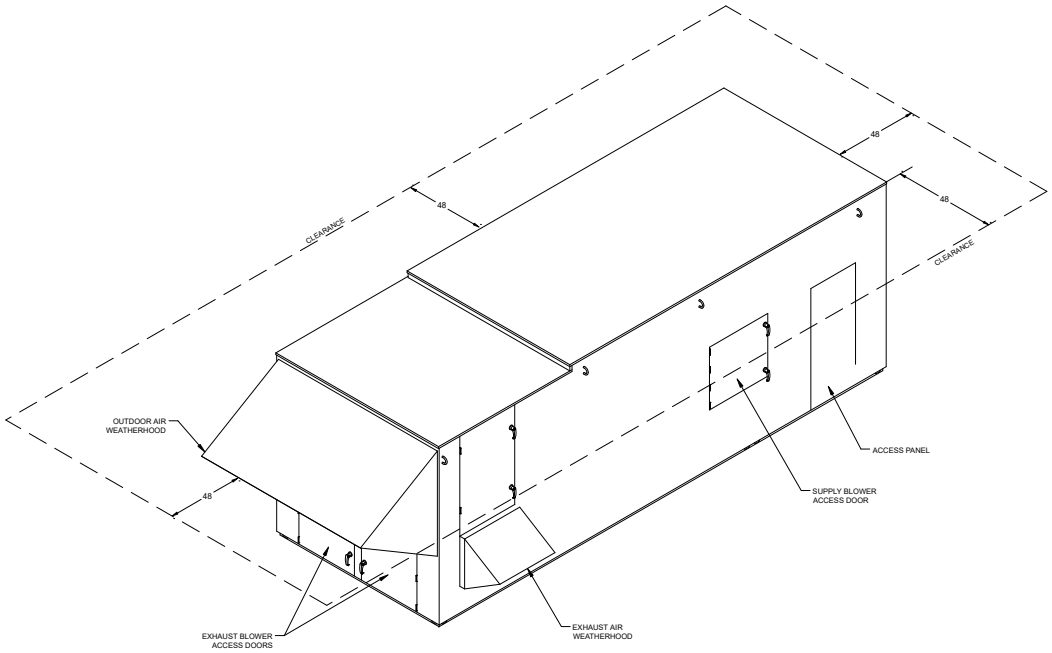
Isometric Drawings

Component Layout



Back Right Isometric

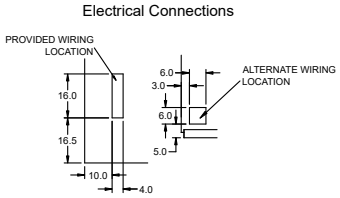
Service Clearances

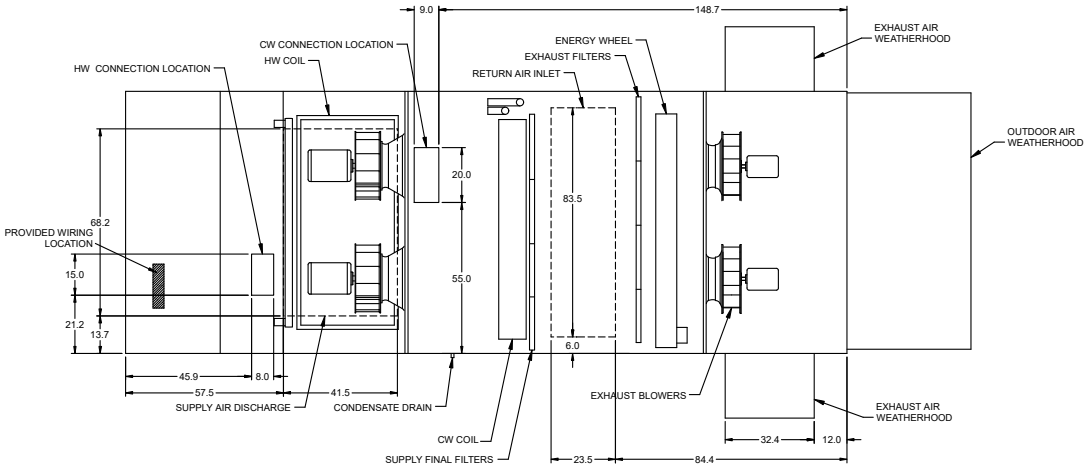


Front Left Isometric

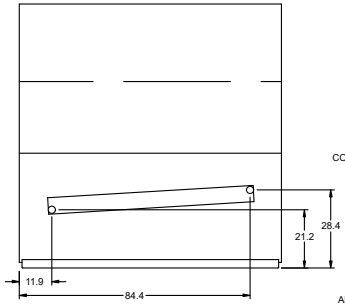
Overview Drawings

Dimensional Overview

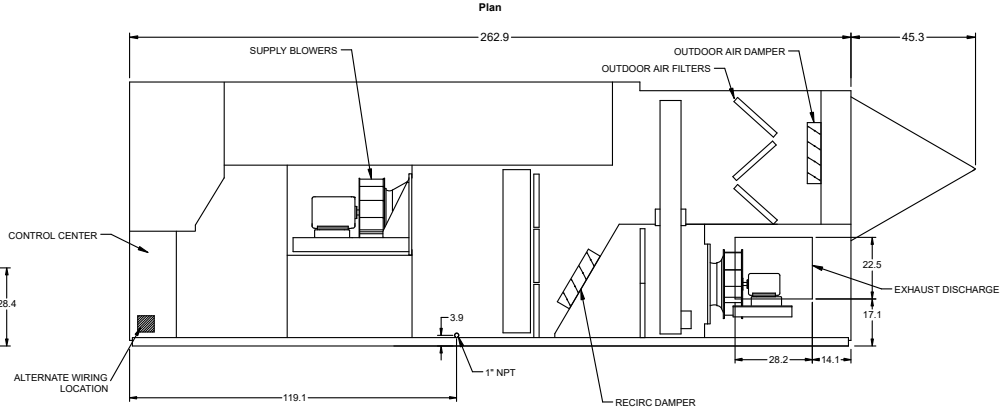




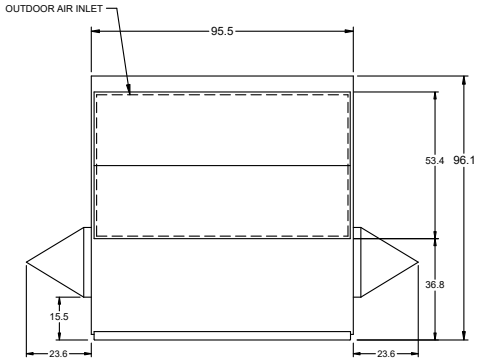
Plan



Left End



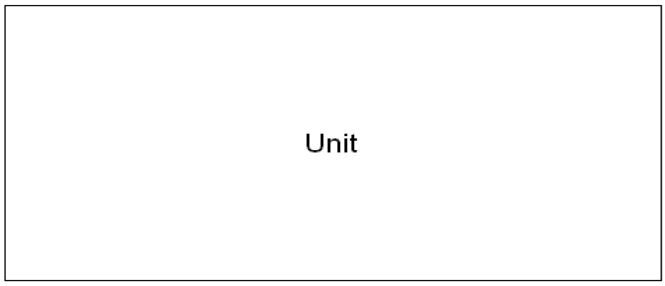
Elevation



Right End

Unit Corner Weights

2,109 lb 2,193 lb



2,109 lb 2,024 lb

Note

Estimated corner weights are shown looking down on unit and the outside air intake will be on the right. Weights are applied at the base of the unit. Images not drawn to scale.

Warranty Statement for Dedicated Outdoor Air Systems (DOAS)

Unit Warranty

Greenheck warrants the equipment to be free from defects in material and workmanship for a period of 30 months from ship date. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Greenheck.

Energy Wheel Warranty

The energy recovery wheel is warranted to be free from defects in material and workmanship for a period of 5 years from the shipment date. This warranty applies to all parts and components in the energy recovery cassettes with the exception of the motor.

