Product Data

Dedicated Outdoor Air Units

40 to 140 Nominal Tons

62L 40-140
Dedicated Outdoor Air Unit
Air Cooled Cooling/Dehumidification
or Air Source Heat Pump
or Water Source Heat Pump
Optional Auxiliary Heat, Energy Recovery

Features/Benefits

Carrier's 62L commercial packaged, dedicated, outdoor air unit offers efficiency, application flexibility, quality, reliability and easy maintenance.

Carrier's 62L Series commercial dedicated outdoor air units offer:

- Capacities up to 140 nominal tons
- Vertical or horizontal supply configurations
- Puron Advance™ low GWP refrigerant (R-454B) as standard
- Double wall construction with 2 in. R-13 closed cell insulation
- Optional AHRI (Air-Conditioning, Heating, and Refrigeration Institute) listed energy recovery wheel
- Multiple heating options
- Multiple fan and motor options, including ODP, TEFC, and ECM motors, and direct drive airfoil or backward incline fans.
- Direct digital control (DDC) control with available (factory-installed) touchscreen interface.
- Multiple reheat options, including modulating HGRH and liquid subcooling reheat with modulating HGRH
- Stand alone or networked operation
- Lead circuit variable capacity compressor
- 100% outdoor air operation

High efficiency

The Carrier 62L dedicated outdoor air system (DOAS) uses highly efficient, scroll compressors that are optimally designed for use with Puron Advance™ refrigerant (R-454B).

Operating efficiency of the unit may be increased by adding the optional high efficiency condenser (on Air Cooled units), liquid subcooling reheat, or energy recovery system.

The energy recovery system uses an AHRI-listed energy recovery wheel to transfer sensible and latent heat between the incoming air and the exhaust air, reducing energy consumption and improving indoor conditions.

Puron Advance™ features

Puron Advance™ (R-454B) is our next generation refrigerant for Dedicated Outdoor Air Systems. With a GWP of 466 and similar working pressure and performance to R-410A, Puron Advance™ easily exceeds the EPA's new, stringent <700 GWP refrigerant requirement while minimizing unit redesign. Like other next generation refrigerants (R-32, etc.), R-454B is classified as an "A2L" refrigerant by ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers). This designation means that R-454B is "mildly flammable" under certain conditions. While this is a change from legacy "A1 — No Flame Propagation" refrigerants like Puron (R-410A), A2Ls are still very low on the flammability scale and quite safe for use. A2L refrigerants are difficult to ignite and have an extremely low flame speed — much less so than natural gas, propane, or even rubbing alcohol. At Carrier, we are committed to safety. As such, all our Puron Advance™ DOAS units include two factory installed leak detection sensors. The system is certified to UL 60335-2-40 and designed to work right away, without any field configuration or wiring. In the event of a leak, these systems are designed to automatically identify and resolve the issue by dissipating the refrigerant to minimize risk to equipment, buildings, or occupants.

Flexibility to suit many applications

The Carrier 62L dedicated outdoor air unit is designed to provide conditioned ventilation air in a wide range of geographic locations.

Cooling and dehumidification capacities 40-140 tons are available to meet the application supply air dew point based on the application airflow and geographic location. All 62L units feature a lead circuit variable speed compressor on unit sizes 40-140 for capacity modulation at part load.

All 62L units 40-70 tons are available in 208V-3Ph-60Hz, 230V-3Ph-60Hz, 460V-3Ph-60Hz or 575V-3Ph-60Hz with a short circuit current rating (SCCR) of 5kA. Unit sizes from 80 to 140 tons are only available in 460V-3PH-60Hz.

Cooling and dehumidification capacity enhancing options, such as liquid sub-cooling reheat, high efficiency condenser, and energy recovery wheels are available to improve application capacity or efficiency and may allow for downsizing the compressor capacity.

The 62L unit is available in a wide range of heat options, including no heat, up to 1600 MBH of gas heat, up to 150 kW of electric heat, or a high capacity hot water coil. Modulating heat control is available to provide precise supply air temperature control.

Units are available in vertical or horizontal supply to meet a variety of installations. Vertical supply units can be curb mounted (accessory curbs available) or structure mounted. Horizontal supply units can be curb, structure, or slab mounted.

The 62L is also available with a vertical exhaust air intake that can be used for barometric relief, power exhaust, or energy recovery with power exhaust to meet project requirements.

All 62L units feature direct drive supply fans for efficient operation. Multiple sizes of airfoil and backward incline fans are available to meet application airflow and static requirements. A wide variety of supply fan motor sizes are available to meet fan power requirements.

Durable construction

Cabinets are constructed of heavy gauge galvanized steel with a prepainted exterior finish to protect the cabinet and preserve the appearance through a long operating life.

The cabinet features a double wall design with a galvanized inner liner. The double wall design is insulated with 2 in., R-13 closed-cell foam insulation,

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which adds rigidity to the structure and resists moisture intrusion.

Quality and reliability

All units are run tested prior to leaving the factory to help ensure proper operation and enhance life expectancy of key components. Components undergo numerous checks and inspections throughout the manufacturing process to eliminate components that do not meet Carrier's high quality standards.

Reliable, variable and fixed capacity scroll compressors are mounted on rubber isolation mounts for quiet operation.

Mechanically and electrically independent dual refrigeration circuits provide redundancy in the event that one circuit should require service. All refrigerant circuits use a thermostatic expansion valve (TXV) to ensure proper refrigerant metering throughout the unit's broad operating envelope. The refrigeration circuits are protected by filter driers specifically designed for Puron Advance™ refrigerant (R-454B).

Standard warranty coverage provides a limited one-year parts warranty and a 5-year limited warranty on the stainless steel gas heat exchanger.

Easy to install, maintain and service

Maintaining and servicing a dedicated outdoor air unit is critical in maximizing the life expectancy and efficient operation of the unit. The Carrier unit has been designed for easy access with simple maintenance procedures.

Hinged access panels provide easy access to controls, fans, coils and filters. The optional factory-installed energy recovery wheel shall slide out of the cabinet for service.

A dedicated vertical or horizontal design does not require conversion time during the unit installation. The curb power connection minimizes roof penetrations.

Power connections are in a protected area, away from harsh environmental conditions. All units feature heavy gauge formed galvanized steel base rails with rigging openings to simplify handling and lifting at the job site.

Indoor air quality

The Carrier 62L is standard with a 2 in. filter track with MERV 8 filters. Units selected with a 4 in. MERV 8, 11, or 13 filters include a 4 in. filter track (see Dimensions section).

The condensate drain pan is double sloped to eliminate standing water per ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) Standard 62-1089R. The drain pan is fabricated of heavy gauge stainless steel to help resist corrosion and is insulated on the bottom with closed cell insulation.

The double wall design of the unit with galvanized interior liners allows easy cleaning of the interior surfaces.

Energy recovery

The Carrier dedicated outdoor air unit may be optionally equipped with an energy recovery (enthalpy) wheel. The enthalpy wheel meets the requirements of AHRI standard 1060 and is certified by AHRI. This energy recovery wheel is sized to provide increased energy recovery and humidity control based on the application requirements. The energy wheel is mounted in a slide-out cassette for simplified maintenance and also includes 2 in. filters on the outdoor air and exhaust air intakes.

Heating systems

Carrier dedicated outdoor air units if configured as Heat Pumps, will come standard with DX Heat Pump heating and may be equipped with a variety of heat system types: gas heat (natural gas standard, propane via special order), electric, or hot water. Precise leaving air temperature control is provided via staged or modulating heat control systems.

The gas heating systems are of the induced-draft design that draws hot combustion gases through the heat exchanger at the ideal rate for maximum heat transfer. Induced-draft systems are an inherently safer design than forced draft, positive pressure designs.

Induced-draft designs operate the heat exchanger under negative pressure, helping to prevent leakage of flue gases into the supply airstream. The gas heat system uses a direct-spark ignition and is protected by numerous safety circuits.

The 62L gas heaters are available from 300 up to 1600 MBtuh. The units also have XL cabinets available. The larger heat capacities on these cabinets facilitate applications that require a higher temperature rise. Standard cabinets with vertical supply heaters can achieve a 100°F maximum temperature rise and a 80°F maximum temperature rise on horizontal supply configurations. However, XL cabinets can achieve a maximum temperature rise of 160°F for vertical supply and 130°F for horizontal supply configurations.

Direct Digital Control (DDC)

The factory-installed and programmed DDC controller provides complete system control of unit operation. The controller monitors all system sensors and makes operating decisions based upon the user's configuration inputs.

Local access to the controller may be accomplished via the Equipment Touch™ touchscreen display. The Equipment Touch is a unit-mounted user interface with a 4.3 in. touchscreen display. The Equipment Touch will be standard factory installed on all Rev J control units. Interface can also be accomplished through the Android Equipment App on the Google Play store.

In addition, the 62L controller has the following features:

- simple access to set points, time schedules, status values, and unit configuration parameters
- supports communications with BACnet™[1] and building automation protocols
- alarm history is recorded and may be accessed via the Equipment Touch display
- password protection
- compressor minimum off time (5 minutes) feature
- service test and a service Diagnostic mode

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Harsh environment coating

Carrier dedicated outdoor air units may be equipped with optional harsh environment protection through a factory-applied coating. This coating, consisting of aluminum-impregnated polyurethane and rated for a 10,000 hour salt spray, will cover all exposed areas of the unit, including all of the coils (evaporator, condenser (on Air Cooled units), hot gas reheat, and liquid subcooling), compressors, interior and exterior panels, piping, and gas heaters.

Reheat options

Carrier dedicated outdoor air units may be equipped with multiple reheat options. Reheat options include hot gas reheat and liquid subcooling. Hot gas reheat includes modulating control to help rewarm dehumidified air to neutral temperatures to help offset space relative humidity. The hot gas from the compressor is directed into a full faced Al/Cu coil after the evaporator to help lower the relative humidity of the supply air. Liquid subcooling is also a reheat option, but instead of using hot gas from the compressor, it uses warm liquid refrigerant after it passes through the condenser and sends it to a full faced Al/Cu coil after the evaporator for additional subcooling. In this process, while helping reheat the supply air, liquid subcooling also reduces the temperature of the refrigerant entering the evaporator coil which can increase overall unit capacity. Liquid subcooling is used in conjunction with hot gas reheat to ensure that the supply air is reheated to neutral conditions.

Model number nomenclature

Carrier

62L B 40 E E K C - J K B C B A E

SEE NEXT PAGE FOR REMAINDER OF MODEL NUMBER NOMENCLATURE

62L – Dedicated Outdoor Air Unit[a]

Cabinet, Supply, Discharge

- A – 100% OA / Cabinet E / Vertical Supply / No Exhaust
- B – 100% OA / Cabinet E / Vertical Supply / Vertical Exhaust
- C – 100% OA / Cabinet EXL / Vertical Supply / No Exhaust
- D – 100% OA / Cabinet EXL / Horizontal Supply / No Exhaust
- E – 100% OA / Cabinet EXL / Vertical Supply / Vertical Exhaust
- F – 100% OA / Cabinet EXL / Horizontal Supply / Vertical Exhaust
- G – 100% OA WSHP / Cabinet E / Vertical Supply / No Exhaust
- H – 100% OA WSHP / Cabinet E / Vertical Supply / Vertical Exhaust
- J – 100% OA WSHP / Cabinet EXL / Vertical Supply / No Exhaust
- K – 100% OA WSHP / Cabinet EXL / Horizontal Supply / No Exhaust
- M – 100% OA WSHP / Cabinet EXL / Vertical Supply / Vertical Exhaust
- N – 100% OA WSHP / Cabinet EXL / Horizontal Supply / Vertical Exhaust
- P – 100% OA ASHP / Cabinet E / Vertical Supply / No Exhaust
- Q – 100% OA ASHP / Cabinet E / Vertical Supply / Vertical Exhaust
- R – 100% OA ASHP / Cabinet EXL / Vertical Supply / No Exhaust
- S – 100% OA ASHP / Cabinet EXL / Horizontal Supply / No Exhaust
- T – 100% OA ASHP / Cabinet EXL / Vertical Supply / Vertical Exhaust
- U – 100% OA ASHP / Cabinet EXL / Horizontal Supply / Vertical Exhaust

Unit Size – Tons (MBH)[b, c]

- 40 – 40 (480)
- 45 – 45 (540)
- 50 – 50 (600)
- 55 – 55 (660)
- 60 – 60 (720)
- 65 – 65 (780)
- 70 – 70 (840)
- 80 – 80 (960)
- AA – 100 (1200)
- BB – 120 (1440)
- CC – 140 (1680)

Energy Recovery Ventilator (ERV) Wheel

	Wheel No.	Diameter (in.)	Thickness (mm)	Bypass
–	None			
A	ERC-6488C	64	88	Yes
B	ERC-6495C	64	95	Yes
C	ERC-68100C	68	100	Yes
D	ERC-68110C	68	110	Yes
E	ERC-74122C	74	122	Yes
F	ERC-74130C	74	130	Yes
G	ERC-81146C	81	146	Yes
H	ERC-81160C	81	160	Yes
K	ERC-86125C	86	125	Yes
L	ERC-86170C	86	170	Yes
M	ERC-86190C	86	190	Yes
N	ERC-6488C	64	88	No
P	ERC-6495C	64	95	No
Q	ERC-68100C	68	100	No
R	ERC-68110C	68	110	No
S	ERC-74122C	74	122	No
T	ERC-74130C	74	130	No
U	ERC-81146C	81	146	No
V	ERC-81160C	81	160	No
X	ERC-86125C	86	125	No
Y	ERC-86170C	86	170	No
Z	ERC-86190C	86	190	No

Supply Fan Motor Options

- A – 3 HP ODP with VFD
- B – 5 HP ODP with VFD
- C – 7-1/2 HP ODP with VFD
- D – 10 HP ODP with VFD
- E – 15 HP ODP with VFD
- F – 1 HP (x2) ODP with VFD
- G – 1-1/2 HP (x2) ODP with VFD
- H – 2 HP (x2) ODP with VFD
- J – 3 HP (x2) ODP with VFD
- K – 5 HP (x2) ODP with VFD
- L – 7-1/2 HP (x2) ODP with VFD
- M – 10 HP (x2) ODP with VFD
- 1 – 10 HP (x2) TEFC with VFD
- 2 – 15 HP (x2) TEFC with VFD[d]
- 3 – Dual ECM[e]
- N – 15 HP (x2) ODP with VFD[e]
- P – 3 HP TEFC with VFD
- Q – 5 HP TEFC with VFD
- R – 7-1/2 HP TEFC with VFD
- S – 10 HP TEFC with VFD
- T – 15 HP TEFC with VFD
- U – 1 HP (x2) TEFC with VFD
- V – 1.5 HP (x2) TEFC with VFD
- W – 2 HP (x2) TEFC with VFD
- X – 3 HP (x2) TEFC with VFD
- Y – 5 HP (x2) TEFC with VFD
- Z – 7.5 HP (x2) TEFC with VFD
- 6 – 20 HP (x2) ODP with VFD[d]
- 7 – 20 HP (x2) TEFC with VFD[d]

Coil and Reheat Options

	Evaporator Coil Rows	HGRH	HGRH Circuit	Sub-Cooling	Condenser Fans[f]
J	– 6	Mod	Lead	—	Var Speed
K	– 6	Mod	Dual	—	Var Speed
M	– 6	Mod	Lead	SubCooling	Var Speed

Heat Options

	MBtuh input	Temperature Rise[g]	E-Heat kW
–	– None		
A	– 300	Standard	N/A
B	– 350	Standard	N/A
C	– 400	Standard	N/A
D	– 500	Standard	N/A
E	– 600	Standard	N/A
F	– 800	High (XL)	N/A
G	– 1000	High (XL)	N/A
H	– 1200	High (XL)	N/A
J	– 1400	High (XL)	N/A
K	– 1600	High (XL)	N/A
S	– N/A	N/A	20
T	– N/A	N/A	25
U	– N/A	N/A	30
V	– N/A	N/A	35
W	– N/A	N/A	40
X	– N/A	N/A	50
Y	– N/A	N/A	60
Z	– N/A	N/A	70
1	– N/A	N/A	80
2	– N/A	N/A	100
3	– N/A	N/A	110
4	– N/A	N/A	120
5	– N/A	N/A	130
6	– N/A	N/A	140
7	– N/A	N/A	150
8	– Hot Water Coil		

NOTE: See Legend and notes on page 6.

Model number nomenclature (cont)

62L B 40 E E K C - J K B C B A E

SEE PREVIOUS PAGE FOR REMAINDER OF MODEL NUMBER NOMENCLATURE

Factory Installed Options
Refer to tables on page 7 for available options codes.

Exhaust Fan

- \- – None
- 4 – 450 mm (High), BI
- 5 – 500 mm (Low), BI
- 6 – 500 mm (High) 460V only, BI
- 7 – 560 mm 208,230V only, BI
- A – 22 in., BI
- B – 25 in., BI
- C – 14 in. (x2), BI
- D – 16 in. (x2), BI
- E – 18 in. (x2), BI
- F – 20 in. (x2), BI
- G – 22 in., AF
- H – 25 in., AF
- J – 14 in. (x2), AF
- K – 16 in. (x2), AF
- L – 18 in. (x2), AF
- M – 20 in. (x2), AF

Power Exhaust Fan Motor Options

- \- – None
- A – 3 HP ODP with VFD
- B – 5 HP ODP with VFD
- C – 7 1/2 HP ODP with VFD
- D – 10 HP ODP with VFD
- E – 15 HP ODP with VFD
- F – 1 HP (x2) ODP with VFD
- G – 1 1/2 HP (x2) ODP with VFD
- H – 2 HP (x2) ODP with VFD
- J – 3 HP (x2) ODP with VFD
- K – 5 HP (x2) ODP with VFD
- L – 7 1/2 HP (x2) ODP with VFD
- M – 10 HP (x2) ODP with VFD
- N – 15 HP (x2) ODP with VFD[d]
- P – 3 HP TEFC with VFD
- Q – 5 HP TEFC with VFD
- R – 7 1/2 HP TEFC with VFD
- S – 10 HP TEFC with VFD
- T – 15 HP TEFC with VFD
- U – 1 HP (x2) TEFC with VFD
- V – 1 1/2 HP (x2) TEFC with VFD
- W – 2 HP (x2) TEFC with VFD
- X – 3 HP (x2) TEFC with VFD
- Y – 5 HP (x2) TEFC with VFD
- Z – 7 1/2 HP (x2) TEFC with VFD
- 1 – 10 HP (x2) TEFC with VFD
- 2 – 15 HP (x2) TEFC with VFD[d]
- 3 – Dual ECM[e]

Supply Fan

- 4 – 450 mm (High), BI
- 5 – 500 mm (Low), BI
- 6 – 500 mm (High) 460V only, BI
- 7 – 560 mm 208,230V only, BI
- A – 22 in., BI
- B – 25 in., BI
- C – 14 in. (x2), BI
- D – 16 in. (x2), BI
- E – 18 in. (x2), BI
- F – 20 in. (x2), BI
- G – 22 in., AF
- H – 25 in., AF
- J – 14 in. (x2), AF
- K – 16 in. (x2), AF
- L – 18 in. (x2), AF
- M – 20 in. (x2), AF

Control Options and Filters

Code	Control Option	Filter Thickness	MERV
–	None	2 in.	MERV 8
A	None	4 in.	MERV 8
B	None	4 in.	MERV 11
C	None	4 in.	MERV 13
D	Smoke detector	2 in.	MERV 8
E	Smoke detector	4 in.	MERV 8
F	Smoke detector	4 in.	MERV 11
G	Smoke detector	4 in.	MERV 13

Voltage Options, Compressor and Condenser Fans

Code	Voltage	Compressor	Cond Eff (AC/ASHP)/Cond Coil (WSHP)
A	208-3-60	VCC Lead Circuit	Standard Efficiency / Copper
C	208-3-60	VCC Lead Circuit	High Efficiency / CuNi
E	230-3-60	VCC Lead Circuit	Standard Efficiency / Copper
G	230-3-60	VCC Lead Circuit	High Efficiency / CuNi
J	460-3-60	VCC Lead Circuit	Standard Efficiency / Copper
M	460-3-60	VCC Lead Circuit	High Efficiency / CuNi
P	575-3-60	VCC Lead Circuit	Standard Efficiency / Copper
R	575-3-60	VCC Lead Circuit	High Efficiency / CuNi
T	460-3-60	VCC Lead Circuit	Standard Efficiency / BPHE[h]

Design Series

K – Revision K Controls

NOTE(S):

- a. See latest version of Carrier's Dedicated Outdoor Air Systems Builder program for any size and option restrictions.
- b. Unit sizes from 80 to 140 Tons are not available on ASHP.
- c. Unit sizes from 80 to 140 Tons are only available in 460-v.
- d. Only available with Airfoil fans.
- e. ECM supply and exhaust fan motors are not available in 575-v. See physical data tables for ECM motor availability per cabinet size.
- f. Does not apply to WSHP.
- g. Standard Temperature rise is 80/100°F for horizontal/vertical supply. High Temperature rise is 130/160°F for horizontal/vertical supply and requires an XL cabinet.
- h. Available on WSHP unit sizes from 80 to 140 Tons.

LEGEND

- **AF** — Airfoil
- **ASHP** — Air Source Heat Pump
- **BI** — Backward Inclined
- **BPHE** — Brazed Plate Heat Exchangers
- **ECM** — Electronically Commutated Motor
- **HGRH** — Hot Gas Reheat
- **N/A** — Not Applicable
- **ODP** — Open Drip Proof
- **TEFC** — Totally Enclosed Fan Cooled
- **VCC** — Variable Capacity Compressor
- **VFD** — Variable Frequency Drive

Model number nomenclature (cont)

FIOP Table

OPTION	DESCRIPTION
1	Air flow monitor control (supply only or supply and exhaust)
2	Spring type vibration isolation on Supply fan and Exhaust Fan (if exhaust fan selected)
3	Non-fused disconnect
4	Pressure control (supply duct pressure, exhaust space pressure)
5	115V GFI Convenience outlet w/15A breaker - Unit-Powered Type
6	10:1 turndown modulating gas heat or SCR controlled electric heat
7	20:1 turndown modulating gas heat
8	ERV VFD Defrost
9	Harsh environment coating- cabinet, evap coil, cond coil (air cooled and ASHP units), reheat coil, sub-cooling coil (if installed), Hot Water Coil (if installed).

Limitations

OPTION	DESCRIPTION
1	Not available with duct pressure control.
2	Spring vibration isolation not available on ECM.
3	Not applicable.
4	Not available with airflow monitor.
5	Not applicable.
6	Not applicable.
7	20:1 available on High (XL) heat only.
8	Not applicable.
9	Not available with ODP motors or ECM motors.

Digits 17 and 18

17 and 18	FIOPs	17 and 18	FIOPs	17 and 18	FIOPs	17 and 18	FIOPs	17 and 18	FIOPs
AA	1	BV	1,5,7	DN	1,7,8	FH	5,9	HP	2,3,5,9
AB	1,2	BW	1,7	DO	2,3,4,5,7,8	FI	6,8,9	HQ	1,2,3,5,9
AC	2	BX	2,3,4,5,7	DP	2,4,5,7,8	FJ	6,9	HR	4,5,9
AD	1,2,3	BY	2,4,5,7	DQ	2,5,7,8	FK	8,9	HT	2,4,5,9
AE	2,3	BZ	2,5,7	DR	2,7,8	FL	9	HV	3,4,5,9
AF	1,3	CC	2,7	DS	3,4,5,7,8	FP	1,5,7,8,9	HX	2,3,4,5,9
AG	3	CD	3,4,5,7	DT	3,5,7,8	FQ	1,7,8,9	HZ	1,2,8
AH	1,3,5	CE	3,5,7	DU	3,7,8	FS	2,3,4,5,7,8,9	II	1,3,8
AJ	2,3,4	CF	3,7	DV	4,5,7,8	FT	2,4,5,7,8,9	IJ	2,3,8
AL	2,4	CG	4,5,7	DX	4,7,8	FU	2,5,7,8,9	IK	1,2,3,8
AM	3,4	CH	4,7	DY	5,7,8	FV	2,7,8,9	IM	2,4,8
AN	4	CI	5,7	DZ	7,8	FX	3,4,5,7,8,9	IO	3,4,8
AS	1,5	CJ	7	EH	1,5,6,8,9	FY	3,5,7,8,9	IQ	2,3,4,8
AT	2,3,4,5	CN	1,5,6,8	EI	1,6,8,9	FZ	3,7,8,9	IS	1,5,8
AU	2,3,5	CO	1,6,8	EJ	1,8,9	GH	4,5,7,8,9	IT	2,5,8
AV	2,4,5	CP	1,8	EK	1,9	GI	4,7,8,9	IU	1,2,5,8
AW	2,5	CQ	2,3,4,5,6,8	EL	2,3,4,5,6,8,9	GK	5,7,8,9	IV	3,5,8
AX	3,4,5	CR	2,4,5,6,8	EM	2,4,5,6,8,9	GM	7,8,9	IW	1,3,5,8
AZ	3,5	CS	2,5,6,8	EN	2,5,6,8,9	GN	7,9	IX	2,3,5,8
BB	4,5	CT	2,6,8	EO	2,6,8,9	GP	1,2,5	IY	1,2,3,5,8
BC	5	CU	2,8	EP	2,8,9	GQ	1,2,3,5	IZ	4,5,8
BG	1,5,6	CV	3,4,5,6,8	EQ	2,9	GS	1,2,9	JK	2,4,5,8
BH	1,6	CW	3,5,6,8	ER	3,4,5,6,8,9	GT	1,3,9	JM	3,4,5,8
BI	2,3,4,5,6	CX	3,6,8	ES	3,5,6,8,9	GU	2,3,9	JO	2,3,4,5,8
BJ	2,4,5,6	CY	3,8	ET	3,6,8,9	GV	1,2,3,9	JQ	1,2,8,9
BK	2,5,6	CZ	4,5,6,8	EU	3,8,9	GX	2,4,9	JR	1,3,8,9
BL	2,6	DD	4,6,8	EV	3,9	GZ	3,4,9	JS	2,3,8,9
BM	3,4,5,6	DE	4,8	EW	4,5,6,8,9	HI	2,3,4,9	JT	1,2,3,8,9
BN	3,5,6	DF	5,6,8	EX	4,6,8,9	HK	1,5,9	JV	2,4,8,9
BO	3,6	DG	5,8	EY	4,8,9	HL	2,5,9	JX	3,4,8,9
BP	4,5,6	DH	6,8	EZ	4,9	HM	1,2,5,9	JZ	2,3,4,8,9
BQ	4,6	DI	8	FF	5,6,8,9	HN	3,5,9	KL	1,5,8,9
BR	6	DM	1,5,7,8	FG	5,8,9	HO	1,3,5,9	KM	2,5,8,9

Model number nomenclature (cont)

Digits 17 and 18 (cont)