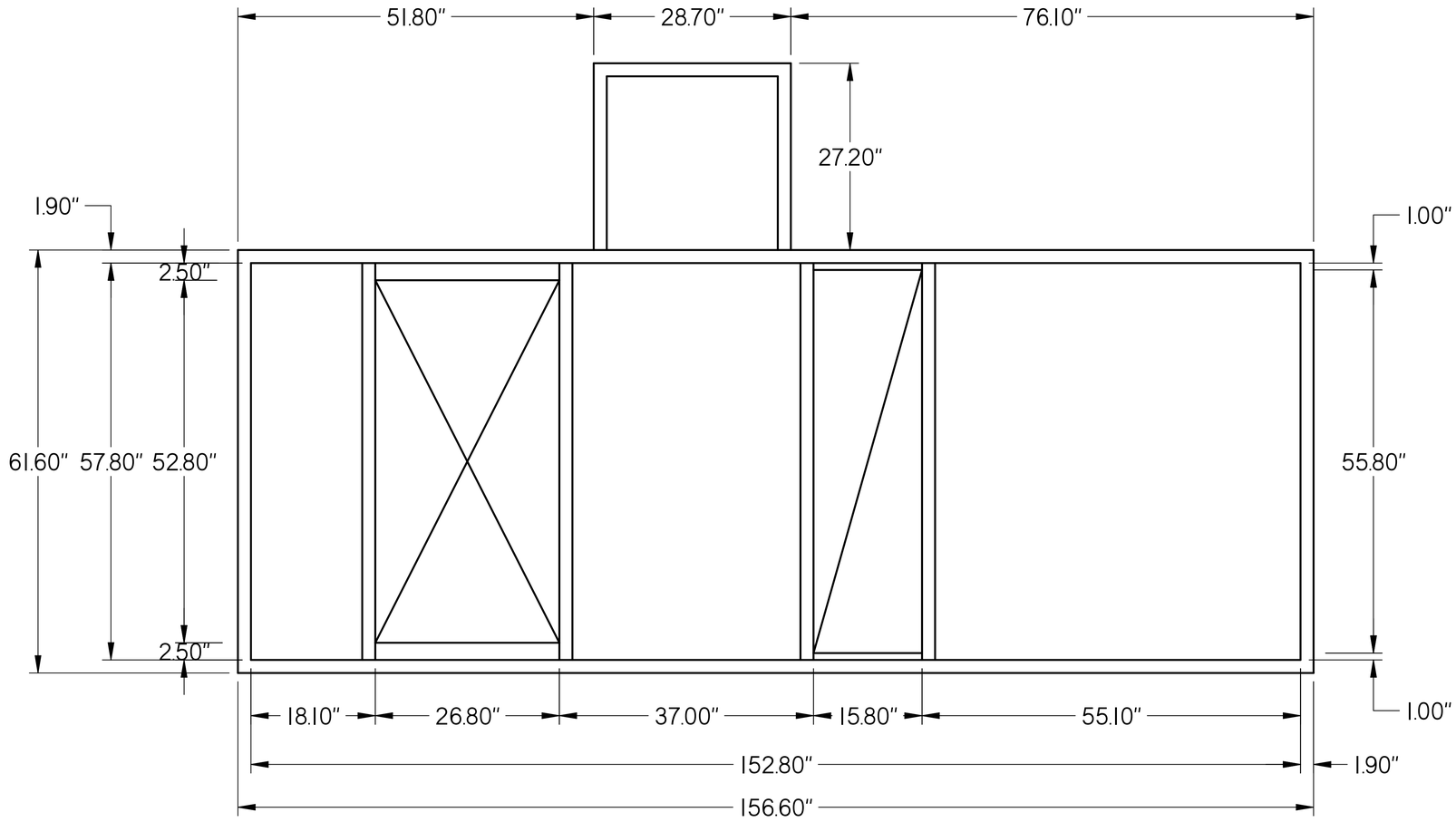
Warranty Notes

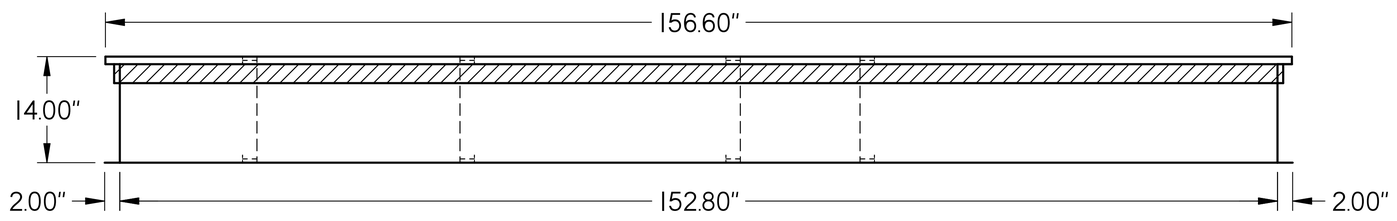
Any component which proves defective during the warranty period will be repaired or replaced at Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

JOB NAME:	LR WEST HIGH SCHOOL		