17 and 18	FIOPs	17 and 18	FIOPs	17 and 18	FIOPs	17 and 18	FIOPs
KN	1,2,5,8,9	NZ	1,5,6,9	SX	1,3,7	YS	1,2,7,8
KO	3,5,8,9	OO	2,5,6,9	SY	2,3,7	YT	1,3,7,8
KP	1,3,5,8,9	OP	1,2,5,6,9	SZ	1,2,3,7	YU	2,3,7,8
KQ	2,3,5,8,9	OQ	3,5,6,9	TU	2,4,7	YV	1,2,3,7,8
KR	1,2,3,5,8,9	OR	1,3,5,6,9	TW	3,4,7	YX	2,4,7,8
KS	4,5,8,9	OS	2,3,5,6,9	TY	2,3,4,7	YZ	3,4,7,8
KU	2,4,5,8,9	OT	1,2,3,5,6,9	UU	1,2,5,7	ZB	2,3,4,7,8
KW	3,4,5,8,9	OU	4,5,6,9	UV	1,3,5,7	ZD	1,2,5,7,8
KY	2,3,4,5,8,9	OW	2,4,5,6,9	UW	2,3,5,7	ZE	1,3,5,7,8
LL	1,2,6	OY	3,4,5,6,9	UX	1,2,3,5,7	ZF	2,3,5,7,8
LM	1,3,6	PP	2,3,4,5,6,9	UZ	1,7,9	ZG	1,2,3,5,7,8
LN	2,3,6	PR	1,2,6,8	VV	2,7,9	ZI	1,2,7,8,9
LO	1,2,3,6	PS	1,3,6,8	VW	1,2,7,9	ZJ	1,3,7,8,9
LQ	2,4,6	PT	2,3,6,8	VX	3,7,9	ZK	2,3,7,8,9
LS	3,4,6	PU	1,2,3,6,8	VY	1,3,7,9	ZL	1,2,3,7,8,9
LU	2,3,4,6	PW	2,4,6,8	VZ	2,3,7,9	ZO	2,4,7,8,9
LW	5,6	PY	3,4,6,8	WW	1,2,3,7,9	ZQ	3,4,7,8,9
LX	1,2,5,6	QQ	2,3,4,6,8	WX	4,7,9	ZS	2,3,4,7,8,9
LY	1,3,5,6	QS	1,2,5,6,8	WZ	2,4,7,9	ZU	1,2,5,7,8,9
LZ	2,3,5,6	QT	1,3,5,6,8	XY	3,4,7,9	ZV	1,3,5,7,8,9
MM	1,2,3,5,6	QU	2,3,5,6,8	YA	2,3,4,7,9	ZW	2,3,5,7,8,9
MW	1,6,9	QV	1,2,3,5,6,8	YC	5,7,9	ZX	1,2,3,5,7,8,9
MX	2,6,9	QX	1,2,6,8,9	YD	1,5,7,9	ZZ	—
MY	1,2,6,9	QY	1,3,6,8,9	YE	2,5,7,9		
MZ	3,6,9	QZ	2,3,6,8,9	YF	1,2,5,7,9		
NN	1,3,6,9	RR	1,2,3,6,8,9	YG	3,5,7,9		
NO	2,3,6,9	RV	3,4,6,8,9	YH	1,3,5,7,9		
NP	1,2,3,6,9	RX	2,3,4,6,8,9	YI	2,3,5,7,9		
NQ	4,6,9	RZ	1,2,5,6,8,9	YJ	1,2,3,5,7,9		
NS	2,4,6,9	SS	1,3,5,6,8,9	YK	4,5,7,9		
NU	3,4,6,9	ST	2,3,5,6,8,9	YM	2,4,5,7,9		
NW	2,3,4,6,9	SU	1,2,3,5,6,8,9	YO	3,4,5,7,9		
NY	5,6,9	SW	1,2,7	YQ	2,3,4,5,7,9		

Overview

Dedicated Outdoor Air Systems (DOAS) are a special type of heating, ventilation, and air conditioning (HVAC) unit that conditions and supplies 100% outdoor air to provide ventilation to one or more zones in a building. The ventilation air can be distributed directly to the zone or to an ancillary cooling and heating device.

The Carrier 62L unit is a direct expansion (DX) Air Cooled, ASHP or WSHP DOAS unit with optional auxiliary heating and optional energy recovery. The 62L unit is designed and built for optimal performance in ventilation applications. While the 62L unit may look like a typical packaged HVAC unit, the application, operation and selection is vastly different. The guide below is intended to provide assistance with applying, sizing, and selecting direct expansion (DX) based Air Cooled, ASHP or WSHP DOAS units.

Application overview

Maintaining high indoor air quality or IAQ is important to a building's performance. Poor IAQ can have a negative impact on building occupants, which can in turn have a negative impact on the building user or building owner. A critical component to maintaining high IAQ is ventilation, or the process of replacing low quality or contaminated air with higher quality air.

Building materials and building activity will contaminate the indoor air with odors, debris, chemicals, or bacteria. Occupant activity in the building will also deplete oxygen levels. By replacing contaminated indoor air with air that has a higher concentration of oxygen and lower contamination levels, building occupants can live, work, and play more comfortably.

A common source of high quality air is outdoor air, which typically only requires minor filtration to improve its quality above typical indoor air levels. The problem with outdoor air is, it can have qualities that negatively impact occupant comfort, such as high humidity, extreme cold or extreme heat. To combat these negative qualities, the outdoor air is conditioned through cooling, heating, or dehumidification. The processes of conditioning outdoor air can consume a lot of energy. A balance must be met to minimize energy consumption while maintaining high indoor air quality.

In traditional heating, ventilation, and air conditioning (HVAC) systems, a single HVAC unit will provide zone air conditioning and zone ventilation. For systems with a single zone, the ventilation air is mixed with return air from the zone, heated, cooled or dehumidified by the HVAC unit, and supplied to the zone. Since the HVAC unit is only providing ventilation air to one zone, it is easy to maintain the proper amount of zone ventilation, helping to minimize energy consumption while maintaining high IAQ.

However, most HVAC units are not designed to handle high quantities or the high extreme conditions of outdoor air. During winter months, the outdoor air can be very cold and requires a high amount of heat. During summer months when the outdoor air is humid, a lot of energy is required to cool and dehumidify. During some periods of the year, the outdoor air may not require much conditioning at all.

Oversizing a traditional HVAC unit to handle the high heating and dehumidification loads of outdoor air can result in poor control of zone air temperature and humidity, leading to poor occupant comfort. By separating the conditioning of ventilation air and zone air to different systems, each system can be optimally sized for the appropriate load condition to ensure proper system comfort.

For systems with multiple zones, using a single HVAC unit to provide both zone air conditioning and zone ventilation and conditioning can be more complex. In a multi-zone system, the ventilation air is mixed with return air from the zones, conditioned by the HVAC unit, and supplied to the zones. Unless each zone is identical, the zones will all have a different ventilation airflow requirement and a different zone conditioning airflow requirement. Since the ventilation air is now a part of the HVAC unit supply airflow and zone conditioning airflow, it is very difficult to ensure each zone is getting enough ventilation air to ensure high IAQ and meet required ventilation rates.

One method of ensuring proper ventilation in a multi-zone system is to calculate the percentage of ventilation air to conditioning air for each zone. After identifying which zone in the system has the highest ventilation air percentage, the HVAC unit must deliver that percentage of ventilation air to the entire system. This results in over ventilation of most zones, which wastes energy. Again, the solution is to separate the ventilation and zone conditioning into separate systems.

To provide zone ventilation air, the DOAS unit will intake 100% outdoor air, and filter it to improve the air quality. The filtered outdoor air will typically have to be conditioned, through cooling, dehumidification, or heating. The now conditioned ventilation air is sent from the DOAS unit to a duct distribution system. The duct distribution system can lead directly to the zones or it can be directed to an ancillary cooling and heating device for further conditioning and distribution to the zone.

Having a dedicated system for ventilation ensures that the exact amount of prescribed ventilation air is delivered to each zone. This helps to maintain high IAQ while minimizing energy consumption. Separating the conditioning of ventilation air and the conditioning of the zone air also simplifies sizing and selection of each unit, helping to ensure proper zone comfort. The DOAS unit is sized to handle the outdoor air loads, leaving the ancillary heating and cooling unit to handle the space load. This separation of loads can also help reduce overall system capacity, which saves on first costs and energy costs.

Using a DOAS can also allow for the zone latent and sensible loads to be separated, or decoupled. In a traditional system, the zone HVAC unit maintains both zone temperature and zone humidity. To maintain zone temperature, the zone HVAC unit must deliver air that is cold enough to offset the zone sensible load generation (heat). To maintain zone humidity levels, the HVAC unit must deliver air that has a low enough dew point temperature to offset the space humidity generation. Because zone loads fluctuate, it can be very difficult for the HVAC unit to maintain both conditions. It also becomes very difficult to control the HVAC unit. In typical systems, the HVAC unit will be controlled to the zone air temperature (sensible load). After the zone air temperature is achieved, the HVAC unit will disable its cooling system. When the cooling system is disabled, the HVAC unit is also stopping its ability to dehumidify.

By sizing the DOAS unit to deliver dry ventilation air to the zone, the DOAS unit will counter the latent load in the zone. This leaves the space sensible load to be handled by the now ancillary cooling and heating unit. By decoupling the system latent and sensible loads, the system sizing can be further minimized, while simplifying system control and operation.

Along with zone ventilation and dehumidification, DOAS units may also be tasked with maintaining zone or building pressure. Since DOAS units supply 100% outdoor air to the zones, the building pressure will start to rise. To prevent over pressurizing the building, an equivalent amount of air must be removed or exhausted from the building. To accomplish this, the DOAS unit can be equipped with a dedicated exhaust fan, allowing both the ventilation air stream and exhaust air stream to pass through the DOAS unit.

Since the exhaust air stream contains air that has previously been conditioned, it will have more neutral energy content than the outdoor air the DOAS unit is attempting to condition. By using an energy recovery device between the ventilation and exhaust air streams, it becomes possible to recover some of the energy that the DOAS unit has already expended to precondition the outdoor air. Using energy recovery can save on DOAS unit energy costs, since it is no longer required to work as hard to condition the outdoor air. Energy recovery also reduces the required capacity of the DOAS unit, saving on initial costs.

As shown above, DOAS units are used differently from traditional HVAC units. While traditional HVAC units are focused on maintaining zone temperature, DOAS units are tasked with providing zone ventilation and dehumidification. The DOAS unit will operate to prioritize zone ventilation and dehumidification over zone conditioning.

Operation overview

To maintain zone indoor air quality, the DOAS unit must deliver ventilation air whenever the zone is occupied and in need of ventilation. To accomplish this, the DOAS unit is typically controlled based on an occupancy schedule or occupancy input from a building automation system (BAS). When the zone is planned to be empty or unoccupied, the DOAS unit is typically shut off. When the zone is occupied, the DOAS unit is enabled and will introduce ventilation air to the space.

In Occupied mode, a DOAS unit will enable the intake of outdoor air (typically through an outdoor air damper). The DOAS unit supply fan will also be enabled to draw in the outdoor air and discharge it to the zones through a common duct distribution system. If the DOAS unit contains an exhaust fan, that will also be enabled to control building pressure while the DOAS unit is supplying outdoor air to the zones.

Before the outdoor air is supplied to the zones, it likely will need to be cooled, dehumidified, or heated. Otherwise, the ancillary heating and cooling unit would be required to handle the loads of both the outdoor air and zone, eliminating one of the benefits of DOAS. The DOAS units can not rely on a standard thermostat to determine how to condition the outdoor air. Instead, most DOAS units will have a digital controller, controlling multiple aspects of the DOAS units. To enable cooling, dehumidification, or heating, the digital controller will typically reference an outdoor air condition, such as temperature, humidity, or enthalpy. To control the output of the heating, cooling, or dehumidification systems, the microprocessor will typically reference a supply air condition, such as dry bulb temperature or humidity.

Most DX based DOAS units will operate to maintain a supply air dry bulb temperature, allowing the DOAS unit to control how the ventilation air will impact space sensible loads.

During heating operation, most DOAS units are set to maintain a zone neutral supply air dry bulb temperature, typically between 65°F and 75°F. This is accomplished by cycling or modulating the output of the DOAS heat source to maintain the supply air temperature set point. During cold weather, most buildings will have a mix of zones requiring cooling and zones requiring heating. By discharging a zone neutral supply air temperature, the DOAS unit will not add to or take away from the zone sensible cooling load. This helps prevent overheating of the zones and prevents the DOAS unit fighting with the ancillary cooling and heating units, which wastes energy.

The neutral DOAS heating supply air temperature also helps improve the effectiveness of the zone ventilation. If warm or hot ventilation air were provided to the zone through an overhead distribution system, the ventilation air would likely not mix with the zone air. Instead, the warm ventilation air would stay near the ceiling of the zone. To ensure the warm ventilation air is properly mixed throughout the zone, the amount of ventilation air provided to the zone would need to be increased or the distribution or return of zone air would have to be moved closer to the zone floor area. Using a neutral DOAS supply air temperature improves ventilation air mixing, ensuring proper ventilation effectiveness.

During cooling and dehumidification operation, determining the DOAS supply air dry bulb temperature can be more complex. In order to dehumidify the outdoor air, it must be cooled beyond saturation to a low dew point temperature. The corresponding dry bulb temperature may be too cold to discharge directly to the space. To prevent overcooling the space or creating drafts, a reheat system is used to raise the dry bulb temperature of the cooled and dehumidified air. The reheat system will then operate to maintain the supply air dry bulb temperature.

In most DOAS applications, the reheat will operate to maintain a zone neutral supply air dry bulb temperature, typically 65°F to 75°F. This prevents overcooling or overheating the zones and prevents the DOAS unit from fighting with the ancillary cooling and heating units. While this method is the best for ensuring proper system operation, it may not be the most energy efficient choice.