TAG:	RTUD-1, 2	APPROVED BY:	DATE:
	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY			
REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	01/08/24	A.B.





SLOPE DIRECTION TBD

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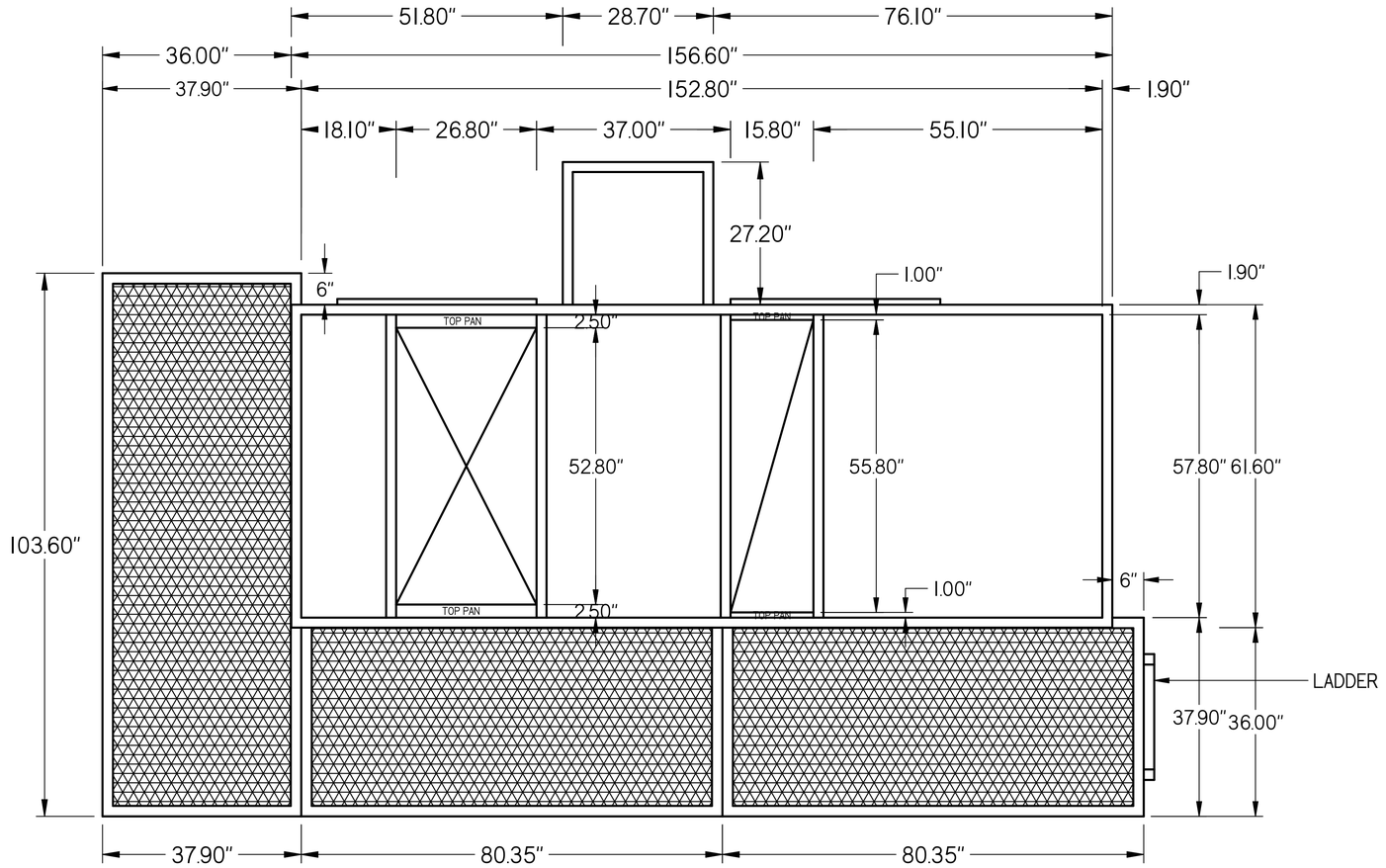
NOTES:

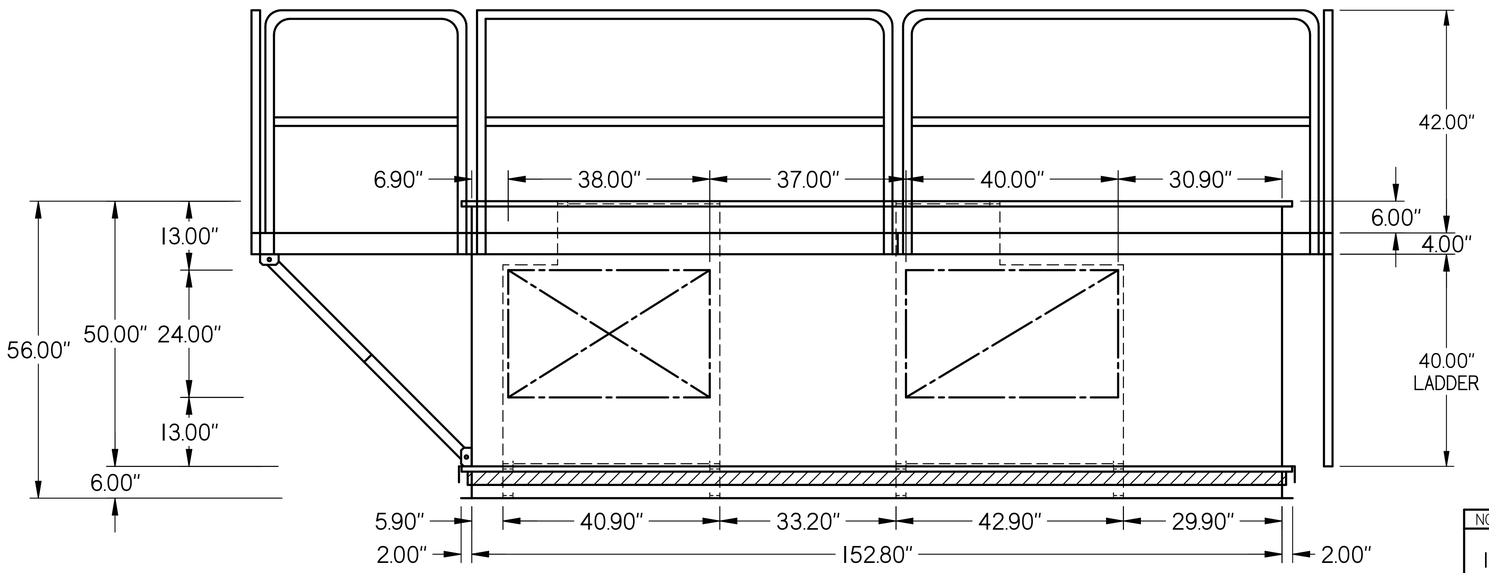
1. 14GA G90 CONSTRUCTION
2. FULLY WELDED.
3. 1X4 WOOD NAILER
4. 1" BLACK DUCT LINER INSULATION

TITLE	RVE-85-52C-CW-2-G1 14" TALL SRC		
	NAME	DATE	Q# 58868
DRAWN	A.B.	1/8/2024	
WEIGHT			
SHEET	SHEET 1 OF 1		
FILE NAME	[RVE-85-52C-CW-2-G1]-[14" TALL]-[DOWNFLOW]-[RTUD-1,2].DFT		

JOB NAME:	LR WEST HIGH SCHOOL		
TAG:	RTUA-1	APPROVED BY:	DATE:
	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY			
REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	01/08/24	A.B.





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NOTES:

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3. BASE CURB = 1X4 WOOD NAILER
4. BASE CURB = 1" BLACK DUCT LINER INSULATION
5. TOP CURB = 1" FOIL FACED INSULATION