In some buildings, there is a constant requirement for cooling in the zones. In this type of application, allowing the DOAS unit to discharge a cool supply air dry bulb temperature, typically 55°F to 60°F, may be beneficial. The cool ventilation air will reduce the space sensible load, allowing the ancillary cooling units to operate less frequently or to possibly be downsized. This can result in lower overall energy consumption for the HVAC system. Even though the discharge air is cool, a reheat system is still typically required to prevent cold air from being discharged to the space, which can cause drafts. The downside to a cool air discharge is that it can cause overcooling of zones with low loads, causing the ancillary units to enter Heating mode, which could end up consuming more overall energy than the neutral air discharge. Cool air discharge also can result in a higher DOAS supply air relative humidity, which if not properly monitored, could lead to issues with microbial

Rather than a constant cool supply air dry bulb temperature, some DOAS units will employ a variable supply air temperature, often known as space temperature reset. When the zone loads are neutral or mixed between cooling and heating, the DOAS will supply a zone neutral dry bulb temperature. When the zone loads are higher or are all cooling, the DOAS can then switch to a cool supply air dry bulb temperature. This method of switching or resetting the DOAS supply air dry bulb temperature can be accomplished by referencing some condition that is indicative of space load, such as average zone temperature, average zone return air temperature, Average Auxiliary Unit mode, or possibly outdoor air temperature. This method can help reduce the risks associated with a constant cool DOAS supply air temperature.

In some climates, there may be periods where the outdoor air is dry and cool, but not cold. In this instance, the DOAS unit would typically be allowed to supply the outdoor air without any conditioning. This is what is commonly known as a Fan Only mode, and is similar to a Free Cooling mode or Airside Economizer mode of a traditional HVAC unit.

Below are simplified examples of typical operating sequences for DX-based DOAS units.

Occupied mode

When the zones are occupied with people, the DOAS unit will enter Occupied mode. The outdoor air damper is opened, the supply fan is enabled, and the exhaust fan (if equipped) or energy recovery device (if equipped) are enabled. The above devices will remain in operation as long as the unit is in Occupied mode.

Cooling Mode

If the outdoor air is hot but the dew point is low, the DOAS unit will enter cooling mode. The DOAS cooling system will be enabled to cool the hot air to a neutral dry bulb temperature set point, typically 65°F to 75°F.

Dehumidification Mode

If the outdoor air is humid, the DOAS unit will enter dehumidification mode. The cooling system will be enabled to dehumidify the ventilation air based on a dew point or supply air relative humidity set point. The DOAS unit reheat system will then be used to reheat the dehumidified ventilation air to a neutral supply air dry bulb temperature (65°F to 75°F).

Cooling/Dehumidification mode

When the outdoor air is hot or humid, the DOAS unit will enter Cooling mode or Dehumidification mode. The DOAS unit cooling system is enabled and will operate to maintain an evaporator leaving air temperature or refrigeration system suction line temperature, to approximate the supply air dew point temperature. The reheat system will then be controlled to maintain the supply air temperature set point, typically 65°F to 75°F.

Fan Only mode

When the outdoor air is not humid, cold, or hot, the unit will disable the sources of cooling, dehumidification, and heating, and supply unconditioned, filtered, outdoor air.

Unoccupied mode

When the zones are not occupied with people, the DOAS unit will enter Unoccupied mode. The heating and cooling sources, energy recovery device (if equipped), exhaust fan (if equipped) and supply fan are disabled. The outdoor air damper will also close. The DOAS unit will typically remain off until the space is occupied again. An exception may be made for systems that require the DOAS to operate in Unoccupied Fan Only mode for space heating or cooling.

As shown by the operating examples above, DOAS units operate to ensure proper conditioning on the ventilation air. This ensures the ventilation air does not have a negative impact of the zone or the ancillary cooling and heating units in the space. While the operation is important to ensuring proper DOAS conditioning, the most important factor in ensuring proper operation is the DOAS sizing.

DOAS sizing

Sizing a DOAS unit is vastly different than selecting a packaged rooftop or WSHP system. Different considerations need to be given to unit airflow, unit capacity, and unit design conditions. The conditioning of 100% outdoor air varies greatly based on geographic location and local climate. Below are guidelines for sizing a typical DOAS unit.

DOAS supply airflow

Since DOAS units condition and supply 100% outdoor air for space ventilation, the unit airflow is typically sized based on the total ventilation airflow requirement for each of the zones. The DOAS supply airflow may also be slightly up-sized to make-up for zone direct exhaust, help maintain, building pressure, or offset the space latent load.

A typical calculation for the DOAS supply airflow is as follows:

$$V_{OT} = \sum_{\text{all zones}} V_{OZ}$$

WHERE:

V_{OT} = System Outdoor Air Intake/System Required Ventilation Airflow/DOAS Supply Airflow (cfm)

V_{OZ} = Zone Ventilation Airflow (cfm)

The zone ventilation requirement is typically set by local code or guidelines such as LEED or ASHRAE 62.1. The zone ventilation rate will typically be based on zone occupancy, zone activity, and zone area.

The most commonly referenced guide for sizing zone ventilation is ASHRAE 62.1-2013, which prescribes minimum zone ventilation rates based on zone occupancy, floor area, and zone type or activity type. ASHRAE 62.1 also provides correction factors for ventilation air distribution effectiveness, based on ventilation air distribution location and dry bulb temperature. Following is an example calculation of zone minimum ventilation air flow using ASHRAE 62.1-2013.

Zone ventilation calculation example:

Elementary classroom (5-8 years of age)

25 zone occupants

20 ft x 50 ft floor area

Overhead distribution system

Zone neutral supply air dry bulb temperature (<15°F above space temperature)

(Reference Equation: 6.2.2.1; Reference Table: 6.2.2.1)

$V_{BZ} = (R_P * P_Z) + (R_A * A_Z)$

V_{BZ} = (10 cfm/Person * 25 People) + (1000ft^2 *.12 cfm/ft^2)

V_{BZ} = (10 * 25) + (1000 *.12) = 370 cfm

WHERE:

V_{BZ} = Zone Breathing Zone Airflow (cfm)
R_A = Floor Area Ventilation Rate (cfm per square foot of zone floor area from Table 6.2.2.1)
R_P = Occupancy Ventilation Rate Airflow (cfm per person from Table 6.2.2.1)
A_Z = Zone Floor Area (Square foot)
P_Z = Zone Occupancy (no. of people)

(Reference Equation: 6.2.2.3; Reference Table: 6.2.2.3)

$$V_{OZ} = V_{BZ}/E_Z$$

$$V_{OZ} = 370 \text{ cfm}/1 = 370 \text{ cfm}$$

WHERE:

V_{BZ} = Zone Breathing Zone Airflow (cfm)
V_{OZ} = Zone Ventilation Airflow (cfm)
E_Z = Ventilation System Efficiency (Table 6.2.2.1)

In the example above, the classroom would require a minimum of 370 cfm of ventilation air during Occupied mode.

DOAS Exhaust Airflow (Optional)

Because DOAS units introduce 100% outdoor air to the zone, an equivalent amount of air must be removed or exhausted from the space, to prevent from over pressurizing the building. The amount of exhaust air through the DOAS unit is typically equivalent to the following:

$$V_{EA} = \sum_{\text{all zones}} (V_{ZA} - V_{DE}) - V_{PO}$$

WHERE:

V_{EA} = DOAS Exhaust Airflow (cfm)
V_{ZA} = Zone Supply Airflow (cfm)
V_{DE} = Zone Direct Exhaust Airflow (cfm)
V_{PO} = Building Pressure Offset (cfm)

DOAS cooling/dehumidification capacity

Selecting the DOAS dehumidification capacity is a critical process for ensuring proper system operation. Selecting the DOAS capacity is a two-step process that involves selecting the design DOAS supply air dew point temperature and design outdoor conditions.

The DOAS supply air dew point temperature will determine how the DOAS unit will impact the space latent load. Selecting the dew point temperature too high will result in the DOAS unit adding to the space latent load, which can have a negative impact on space comfort. Selecting the dew point temperature too low can result in an unnecessary oversizing of equipment and wasted energy consumptions. The DOAS supply air dew point requirement is typically driven by the system design and the latent capability of the ancillary cooling and heating equipment.

For systems without latent capability (such as chilled beam systems) or for systems sized where the DOAS unit is sized to offset the space latent load, the DOAS supply air dew point temperature must be calculated for each zone to offset the space latent load generation. The calculation is as follows:

$$W_{OZ} = W_{ZD} - \frac{Q_Z}{.68^{*}\,V_{OZ}}$$

WHERE:

W_{OZ} = DOAS Supply Air Grains of Moisture per lb
W_{ZD} = Zone Desired Air Grains of Moisture per lb
Q_Z = Zone Latent Load Generation (Btu/hr)
V_{OZ} = Zone Ventilation Airflow (cfm)

In order for the DOAS unit to maintain the zone dew point temperature or zone absolute humidity (W_{ZD}), the DOAS supply air dew point temperature or absolute humidity (W_{OZ}) and supply airflow (V_{OZ}) must overcome the zone latent load generation (Q_Z). If the DOAS unit is serving multiple zones, the required dew point temperature for each zone needs to be calculated. The DOAS unit must deliver a dew point temperature to the entire system that matches the zone requiring the lowest dew point temperature. Alternatively, if one zone requires a much lower dew point than all other zones, the ventilation airflow to the worst case zone could be increased. Below is an example of the DOAS supply air dew point calculation.

DOAS supply air dew point calculation example:

Elementary classroom (5-8 years of age)
25 zone occupants
Zone latent load: 198 Btu/hr per person
370 cfm zone ventilation airflow
Zone humidity level: 64 gr/lb (55°F dew point temperature)

$$W_{OZ} = W_{ZD} - \frac{Q_Z}{.68^{*}\,V_{OZ}}$$

$$W_{OZ} = 64 \text{ gr/lb} - \frac{(198 \text{ Btu/hr} * 25 \text{ People})}{(.68 * 370 \text{ cfm})}$$

$$W_{OZ} = 64 - \frac{(198 * 25)}{(.68 * 370)} = 44.32\text{gr/lb}$$

The DOAS supply air would have to contain 44.32 grains of moisture per pound of dry air, which is approximately a 45°F dew point temperature. If the zone ventilation rate were increased by 20% to 444 cfm, the resulting required supply air dew point temperature would be approximately 47°F.

For systems where the ancillary cooling unit has latent capability (such as a variable refrigerant flow system or water source heat pump system) and the ancillary device is sized for the zone latent load, the DOAS may not be required to offset the zone latent load. In this instance, the DOAS supply air dew point temperature should match the zone dew point temperature set point, typically between 54°F and 56°F. A higher DOAS supply air dew point would result in the DOAS unit adding to the zone latent load, requiring an increase in the sizing of the ancillary unit.

Once the DOAS supply air dew point has been decided, the DOAS refrigeration system capacity must be sized to be able to produce the required dew point temperature at design conditions and the required unit airflow. While most traditional HVAC systems are selected at peak outdoor air sensible load or a design cooling day, DOAS unit capacity is typically driven by peak outdoor air latent load or an evaporation day for the project location. The latent load of the outdoor air requires more energy to remove than the sensible load of the outdoor air. Most DOAS units will typically require 1 ton of refrigeration system capacity per every 150 cfm (without energy recovery) to 250 cfm (with energy recovery) of supply air flow.

If the DOAS unit is to be equipped with an energy recovery device, such as a rotary energy recovery wheel or fixed plate heat exchanger, then the DOAS refrigeration system capacity will be sized based on the energy recovery device leaving air conditions.

DOAS reheat capacity

Most DOAS units are equipped with some form of reheat device; whether it is a DX-based reheat system or a form of energy recovery device. The purpose of the reheat is to raise the temperature of the cooled and dehumidified ventilation air to a higher dry bulb temperature. The reheat systems should be sized to provide an adequate temperature rise to meet the design DOAS supply air dry bulb temperature at the given reheat entering air conditions and airflow. Consideration must also be given to reheat performance at part load conditions.

DOAS heating capacity

The DOAS heating system capacity is driven by the supply airflow, the required supply air dry bulb temperature, and the design heating day for the project location. The heat system should be sized to provide an appropriate temperature rise in the outdoor air to maintain a zone neutral supply air temperature.

If the DOAS unit is equipped with an energy recovery device, the DOAS heat source will typically be sized based on the energy recovery device leaving air temperature. However, special consideration must be given if the project is located in cold climates and the DOAS unit is equipped with an energy recovery device, such as a rotary energy recovery wheel. Some energy recovery systems risk frosting at low ambient conditions, which can cause damage to the energy recovery device. To combat this, most energy recovery systems are equipped with a defrost system, such as a preheater or speed drive. Some defrost systems will reduce the heat transfer capability of the energy recovery device, to prevent frosting. In this instance, the heater should be sized as if the energy recovery device did not exist.

Properly sizing a DOAS will ensure performance at design conditions for a given application. Consideration must also be given to how the DOAS is configured, to help optimize DOAS part load performance, energy consumption, and application specifics.

Ventilation air distribution

The type of ventilation air distribution system has an effect on both the configuration of the DOAS unit, as well as the operation of the ancillary cooling and heating units. The two main types of distribution are series and parallel ventilation air distribution.

In a series ventilation air distribution system, the ventilation air from the DOAS unit is sent through a duct distribution system to the return of an ancillary device. The ventilation air is then mixed with zone return air and reconditioned by the ancillary unit. The ancillary unit will then distribute the ventilation air to the zone.

When selecting a DOAS unit for a series distribution system, the reheat system is not as critical. In this instance, a lower amount of reheat can be used. Since the ventilation air is mixed with return air from the space, adding additional reheat would just add to the sensible load of the ancillary unit. The reheat operation also does not have to be very precise, since the ventilation air is being mixed with return air from the space and being reconditioned by the ancillary unit.

However, since the ancillary unit is supplying the ventilation air to the zone, the ancillary unit fan must operate whenever the zone is occupied, which is a waste of energy consumption. A series ventilation distribution system is a better fit for applications with low occupant density or low occupancy hours.

In a parallel ventilation air distribution system, the ventilation air from the DOAS unit is sent through a duct distribution system to the zone. The ventilation air can either be sent directly to the zone or it can be mixed with supply air from the ancillary unit and then sent to the zone.