TITLE: **RVE-85-52C-CW-2-G1**
56" TALL TWO-PIECE HORIZ FRC

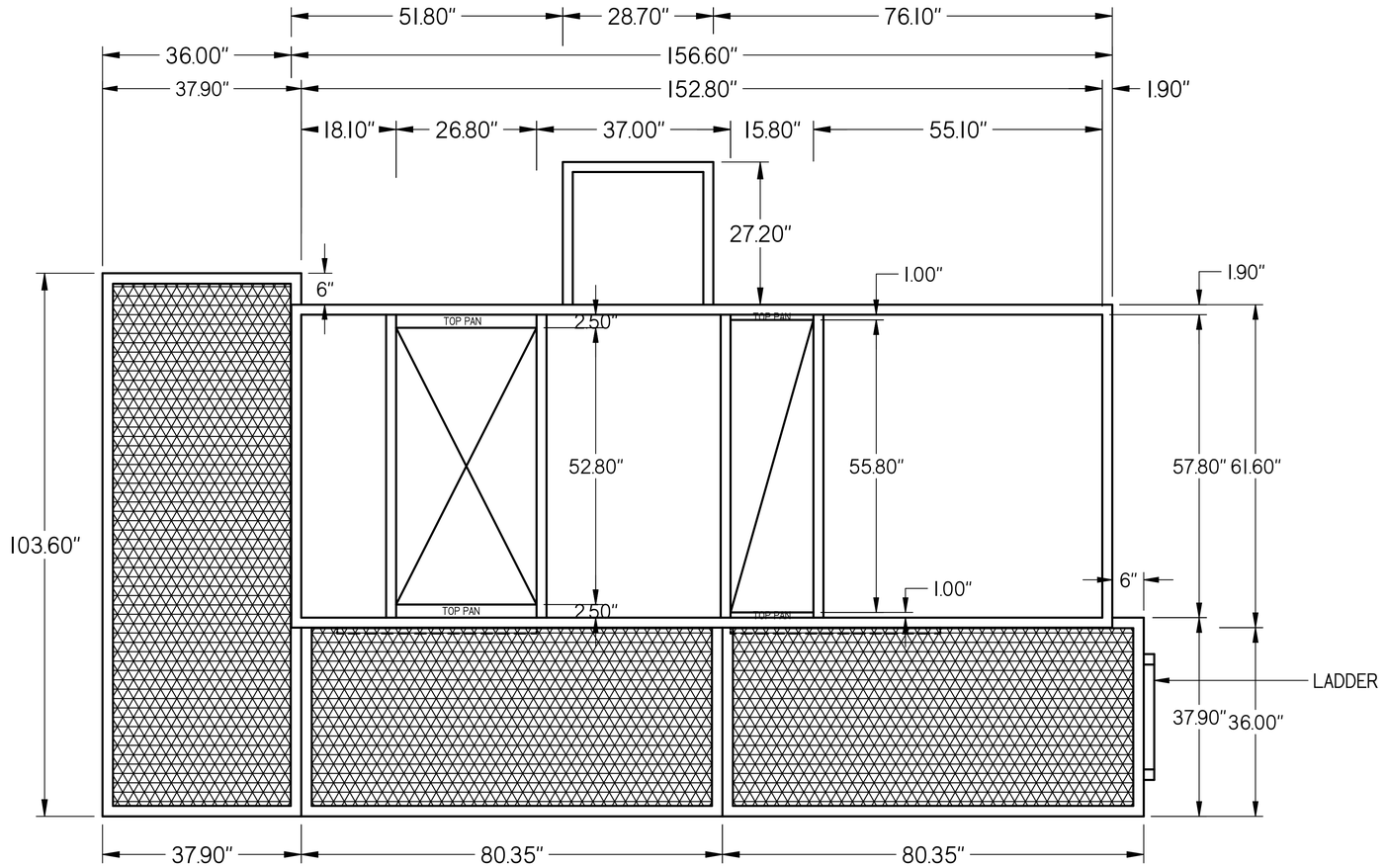
	NAME	DATE
DRAWN	A.B.	1/8/2024
WEIGHT		
SHEET	SHEET 1 OF 1	
FILE NAME	[RVE-85-52C-CW-2-G1]-[56" TALL]-[TWO-PIECE HORIZ FRC,CATWALK]-[RTUA-1].DFT	

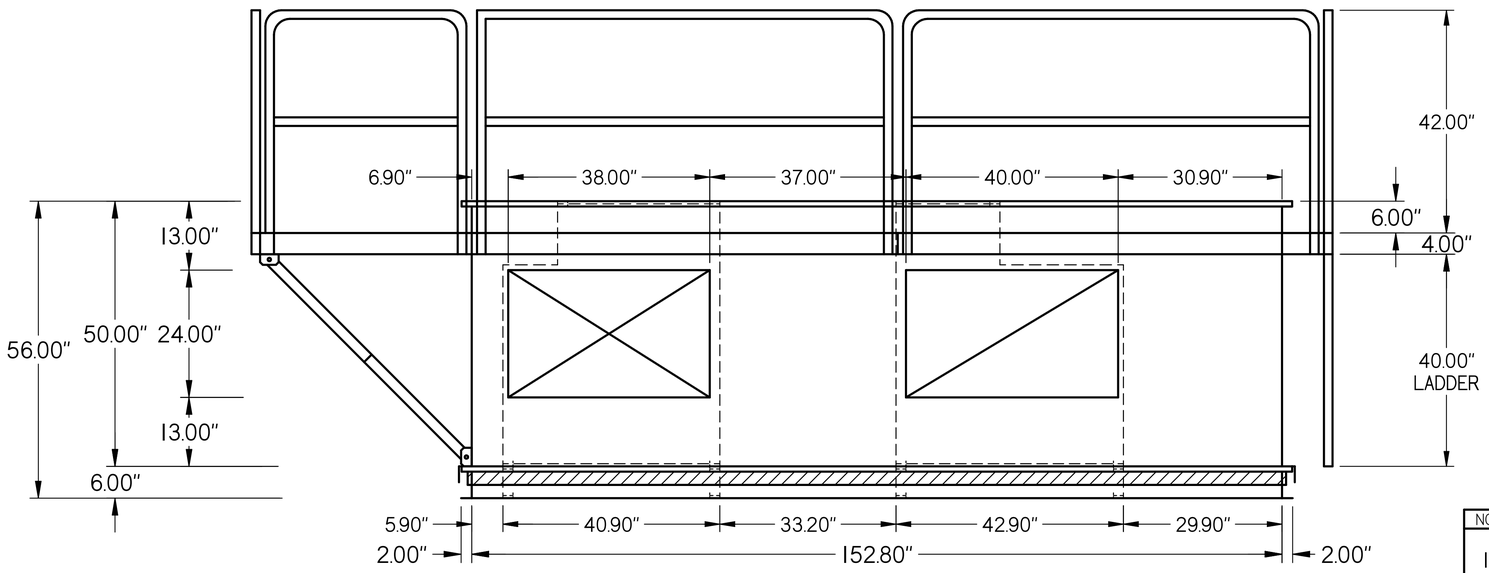
Q# 58832

JOB NAME:	LR WEST HIGH SCHOOL		
TAG:	RTUA-2	APPROVED BY:	DATE:
	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY

REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	01/08/24	A.B.





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5. TOP CURB = 1" FOIL FACED INSULATION

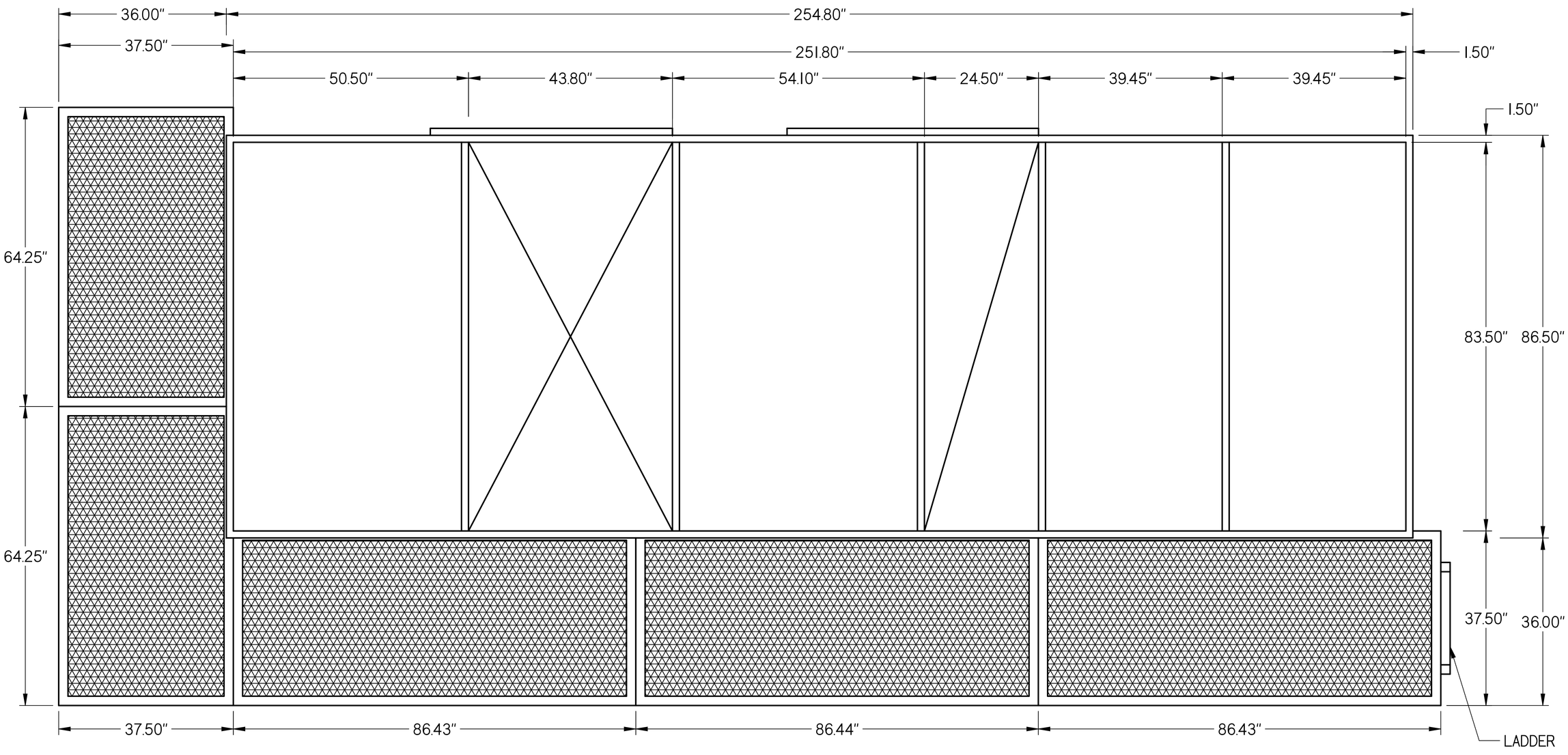
TITLE: **RVE-85-52C-CW-2-G1**
56" TALL TWO-PIECE HORIZ FRC

	NAME	DATE
DRAWN	A.B.	1/8/2024
WEIGHT		
SHEET	SHEET 1 OF 1	
FILE NAME	[RVE-85-52C-CW-2-G1]-[56" TALL]-[TWO-PIECE HORIZ FRC,CATWALK]-[RTUA-2].DFT	

Q# 58832

JOB NAME:	LR WEST HIGH SCHOOL		
TAG:	RTUG-1	APPROVED BY:	DATE:
PLAN VIEW	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY			
REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	01/08/24	A.B.