When selecting a DOAS unit for a parallel distribution system, the reheat system performance is critical. Since the DOAS unit is supplying air directly to the zone, having an accurate supply air temperature is important. It is also important to be able to maintain a neutral supply air temperature, if the application requires it. Having ventilation air that is too cold or too warm could cause drafts or comfort issues in the space.

In a parallel system, since the ancillary unit is not maintaining zone ventilation, the ancillary unit fan can be operated intermittently, saving energy. However, greater attention must be paid in a parallel system to the distribution or mixing in the zone of the ventilation air. A parallel ventilation air distribution system is a better fit for zones with high occupant densities or high occupancy operating hours.

Quick selection guide

A DOAS unit should always be used in conjunction with ancillary HVAC equipment, serving the same space. The DOAS unit will provide the conditioned ventilation air, but will not maintain space temperature nor space relative humidity set points. Instead, the ancillary HVAC equipment will maintain space temperature and space relative humidity set points. If no ancillary equipment exists, contact application engineering.

Note (or enter into DOAS Builder selection software) the DOAS unit supply airflow and external static pressure. This may be listed as *Supply Air CFM* or *Outdoor Air CFM* on the schedule.

If the DOAS unit will have an exhaust fan, note/enter the listed exhaust fan airflow and external static pressure. If no exhaust fan airflow exists on the DOAS equipment schedule, you can typically assume it will match the supply fan airflow and static pressure.

If the DOAS unit will have an energy recovery wheel, note/enter the specified exhaust air conditions. If no exhaust air conditions exist, assume a summer exhaust air-condition of 75°F/63°F dry bulb/wet bulb and a winter exhaust air condition of 70°F/50°F dry bulb/wet bulb.

Select the DOAS cooling capacity based on the listed evaporator leaving air condition (dry bulb/ wet bulb/ dew point) and the design evaporation conditions for the project location as follows:

1. Base the design of the dry bulb and wet bulb temperatures upon the design evaporation day (max latent load) for the project location. The DOAS unit must be sized based on the design evaporation day. If the conditions listed on the schedule are not the design evaporation conditions for your area, please consult with the project engineer or contractor. If no design dehumidification data is listed, refer to the ASHRAE website for the latest data.
2. Review the evaporator leaving air conditions, specifically the dew point temperature and maintain this value at or below 55°F to ensure proper latent removal of the DOAS unit.
3. For systems with ancillary equipment without latent capacity or ancillary units that are not sized to handle the space latent load, the DOAS supply air dew point must be calculated with space conditions in mind to ensure proper system operation. In these situations, the supply air dewpoint temperature of the DOAS unit must be low enough to offset or completely handle the space latent load.
4. If the DOAS unit has an energy recovery wheel, ensure DOAS cooling capacity is selected based on the wheel leaving air temperature and the ambient air temperature.

Select the DOAS reheat capacity based upon the listed cooling/dehumidification supply air temperature. If no cooling/dehumidification supply air temperature is specified, select enough reheat capacity to produce a supply air dry bulb temperature (when reheat is active) of 68°F to 75°F to ensure the supply air does not negatively affect space conditions (supply air neutral). Follow these additional precautions:

1. If the cooling/dehumidification supply air temperature is listed lower than recommended, but above the recommended supply air dew point temperature, as 55°F to 65°F, a reheat system is still recommended.
2. If the DOAS unit will be installed in a humid location and set for a neutral cooling/dehumidification supply air temperature (68°F to 75°F), then select liquid subcooling in addition to the hot gas reheat package. The liquid subcooling reheat will enhance unit dehumidification performance.

Select DOAS heating capacity based upon the listed heating supply air temperature and the design heating conditions for the project location. If no design heating data is listed, refer to the ASHRAE website for the latest information. If no heating leaving air temperature is specified, select enough heating capacity to produce 70°F to 85°F heating supply air during design conditions.

The DOAS Air or Water Source Heat Pump unit, may not be able to operate DX heat pump heating in cold climates. In this instance, an optional auxiliary gas, electric or hot water coil heater should be considered. The addition of an optional electric heater will impact the electrical parameters (MCA, MFS or MOCP) of the unit.

If the DOAS unit has an energy recovery wheel in conjunction to a heating element and the outdoor air temperature is likely to drop below 15°F, select enough heating capacity as if the energy recovery wheel does not exist. If the ambient temperature will not fall below 15°F, select enough heating capacity based on the winter energy recovery wheel leaving air temperature.

Selecting DOAS unit options

Most DOAS units are constant volume, so the supply fan operates at a fixed speed. The 62L units are equipped with a direct drive supply fan with either an ECM motor or an induction motor with VFD. The VFD is intended to be used for air balancing and soft starting purposes.

If variable air volume airflow from the DOAS unit is required, a duct static pressure transducer must be added and the unit control configured for duct static pressure operation.

Most (if not all) DOAS exhaust fans are used as variable air volume fans and must have variable frequency drive (VFD) control. The VFD will modulate the exhaust airflow to maintain space static pressure. If the exhaust fan is constant air volume, a VFD can still be used for easy system balancing, soft starting and easy adjustment to airflow. If constant air volume, the VFD will be set for fixed speed operation in the field.

- If the DOAS unit has an energy recovery wheel and the project is located in a mild climate, select a wheel with bypass. When the outdoor air temperature is within 3°F of the return air temperature, the wheel bypass will open, reducing the fan airside pressure drop and saving energy.
- If the DOAS unit has an energy recovery wheel with defrost and a heat source, the heat source should be selected as if the energy wheel does not exist. The energy recovery wheel will enter into a defrost cycle when the exhaust air leaving the wheel is saturated or supersaturated. The exhaust air is considered saturated or supersaturated when the calculated exhaust air wet bulb temperature leaving the wheel is equal to or higher than the dry bulb temperature.

If the DOAS unit will be discharging directly to the space (parallel application), modulating reheat control is recommended for precise supply air temperature control. On the 62L only Modulating HGRH is available.

A DOAS unit should have at least one variable capacity compressor on the lead circuit, due to the wide load range of outdoor air conditions. The variable capacity compressor should have the ability to turn-down to 58% of the nominal compressor capacity.

For DOAS units with high heat capacity, modulating heat control (modulating gas or SCR electric) is recommended. For units with high capacity gas heat, a high turndown (20:1) heater is recommended.

For applications requiring a 55°F or lower supply air dew point temperature, liquid subcooling reheat can be used to improve unit dehumidification performance. Liquid sub-cooling is always and only active when the unit is in dehumidification mode. Liquid sub-cooling is only recommended for applications that require neutral air delivery. Liquid sub-cooling should not be equipped for applications where supply air temperature reset is required.

Gas Heat Capacities

62L UNIT CABINET SIZE[a]	UNIT CAPACITY (tons)[a]	INPUT (Btuh)	OUTPUT (Btuh)	NO. OF GAS HEAT SECTIONS	NO. OF STAGES	MODULATION RANGE (%)[b]	MAXIMUM TEMP. RISE (°F) (HORIZONTAL/VERTICAL SUPPLY)[c]
E	40-80	300,000	243,000	1	2	10:1	80/100
	40-80	350,000	283,500	1	2	10:1	80/100
	40-80	400,000	324,000	1	2	10:1	80/100
	40-80	500,000	405,000	1	2	10:1	80/100
	40-80	600,000	486,000	1	2	10:1	80/100
E / XL	40-140	600,000	486,000	1	2	10:1	130/160
	40-140	800,000	648,000	2	4	10:1, 20:1	130/160
	40-140	1,000,000	810,000	2	4	10:1, 20:1	130/160
	40-140	1,200,000	972,000	2	4	10:1, 20:1	130/160
	40-140	1,400,000	1,134,000	4	8	20:1	130/160
	40-140	1,600,000	1,296,000	4	8	20:1	130/160

NOTE(S):

a. Unit cabinet and tonnage matches are dependent on presence of ERV and unit application type (Air Cooled Cooling Only, ASHP or WSHP).
b. Standard gas heaters are 2 stage heaters. XL gas heaters are 4 stage or 8 stage heaters, dependent on the heater size. 10:1 and 20:1 (certain heater sizes and cabinets) modulation turn down is optional.
c. Maximum temperature rise dependent on unit supply configuration.

Multiple Cabinet Options

TONS	62L CABINETS					
	Air Cooled Cooling Only		ASHP		WSHP	
	E	EXL	E	EXL	E	EXL
40	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only
45	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only
50	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only
55	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only	ERV Only
60	X	X	X	X	Not available with ERV	Not available with ERV
65	X	X	X	X	Not available with ERV	Not available with ERV
70	X	X	X	X	Not available with ERV	Not available with ERV
80	Not available with ERV	Not available with ERV			Not available with ERV	Not available with ERV
100		Not available with ERV				Not available with ERV
120		Not available with ERV				Not available with ERV
140		Not available with ERV				Not available with ERV

Energy Conservation Wheel Capacities[a]

62L CABINET SIZE	WHEEL NO.	WHEEL DIAMETER (in.)	WHEEL THICKNESS (mm)
E EXL	ERC-6488C	64	88
	ERC-6495C	64	95
	ERC-68100C	68	100
	ERC-68110C	68	110
	ERC-74122C	74	122
	ERC-74130C	74	130
	ERC-81146C	81	146
	ERC-81160C	81	160
	ERC-86125C	86	125
	ERC-86170C	86	170
	ERC-86190C	86	190

NOTE(S):

a. For ERV performance data (Maximum Airflow and Air Pressure Drop), refer to the latest version of Carrier's Dedicated Outdoor Air Systems Builder Software.

Electric Heat Capacities [a,b,c,d,e,f,g,h]

62L CABINET AND SIZE	ELECTRIC HEAT kW (240,480,575-v)	ELECTRIC HEAT kW (208-v)	STAGES	AMPS		
				240-v	480-v	208-v
E/EXL Cabinet 40-140	20	15.0	1	48.1	24.1	41.6
	25	18.8	2, SCR	60.1	30.1	52.0
	30	22.5	2, SCR	72.2	36.1	62.5
	35	26.3	2, SCR	84.2	42.1	72.9
	40	30.0	2, SCR	96.2	48.1	83.3
	50	37.5	4, SCR	120.3	60.1	104.1
	60	45.0	4, SCR	144.3	72.2	124.89
	70	52.5	4, SCR	168.4	84.2	145.7
	80	60.0	4, SCR	192.5	96.2	166.5
	100	75.0	4, SCR	240.6	120.3	208.2
	110	82.5	4, SCR	264.6	132.3	229.0
	120	90.0	4, SCR	288.7	144.3	249.8
	130	97.5	4, SCR	312.7	156.4	270.6
	140	105.0	4, SCR	336.8	168.4	291.5
	150	112.5	4, SCR	360.9	180.4	312.3

NOTE(S):

a. Minimum entering air temperature is -30°F.
b. Maximum entering air temperature is 104°F.
c. Minimum temperature rise is 12°F.
d. Maximum temperature rise is 75°F (with Standard Heaters).
e. Minimum leaving air temperature is N/A.
f. Unit sizes 80 Tons and above are only available in 460V.
g. Minimum airflow of 50 cfm per kW of heat across the electric heating coil.
h. Unit cabinet and tonnage matches are dependent on presence of ERV.

LEGEND

SCR — Silicon-Controlled Rectifier

Physical data - 62L E cabinet

Physical Data — 62L E Cabinet (40 to 70 Ton)[a,b,c,d,e]

UNIT 62L E, EXL CABINET	40	45	50	55	60	65	70
NOMINAL CAPACITY (TONS)[d,e]	40	45	50	55	60	65	70
No. of Refrigerant Circuits	2						
Oil	Pre-Charged						
REFRIGERANT TYPE	R-454B						
OUTDOOR COIL (Air Source)							
Air Source Standard Efficiency Condenser (sq ft)	119.2						
Air Source High-Efficiency Condenser (sq ft)	119.2						
OUTDOOR FAN (Air Source)							
Standard Efficiency Condenser without ERV							
Quantity…Diameter (mm)	Use D Cabinet				6…710		
Motor Hp					1.7		
High Efficiency Condenser without ERV							
Quantity…Diameter (mm)	Use D Cabinet				—		
Motor Hp					—		
Standard Efficiency Condenser with ERV							
Quantity…Diameter (mm)	6…630				6…710		
Motor Hp	1.48				1.7		
High Efficiency Condenser with ERV							
Quantity…Diameter (mm)	—	6…710			—		
Motor Hp	—	1.7			—		
OUTDOOR COIL (Water Source)							
Type	Coaxial (tube in tube) heat exchanger. Copper or Cupronickel inner tube and steel outer tube.						
Nominal GPM	120	136	150	164	180	196	210
COAX HX WPD (ft H_2O)	12.5	16.8	23.2	21.7	19.5	22.8	15.8
OUTDOOR COIL WATER CONNECTION SIZE FPT (in.)	2		2.5				
INDOOR COIL							
Face Area without ERV (sq ft)	Use D Cabinet				41.7		47.2
Face Area with ERV (sq ft)	41.7			47.2	41.7		47.2
SUPPLY FAN							
Backward Curved ECM (mm)	Dual 450 (High), Dual 500 (Low), Dual 500 (High) 460V Only, Dual 560 208,230V Only						
Airfoil (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20						
Backward Inclined (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20						
Nominal cfm 100% OA	6000	6750	7500	8250	9000	9750	10500
Motor Hp Range	Dual ECM, 3, 5, 7.5, 10, 15, Dual 1, Dual 1.5, Dual 2, Dual 3, Dual 5, Dual 7.5, Dual 10, Dual 15, Dual 20 (AF Only)						
OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL							
Face Area without ERV (sq ft)	Use D Cabinet				41.7		47.2
Face Area with ERV (sq ft)	41.7			47.2	41.7		47.2
CONDENSATE DRAIN CONNECTION (NPT) (in.)	1						
OPTIONAL GAS HEAT SECTION							
Gas Input Sizes (Btuh x 1000)	300, 350, 400, 500, 600						
Gas Input Sizes (Btuh x 1000) XL Cabinet	600, 800, 1000, 1200, 1400, 1600						
Control Type							
Stages (no. of stages)	2						
Stages XL Cabinet (no. of stages)	2, 4, 8						
Modulating (% range)[b]	10:1, 20:1[b]						
Efficiency (Steady State) (%)	81						
Supply Line Pressure Range (in. wg)	5.0 min. - 13.5 max.						
Rollout Switch Cutout Temp (°F)	350						
Gas Valve Quantity	1 Std - 2 with modulating option						
Manifold Pressure (in. wg)							
Natural Gas Std	3.5						
LP Gas Special Order	10						
OPTIONAL ELECTRIC HEAT							
Size Range (kW)	20, 25, 30, 35, 40, 50, 60, 70, 80, 100, 110, 120, 130, 140, 150						
Control Type							
Stages (no. of stages)	2, 4						
SCR (% range)	0 - 100						