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TITLE	RVE-180-81D-CW-2-G2 56" TALL TWO-PIECE HORIZ FRC	
	NAME	DATE
DRAWN	A.B.	1/8/2024
WEIGHT		Q# 58868
SHEET	SHEET 1 OF 2	
FILE NAME	(RVE-180-81D-CW-2-G2)-(56" TALL)-(TWO-PIECE HORIZ FRC,CATWALK)-(RTUG-1).DFT	

JOB NAME:	LR WEST HIGH SCHOOL
TAG:	RTUG-1

APPROVED BY: DATE:

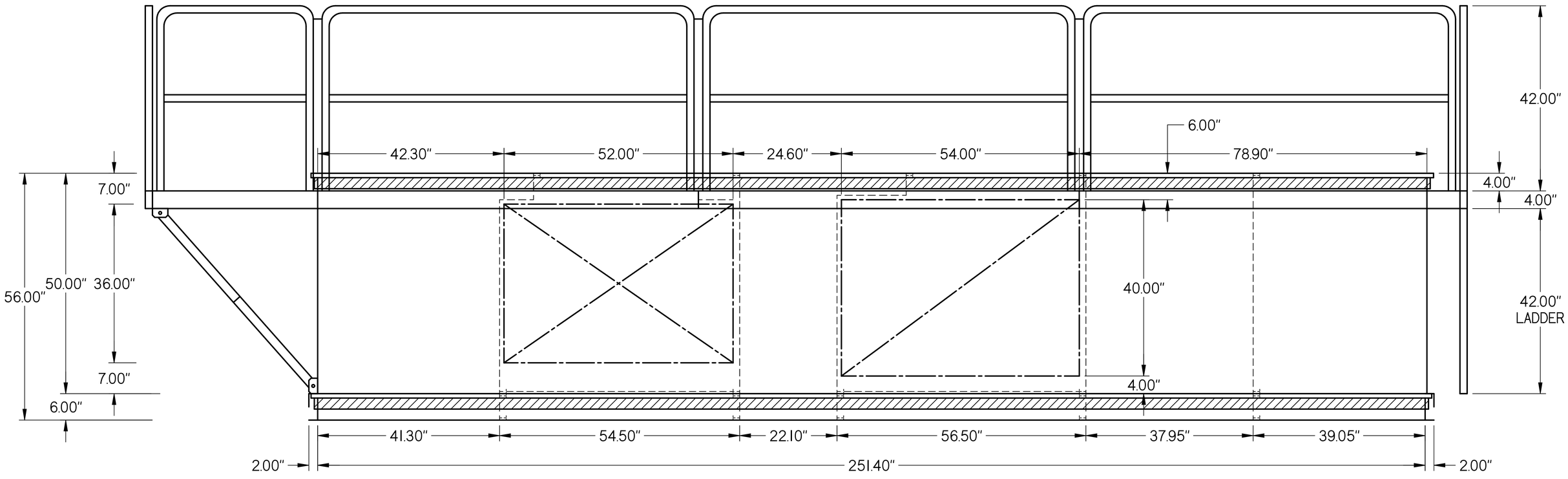
FRONT VIEW

APPROXIMATE WEIGHT:

"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"

REVISION HISTORY

REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	01/08/24	A.B.



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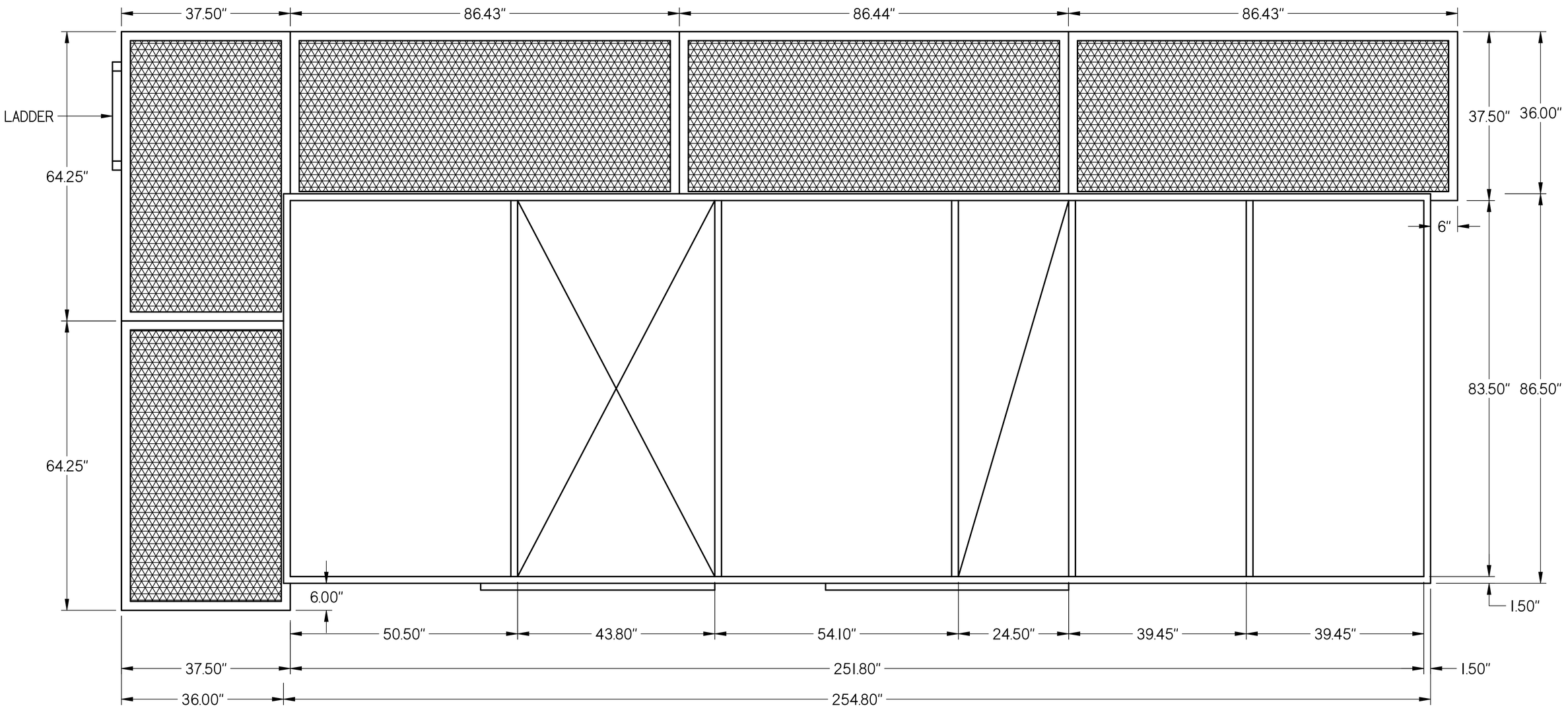
TITLE	RVE-180-81D-CW-2-G2 56" TALL TWO-PIECE HORIZ FRC	
	NAME	DATE
DRAWN	A.B.	1/8/2024
WEIGHT		
SHEET	SHEET 2 OF 2	
FILE NAME	{RVE-180-81D-CW-2-G2}-{56" TALL}-{TWO-PIECE HORIZ FRC,CATWALK}-{RTUG-1}.DFT	