Physical Data — 62L E Cabinet (40 to 70 Ton)[a,b,c,d,e] (cont)

UNIT 62L E, EXL CABINET	40	45	50	55	60	65	70
NOMINAL CAPACITY (TONS)[d,e]	40	45	50	55	60	65	70
OPTIONAL HOT WATER HEAT COIL WITH ERV	47.5 x 47.0, 4 row, 8 FPI (See Hot Water Coil Drawings)						
OPTIONAL HOT WATER HEAT COIL WITHOUT ERV	47.5 x 47.0, 4 row, 8 FPI (See Hot Water Coil Drawings)						
OUTDOOR AIR FILTERS							
Quantity…Size (in.) with ERV							
Standard 2 in. MERV 8	9…20x25, 3…25x25			6…20x25, 9…20x20, 1…25x25	9…20x25, 3…25x25		6…20x25, 9…20x20, 1…25x25
Optional 4 in.							
MERV 8	9…20x25, 3…25x25			6…20x25, 9…20x20, 1…25x25	9…20x25, 3…25x25		6…20x25, 9…20x20, 1…25x25
MERV 11							
MERV 13							
Quantity…Size (in.) without ERV							
Standard 2 in. MERV 8	Use D Cabinet				9…20x25, 3…25x25		6…20x25, 9…20x20, 1…25x25
Optional 4 in.							
MERV 8	Use D Cabinet				9…20x25, 3…25x25		6…20x25, 9…20x20, 1…25x25
MERV 11							
MERV 13							
OPTIONAL ERV							
Type	Synthetic Polymer						
Diameter (in.)...depth (mm)	64…88, 64…95, 68…100, 68…110, 74…122, 74…130, 81…146, 81…160, 86…125, 86…170, 86…190						
OPTIONAL ERV FILTERS							
Quantity…Size (in.) Standard 2 in. MERV 8							
with 64 in. ERV	8...15x20, 8…18X20						
with 68 in. ERV	4...18x25, 12…18X20						
with 74 in. ERV	2…14x20, 6…25x25, 6…14x25, 2…20x25						
with 81 in. ERV	6…18x25, 6…25x24, 2…18x20, 2...20x24						
with 86 in. ERV	8…20x25, 8…20x20, 2…25x16, 2…16x20						
OPTIONAL EXHAUST FAN							
Backward Curved ECM (mm)	Dual 450 (High), Dual 500 (Low), Dual 500 (High) 460V Only, Dual 560/208,230V Only						
Airfoil (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20						
Backward Inclined (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20						
Nominal cfm	6000	6750	7500	8250	9000	9750	10500
Motor Hp Range	Dual ECM, 3, 5, 7.5, 10, 15, Dual 1, Dual 1.5, Dual 2, Dual 3, Dual 5, Dual 7.5, Dual 10, Dual 15, Dual 20 (AF Only)						

NOTE(S):

a. For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder.
b. 20:1 modulating control available on EXL Cabinet (800-1600 MBtuh only).
c. Refer to the DOAS NG builder for the latest product data within the equipment submittal report. The above is to be used as reference only.
d. Air Source Heat Pumps are available up from 60 to 70 Tons without ERV and from 40 to 70 tons with ERV.
e. Water Source Heat Pumps are available up from 60 to 140 Tons without ERV and from 40 to 55 tons with ERV.

LEGEND

ECM — Electronically Commutated Motor
ERV — Energy Recovery Ventilator
FPI — Fins per Inch
LP — Liquid Propane
OA — Outdoor Air
SCR — Silicon-Controlled Rectifier

Physical Data — 62L E Cabinet (80 to 140 Tons) [a,b,c,d,e]

UNIT 62L E, EXL CABINET	80	100	120	140
NOMINAL CAPACITY (TONS)[d,e]	80	100	120	140
No. of Refrigerant Circuits	2			
Oil	Pre-Charged			
REFRIGERANT TYPE				
OUTDOOR COIL (Air Source)	R-454B			
Air Source Standard Efficiency Condenser (sq ft)	119.2	—		
Air Source High-Efficiency Condenser (sq ft)	119.2	118.8		
OUTDOOR FAN (Air Source)				
Standard Efficiency Condenser without ERV				
Quantity…Diameter (mm)	6…710	—		
Motor Hp	1.7	—		
High Efficiency Condenser without ERV				
Quantity…Diameter (mm)	—	9…710		
Motor Hp	—	1.7		
Standard Efficiency Condenser with ERV				
Quantity…Diameter (mm)	—			
Motor Hp	—			
High Efficiency Condenser with ERV				
Quantity…Diameter (mm)	—			
Motor Hp	—			
OUTDOOR COIL (Water Source)				
Type	Stainless Steel Brazed-Plate Heat Exchanger			
Nominal GPM	270	338	380	416
COAX HX WPD (ft H_2O)	16.2	17.7	18.1	18.5
OUTDOOR COIL WATER CONNECTION SIZE FPT (in.)	3			
INDOOR COIL				
Face Area without ERV (sq ft)	47.2			
Face Area with ERV (sq ft)	—			
SUPPLY FAN				
Backward Curved ECM (mm)	Dual 450 (High), Dual 500 (Low), Dual 500 (High) 460V Only, Dual 560 208,230V Only			
Airfoil (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20			
Backward Inclined (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20			
Nominal cfm 100% OA	12000	15000	18000	21000
Motor Hp Range	Dual ECM, 3, 5, 7.5, 10, 15, Dual 1, Dual 1.5, Dual 2, Dual 3, Dual 5, Dual 7.5, Dual 10, Dual 15, Dual 20 (AF Only)			
OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL				
Face Area without ERV (sq ft)	47.2			
Face Area with ERV (sq ft)	—			
CONDENSATE DRAIN CONNECTION (NPT) (in.)	1			
OPTIONAL GAS HEAT SECTION				
Gas Input Sizes (Btuh x 1000)	300, 350, 400, 500, 600			
Gas Input Sizes (Btuh x 1000) XL Cabinet	600, 800, 1000, 1200, 1400, 1600			
Control Type				
Stages (no. of stages)	2			
Stages XL Cabinet (no. of stages)	2, 4, 8			
Modulating (% range)[b]	10:1, 20:1[b]			
Efficiency (Steady State) (%)	81			
Supply Line Pressure Range (in. wg)	5.0 min. - 13.5 max.			
Rollout Switch Cutout Temp (°F)	350			
Gas Valve Quantity	1 Std - 2 with modulating option			
Manifold Pressure (in. wg)				
Natural Gas Std	3.5			
LP Gas Special Order	10			
OPTIONAL ELECTRIC HEAT				
Size Range (kW)	20, 25, 30, 35, 40, 50, 60, 70, 80, 100, 110, 120, 130, 140, 150			
Control Type				
Stages (no. of stages)	2, 4			
SCR (% range)	0 - 100			
OPTIONAL HOT WATER HEAT COIL WITH ERV	47.5 x 47.0, 4 row, 8 FPI (See Hot Water Coil Drawings)			
OPTIONAL HOT WATER HEAT COIL WITHOUT ERV	47.5 x 47.0, 4 row, 8 FPI (See Hot Water Coil Drawings)			

Physical data - 62L E cabinet (cont)

Physical Data — 62L E Cabinet (80 to 140 Tons) [a,b,c,d,e] (cont)

UNIT 62L E, EXL CABINET	80	100	120	140
NOMINAL CAPACITY (TONS)[d,e]	80	100	120	140
OUTDOOR AIR FILTERS				
Quantity…Size (in.) with ERV				
Standard 2 in. MERV 8	6…20x25, 9…20x20, 1…25x25			
Optional 4 in.				
MERV 8	6…20x25, 9…20x20, 1…25x25			
MERV 11				
MERV 13				
Quantity…Size (in.) without ERV				
Standard 2 in. MERV 8	6…20x25, 9…20x20, 1…25x25			
Optional 4 in.				
MERV 8	6…20x25, 9…20x20, 1…25x25			
MERV 11				
MERV 13				
OPTIONAL ERV				
Type	—			
Diameter (in.)...depth (mm)	—			
OPTIONAL ERV FILTERS				
Quantity…Size (in.) Standard 2 in. MERV8				
with 60 in. ERV	—			
with 66 in. ERV	—			
with 72 in. ERV	—			
with 78 in. ERV	—			
with 84 in. ERV	—			
OPTIONAL EXHAUST FAN				
Backward Curved ECM (mm)	Dual 450 (High), Dual 500 (Low), Dual 500 (High) 460V Only, Dual 560 208,230V Only			
Airfoil (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20			
Backward Inclined (in.)	22, 25, Dual 14, Dual 16, Dual 18, Dual 20			
Nominal cfm	12000	15000	18000	21000
Motor Hp Range	Dual ECM, 3, 5, 7.5, 10, 15, Dual 1, Dual 1.5, Dual 2, Dual 3, Dual 5, Dual 7.5, Dual 10, Dual 15, Dual 20 (AF Only)			

NOTE(S):

a. For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder.
b. 20:1 modulating control available on EXL Cabinet (800-1600 MBtuh only).
c. Refer to the DOAS NG builder for the latest product data within the equipment submittal report. The above is to be used as reference only.
d. Air Source Heat Pumps are available up from 60 to 70 Tons without ERV and from 40 to 70 tons with ERV.
e. Water Source Heat Pumps are available up from 60 to 140 Tons without ERV and from 40 to 55 tons with ERV.

LEGEND

ECM — Electronically Commutated Motor
ERV — Energy Recovery Ventilator
FPI — Fins per Inch
LP — Liquid Propane
OA — Outdoor Air
SCR — Silicon-Controlled Rectifier

Options and accessories

ITEM	STANDARD	OPTION[a]	ACCESSORY[b]
Heat Options			
Staged Gas Heat (NG)		X	
DX Heat Pump Heating		X	
Modulating Gas Heat (10:1 or 5:1 Turndown)		X	
Staged Electric Heat		X	
SCR Controlled Electric Heat		X	
Hot Water Heating Coil		X	
Energy Recovery Ventilator (ERV)		X	
Wheel VFD Defrost Control	X		
Wheel Bypass Dampers		X	
Control Options			
Filter Status Switch	X		
Exhaust Air Smoke Detector		X	
Unit-Powered Type Convenience Outlet		X	
Non-fused Disconnect Switch		X	
Lead Circuit Variable Speed Compressor	X		
DDC Controls	X		
Equipment Touch Keypad/Display	X		
Condensate Overflow Switch	X		
Variable Speed Condenser Fans (Air Cooled or ASHP)	X		
R-454B Refrigerant Leak Detection Sensors	X		
Water Regulating Valves (WSHP)	X		
Coil Options			
Copper Condenser Coil, WSHP only		X	
CuNi Condenser Coil, WSHP only		X	
BPHE Condenser Coil, WSHP Only		X	
Modulating Hot Gas Reheat	X		
Liquid Subcooling Coil		X	
Corrosion Protection Coating		X	
Filter Options			
2 in. MERV 8 Filters		X	X
4 in. MERV 8 Filters		X	X
4 in. MERV 11 Filters		X	X
4 in. MERV 13 Filters		X	X
Supply Fan Options			
Airfoil Fan		X	
Backward Inclined Fan		X	
ECM		X	
VFD Control (Not on ECM)	X		
Exhaust Fan Options			
Airfoil Fan		X	
Backward Inclined Fan		X	
ECM		X	
VFD Control (Not on ECM)	X		
14 in. Knock Down/Field-Assembled Roof Curb			X
Spring Type Fan Isolation (Not on ECM)		X	
OA 2 Position Motorized Damper	X		
Airflow Monitoring Station		X	
Supply/Exhaust Pressure Control		X	

NOTE(S):

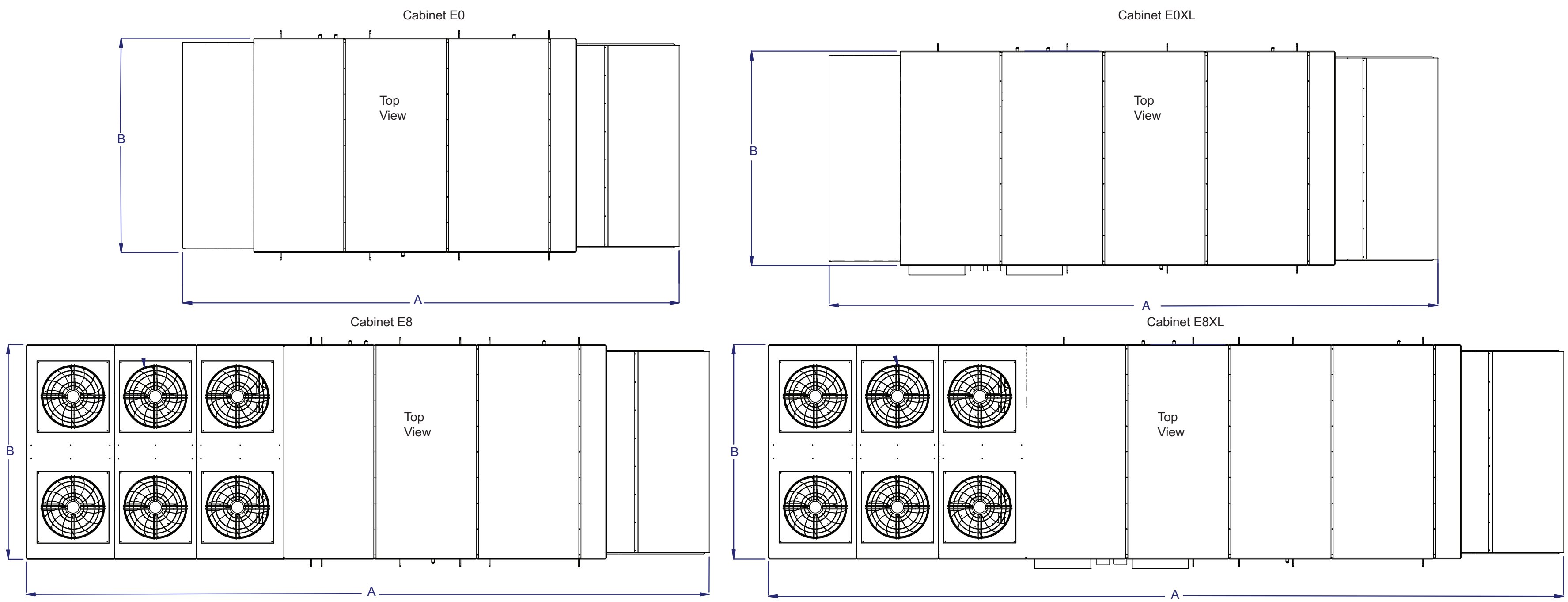
a. See DOAS Builder software for availability.
b. Field-installed.