Q# 58868

JOB NAME:	LR WEST HIGH SCHOOL		
TAG:	RTUG-2	APPROVED BY:	DATE:
PLAN VIEW	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY

REV	DESCRIPTION	DATE	ENGINEER
1	INITIAL DRAWING	01/08/24	A.B.



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TITLE	RVE-180-81D-CW-2-G2 56" TALL TWO-PIECE HORIZ FRC		
	NAME	DATE	Q# 58868
DRAWN	A.B.	1/8/2024	
WEIGHT			
SHEET	SHEET 1 OF 2		
FILE NAME	{RVE-180-81D-CW-2-G2}-{56" TALL}-{TWO-PIECE HORIZ FRC,CATWALK}-{RTUG-21.DFT		

JOB NAME:	LR WEST HIGH SCHOOL		
TAG:	RTUG-2	APPROVED BY:	DATE:
FRONT VIEW	APPROXIMATE WEIGHT:	*"IN THE ABSENCE OF A SIGNED DRAWING, MGM PRODUCTS ACCEPTS THE P.O AS CONFIRMATION OF WHAT IS TO BE BUILT"*	

REVISION HISTORY

REV	DESCRIPTION	DATE	ENGINEER
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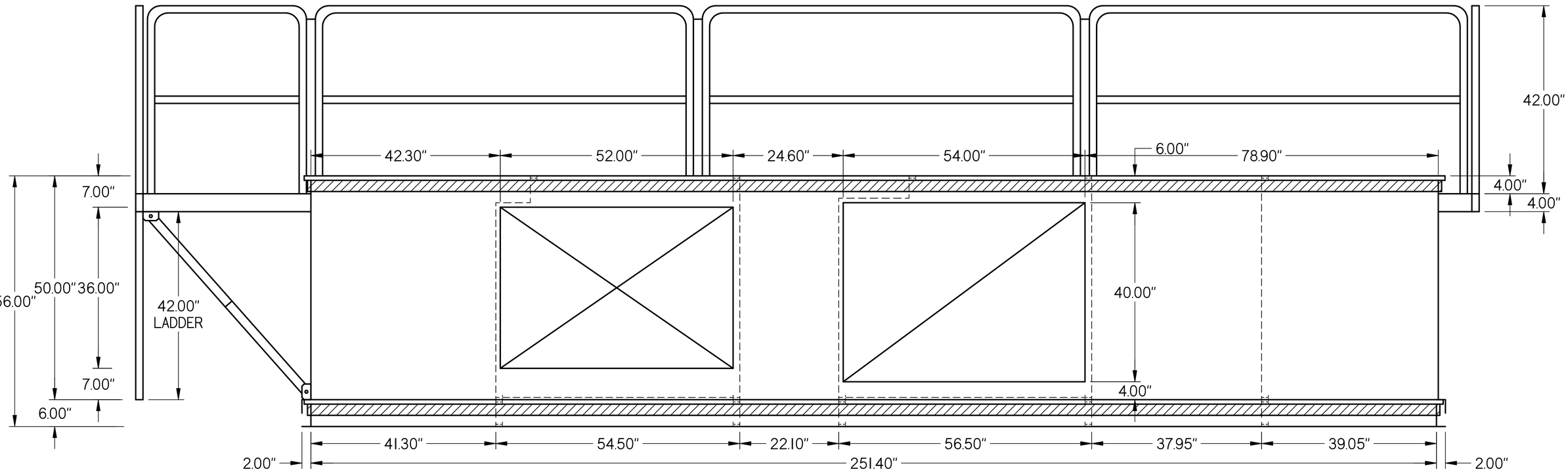

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TITLE	RVE-180-81D-CW-2-G2 56" TALL TWO-PIECE HORIZ FRC	
	NAME	DATE
DRAWN	A.B.	1/8/2024
WEIGHT		Q# 58868
SHEET	SHEET 2 OF 2	
FILE NAME	[RVE-180-81D-CW-2-G2]-[56" TALL]-[TWO-PIECE HORIZ FRC,CATWALK]-[RTUG-2].DFT	