LEGEND

DDC — Direct Digital Controls
ECM — Electronically Commutated Motor
ERV — Energy Recovery Ventilator
NG — Natural Gas
OA — Outdoor Air
SCR — Silicon Controlled Rectifier
VFD — Variable Frequency Drive

Refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder for unit dimensions.

Cabinet Dimensions

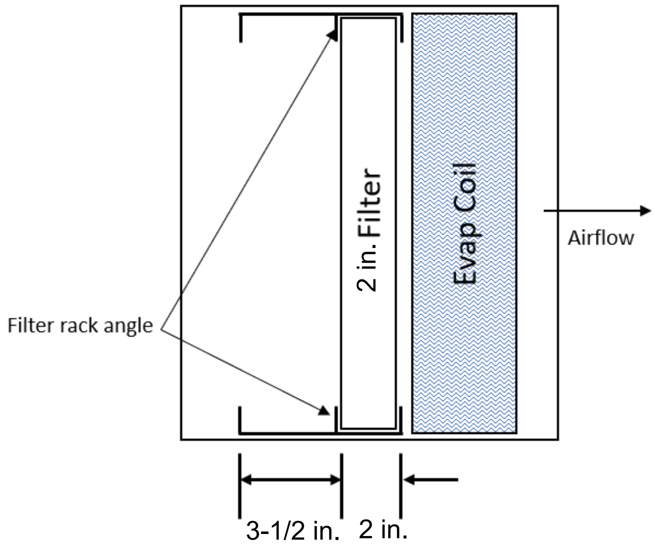


CABINET[a,b,c,d]	CONDENSER FAN[e]	WITHOUT EXHAUST	WITH EXHAUST	WIDTH (B)	HEIGHT (C) (not shown)
		LENGTH (A)	LENGTH (A)		
E	0	229.875	107.000	107.000	108.000
	6	—	377.500	107.000	108.000
	8	316.375	398.625	107.000	108.000
EXL	0	281.875	368.125	108.000	108.000
	6	—	429.500	108.000	108.000
	8	368.375	450.625	108.000	108.000
	9	368.375	450.625	100.125	114.00

NOTE(S):

a. Dimensions will be dependent on unit model number nomenclature configuration, option content and other field added features.
b. Consult final selection drawings for more details and exact dimensions from the DOAS Builder software.
c. Dimensions are given in inches.
d. Base rail details and exact dimensions are not shown in the certified drawing from the DOAS Builder software.
e. Drawings above are representative, the different condenser fan configurations are listed on the table. The "0" represents water cooled units.

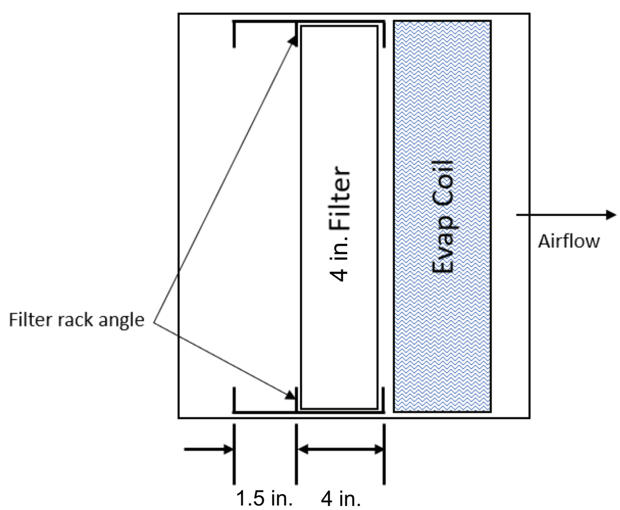
Filter Rack Arrangement - Evaporator Section
Typical Filter Rack Arrangement with a 2 in. MERV 8 Filter Option



NOTE(S):

a. For additional filtration, a 4 in. filter could be field installed upstream the 2 in. filter by removing the filter rack angle divider.
b. If additional filtration is installed, this will impact the total static pressure of the unit. Verify the impacts of this additional filtration with the DOAS Builder software and adjust as needed.
c. Units selected with an ERV will receive an additional filtration section for the ERV (see page 24).

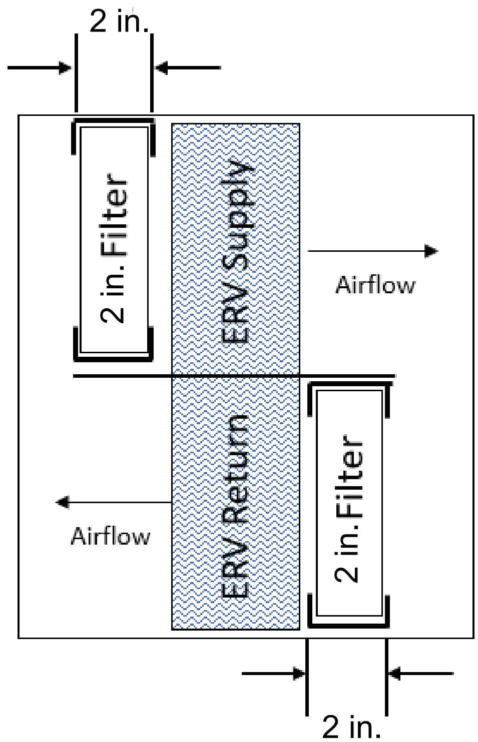
Filter Rack Arrangement - Evaporator Section
Typical Filter Rack Arrangement with a 4 in. MERV 8,11 or 13 Filter Option



NOTE(S):

a. For additional filtration a 2 in. filter could be field installed upstream the 4 in. filter by removing the filter rack angle divider.
b. If additional filtration is installed, this will impact the total static pressure of the unit. Verify the impacts of this additional filtration with the DOAS Builder software and adjust as needed.
c. Units selected with an ERV will receive an additional filtration section for the ERV (see page 24).

Filter Rack Arrangement - ERV Section
Typical ERV Filter Rack Section Arrangement for Unit with ERV Option Only

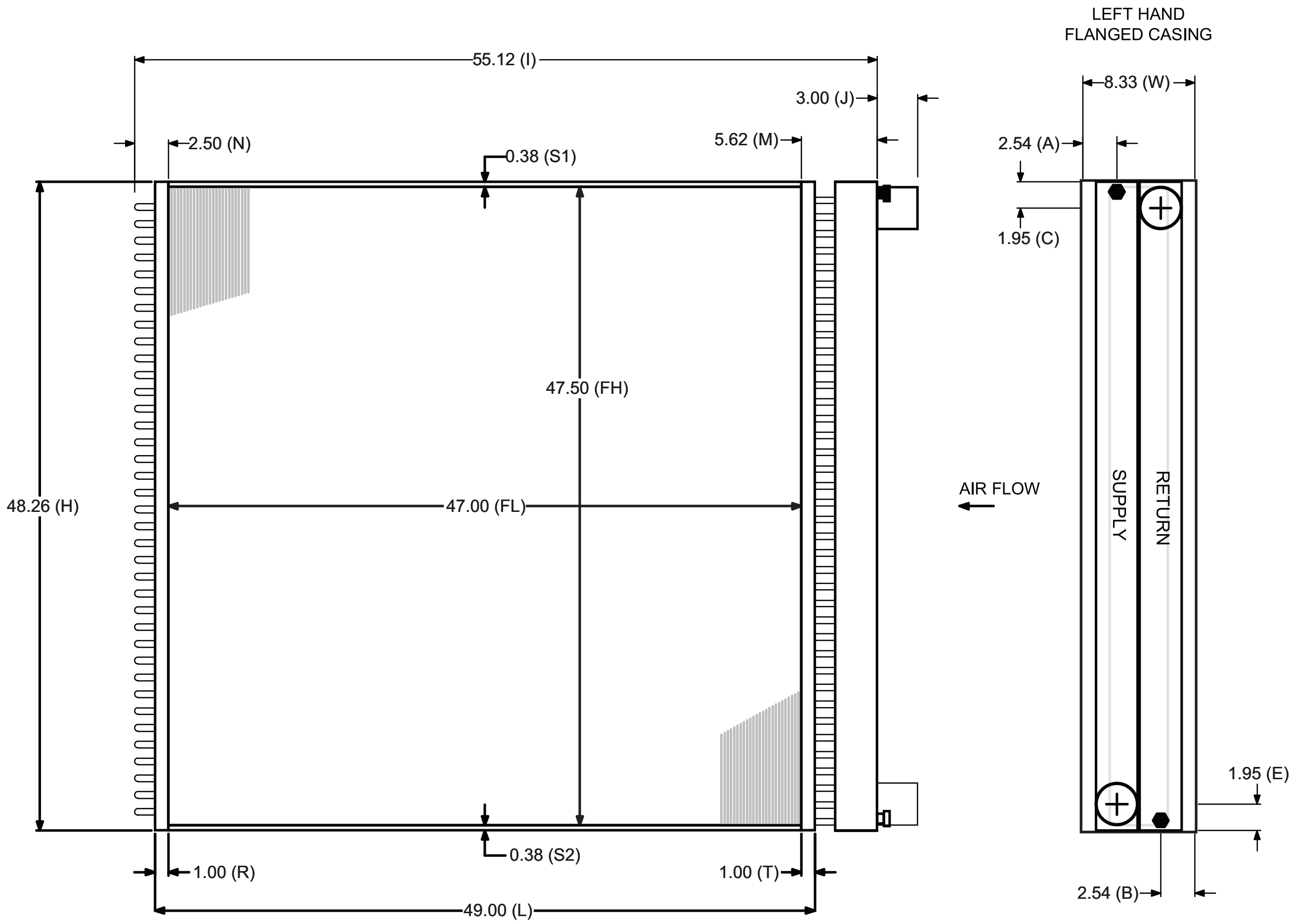


NOTE(S):

a. Units selected with an ERV will receive an additional 2 in. MERV 8 filtration section on the supply and exhaust air stream.

b. The ERV filtration section comes standard with 2 in. MERV filter media. There are no filtration options available to change the filter media type on the ERV.

Optional Hot Water Heat Coil - E / EXL Cabinet



NOTE(S):
a. All dimensions are in inches.
b. Manually verifying dimensions is highly recommended.
c. The supply line should be connected to the lower connection on the leaving air side of counterflow operation.
d. Coils will vent and drain through factory-installed vent and drain fittings when mounted level for horizontal flow.
e. Connection location other than standard could affect vent and drain locations. Consult factory.
f. Connection Size = 3-1/8 in. Sweat
g. Vent and Drain Size = 1/2 in. FPT

Performance data

Refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder for performance data.

Control components

The 62L Series of dedicated outdoor air units use a direct digital controller that has been specifically designed for Carrier dedicated outdoor air units. The controller monitors the operating conditions in the outdoor air unit and controls the compressors, fans, heating systems, and optional devices. The controller has the capability of communicating with major building automation protocols including BACnet MS/TP.

NOTE: The temperatures listed in this section are default values and may be adjusted to meet the needs of the application.

Sequence of operation — 100% outdoor air units — 62L

The 62L unit is designed to condition 100% outdoor air to room neutral conditions for ventilation purposes. As such, the 62L unit is not designed to, nor will the 62L unit maintain space cooling, heating or relative humidity conditions. A separate ancillary device must be installed to provide primary space heating, cooling, and humidity control.

The controller is turned on by a switch located on its front, upper left corner. Several Occupancy Control options are available for starting the unit. These can be selected from the Equipment Touch™ display pad on the Controls screen (requires user password). The Resident Program has an adjustable scheduler that uses the internal time clock to allow for separate Sequences for Occupied and Unoccupied periods. This can be accessed from the Equipment Touch display pad on the Schedules screen (requires user password).

NOTE: All temperature-related events have an additional 10-second (fixed) “delay on make” to allow temperatures to settle.

Occupied mode

When the Unit Controller Schedule calls for the start of the Occupied mode, and the controller has verified that there are no faults or shutdown conditions, after a 30-second (fixed) delay the unit goes into Occupied mode.

Outdoor air damper (OD)

After the unit goes into Occupied mode, the Outdoor Air (OA) damper will open. As the OA damper opens, the Outdoor Air Damper Actuator (OADA) auxiliary switches close. The OA damper stays open until the system reaches the end of the Occupied mode period. It will remain open until the supply fan turns off. After the supply fan turns off, the OA damper will close.

Supply fan (SF)

As the OA damper opens, the OADA auxiliary switch (adjustable) will close and the SF will turn on. The SF shall operate continuously while the unit is in the Occupied mode. When the system reaches the end of the Occupied mode period, the SF will continue to run for an additional 2 minutes before turning off.

The SF will operate based on one of four control methods, depending on the unit and control configuration.

Constant Volume (CV)

The unit will operate the SF at full speed or the commanded manual override speed.

Duct Pressure Control (VAV-DPT)

The unit will operate the SF to maintain the supply duct pressure set point.

Air Monitor Control (VAV-AMS)

The unit will operate the SF to maintain the SF airflow set point.

Space Pressure Control (VAV-SPT)

The unit will operate the SF to maintain the space pressure set point (special order).

Exhaust fan (EF)

At the same time the SF turns on, the EF will be enabled to run. The EF shall be enabled to run continuously while the unit is in the Occupied mode. When the system reaches the end of the Occupied mode period, the EF will be enabled to run for an additional 2 minutes before turning off.

The EF will operate based on one of three control methods, depending on the unit and control configuration.

Constant Volume (CV)

The unit will operate the EF at full speed or the commanded manual over-ride speed.

Space Pressure Control (VAV-SPT)

The unit will operate the EF to maintain the space pressure set point.

Air Monitor Control (VAV-AMS)

The unit will operate the EF to maintain the EF airflow set point.

Energy conservation wheel (ECW)

After the OA damper opens and the SF turns on, the ECW turns on. The ECW Bypass Damper (if equipped) will open when the ECW is off and it will close when the ECW is on.

ECW with VFD Controlled Defrost (WM-VFD)

When the OAT is 3°F (adjustable) or more above or below the RAT, the ECW will be on. It will be off, if the OAT is less than 3°F (adjustable) above or below the RAT. It will decrease speed or stop as the wheel exhaust air temperature (WExAT) goes below 25°F (adjustable) to allow for wheel defrosting. It will start back up and increase speed when the WExAT rises toward 25°F (adjustable) or more.

Cooling mode

Cooling mode is available when the Entering Coil Air Temperature (ECAT) is above the ECAT cooling lower limit (55°F, adjustable) and there is a demand for cooling. When the Entering Coil Air Temperature (ECAT) is 1°F (adjustable) or more above the Supply Air Temperature (SAT) cooling set point (70°F, adjustable), compressor no. 1 turns on. When the SAT is 2°F (adjustable) or more above the SAT cooling set point (70°F, adjustable), compressor no. 2 turns on — not less than 10 minutes (adjustable) after compressor no. 1 turned on. When the SAT is 2°F (adjustable) or more below the SAT cooling set point (70°F, adjustable), compressor no. 2 turns off. When the ECAT is 1°F (adjustable) or more below the Supply Air Temperature (SAT) cooling set point (70°F, adjustable), compressor no. 1 turns off.

Variable Speed Compressors (Size 40-140)

The controller regulates the capacity of the variable speed lead compressor with a 0-10 vdc output signal that controls the VFD's output to the compressor, resulting in an increase or decrease of the compressors motor speed. The variable speed compressor will modulate based upon the Supply Air Temperature (SAT) sensor and set point (70°F, adjustable). The compressor will ramp up to 100% once an hour, for 60 seconds, to push oil back to the compressor. The hot gas reheat circuit and subcooling circuits (if present), will be enabled for the duration of the oil purge. If the DX LAT drops to 38°F or less for 10 minutes, the controller will issue an alarm and the compressor stops. When the DX LAT warms back up to 55°F or more, the compressor turns back on. If there is a current call for first stage cooling and compressor no. 1 is shut down due to an alarm (HPS1, LPS1, or DX LAT1), compressor no. 2 will be turned on to take its place until it returns.

Hot Gas Reheat (HGRH) – Modulating

When the SAT is 1°F (adjustable) or more below the SAT cooling set point, HGRH turns on and modulates to maintain the SAT cooling set point. When the SAT is 2°F (adjustable) or more above the SAT cooling set point, HGRH turns off.

Dehumidification mode

Dehumidification Mode is available if the ECAT is 1°F (fixed) above the dehumidification lower limit of 60°F (adjustable) and there is no call for heating.

When the Entering Coil Air Dew Point (ECDP) is 1°F (adjustable) or more above the Supply Air Dew Point (SADP) set point (55°F, adjustable), dehumidification mode is enabled. After the minimum time-off delay, compressor no. 1 turns on.

When the SADP is 2°F (adjustable) or more above the SADP set point, and after minimum time-off delay, compressor No. 2 turns on — not less than 10 minutes (adjustable) after compressor No. 1 turns on.

When the SADP is 1°F (adjustable) or more below the SADP set point, compressor No. 2 turns off.

When ECDP is 2°F (adjustable or more below the SADP set point), compressor no. 1 turns off and dehumidification mode is disabled.

Variable Speed Compressor (Size 40-140)

The variable speed compressor will modulate based upon the DX Leaving Air Temperature (DX LAT) sensor and set point (55°F, adjustable). See Variable Speed. Freeze protection, oil purge, and back-up sequence are also in effect. See Cooling sequence for details.

Hot Gas Reheat (HGRH) – Modulating

When the SAT is 1°F (adjustable) or more below the SAT cooling set point, HGRH turns on and modulates to maintain the SAT cooling set point. When the SAT is 2°F (adjustable) or more above the SAT cooling set point, HGRH turns off.

Liquid Subcooling Reheat (LSRH) - if equipped

When either of the compressor are enabled during dehumidification mode, the subcooling coil is enabled. When the compressors are disabled, the subcooling coil is disabled.

Zone Air Temperature Reset (Optional)

ZAT/SAT Set Point Reset is selectable using the Equipment Touch display pad or Building Automation System (BAS) (default is "OFF"). As the ZAT goes above the ZAT cooling set point, the SAT cooling set point will decrease by a ratio (adjustable) in order to lower the ZAT. As the ZAT goes below the ZAT cooling set point, the SAT cooling set point will increase by a ratio (adjustable) in order to raise the ZAT. When the ZAT equals the ZAT cooling set point, the SAT cooling set point will return to the original value. As the ZAT goes below the ZAT heating set point, the SAT heating set point will increase by a ratio (adjustable) in order to raise the ZAT. As the ZAT goes above the ZAT heating set point, the SAT heating set point will decrease by a ratio (adjustable) in order to lower the ZAT. When the ZAT equals the ZAT heating set point, the SAT heating set point will return to the original value.

Example: A ZAT:SAT ratio of 1:3 means for every 1°F of ZAT increase the SAT set point will decrease by 3°F; maximum -15°F (ZAT = 73°F, SAT = 69°F; ZAT = 74°F, SAT = 66°F; ZAT = 75°F, SAT = 63°F; etc.).

Heat Pump Heating Mode:

Heat Pump Mode is available when the ECAT is 1°F (fixed) below the ECAT heating upper limit (60°F, adjustable) and there is a demand for heating.

Reversing Valve is "ON" in Heating Mode.

When the SAT is 2°F (adjustable) or more below the SAT heating set point (70°F,adjustable), compressor no. 2 turns on -- not less than 10 minutes (adjustable) after compressor no. 1 turned on.

When the SAT is 2°F (adjustable) or more above the SAT heating set point, compressor no. 2 turns off.

When the ECAT is 1°F (adjustable) or more below the ECAT heating set point (55°F, adjustable), compressor no. 1 turns on.

When the ECAT is 1°F (adjustable) or more above the ECAT heating set point, compressor no. 1 turns off.

Heat pump operation shall be disabled if the SF-VSC modulation drops below 85% (factory suggestion; adj.).

Optional: When enabled, if there is a call for first-stage heating, second stage heating will be enabled after a 10-minute (adjustable) delay. Default is "OFF".

Compressor enabling logic includes a 5-minute (fixed) minimum run-time as well as the 5-minute (fixed) minimum time-off delay to prevent compressor short cycling.

Standard Lead Compressor with VFD:

The compressor will modulate based on the SAT heating set point.

The compressor will ramp to 100% once an hour, for 60 seconds, to push oil back to the compressor.

If there is a current call for first-stage heating and compressor no. 1 is shut down due to an alarm (HPS1, LPS1, or Freeze Protection no. 1), compressor no. 2 will be turned on to take its place until it returns.

WARNING: (WSHP Only) Still water freezes at 32°F. Steps must be taken by purchaser to ensure that water does not freeze in any components during winter conditions, including any loss of power or malfunction. Failure to provide freeze protection can lead to equipment and property damage.

Defrost Mode (ASHP Only):

On defrost mode, the reversing valve will switch to cooling to defrost the built-up ice on the outdoor coil.

The unit is equipped with a Defrost Timer. The defrost timer provides a selectable time interval between defrost cycles. It will allow a 10 minute defrost every 30/60/90 minutes as long as the defrost thermostat is closed. The timer is factory set at 60 minutes. The time interval may be changed to 30 or 90 minutes if desired (disconnect power to the unit before moving the jumper). The hold input on the defrost timer allows the timer to accumulate time while the compressor is running in heating mode. A warm outdoor coil causes the defrost thermostat to open which will prevent time accumulation or end the Defrost period. The defrost timer allows up to a 10 minutes defrost cycle if the defrost thermostat is closed. When the defrost period ends, either by opening of the defrost thermostat or after the 10 minutes defrost period has elapsed, the timer is reset. By shorting the two test terminals together on the defrost timer, a 60 minute delay is reduced to 14 seconds and a 10 minute delay is reduced to 2.3 seconds for testing purposes.

Auxiliary Heating Mode (If equipped)

After the heat pump has been enabled, when the SAT is 2°F (adjustable) or more below the SAT heating set point (70°F, adjustable), and after a 10-minute (adjustable) delay period, auxiliary heating will be enabled. When the SAT is above the SAT heating set point, auxiliary heating will be disabled.

On demand for auxiliary heating, the ALC controller modulates the auxiliary Gas, Electric or Hot Water heating based upon the SAT heating set point (70°F, adjustable).

Emergency Heating Mode (If equipped)

The Compressor is “OFF” in Emergency Heating Mode.

Emergency Heating mode is selectable using the Equipment Interface or Building Automation System (BAS) (default is “OFF”). Emergency Heating mode will automatically be turned on if the heat pump compressor fails or is disabled due to either the OAT going below the Compressor Disable set point of 26°F (adjustable) or the SF-VSC modulating below 85% (adjustable).

Emergency Heating Mode is available when the ECAT is 1°F (fixed) below the ECAT heating upper limit (60°F, adjustable) and there is a demand for heating.

When the ECAT is 1°F (adjustable) or more below the ECAT heating set point (55°F, adjustable), emergency heating is enabled.

When the ECAT is 1°F (adjustable) or more above the ECAT heating set point, emergency heating is disabled.

On demand for emergency heating, the ALC controller modulates the emergency Gas, Electric or Hot Water heating based upon the SAT heating set point (70°F, adjustable).

Heating mode

Heating mode is available when the OAT is below the OAT heating upper limit (60°F, adjustable) and there is a demand to temper outdoor air to room neutral conditions. When the ECAT is 1°F (adjustable) or more below the ECAT heating set point (50°F, adjustable), heating is enabled and operates to maintain SAT heating set point (70°F, adjustable). When ECAT is 1°F (adjustable) or more above ECAT heating set point (50°F, adjustable), heating is disabled.

Staged Heat (Electric Heat) 2-Stage Heat

Terminal W1 turning on enables first-stage heating. As SAT goes further below the SAT heating set point (70°F, adjustable), terminal W2 energizes and second-stage heating is enabled. As SAT rises, terminal W2 turns off and second-stage heating turns off. As the SAT goes 1°F (adjustable) or more above the SAT heating set point (70°F, adjustable), terminal W1 turns off and first-stage heating turns off.

Staged Heat (Electric heat) 4-Stage

Terminal W1 turning on enables the Heating Analog Relay Module (HARM) on the control panel which activates the different stages of heating. As the SAT goes further below the SAT heating set point (70°F, adjustable), the different stages will turn on. As the SAT goes further above the SAT heating set point (70°F, adjustable), the different stages will turn off.

Staged Heat (Gas heater) 2-Stage

Terminal W1 turning on enables first-stage heating. As SAT goes further below the SAT heating set point (70°F, adjustable), terminal W2 energizes and second-stage heating is enabled. As SAT rises, terminal W2 turns off and second-stage heating turns off. As the SAT goes 1°F (adjustable) or more above the SAT heating set point (70°F, adjustable), terminal W1 turns off and first-stage auxiliary heating turns off.

Staged Heat (Gas heater) 4-Stage

Terminal W1 turning on enables the Heating Analog Relay Module (HARM) on the control panel which activates the different stages of heating. As the SAT goes further below the SAT heating set point (70°F, adjustable), the different stages will turn on. As the SAT goes further above the SAT heating set point (70°F, adjustable), the different stages will turn off.

Gas Heater

Terminal W1 turning on energizes the gas heater controller and first-stage auxillary heating is enabled. If the SAT is 1°F (adjustable) or more above the SAT heating set point (70°F, adjustable) terminal W1 turns off, which de-energizes the gas heater controller, and first-stage auxillary heating is turned off. All other stages operate as above.

Modulated Heat

<u>SCR Electric Heat:</u>

On demand to temper outdoor air to room neutral conditions, the controller modulates the electric heating SCR in order to maintain the SAT heating set point (70°F, adjustable).

<u>Modulating Gas Heater:</u>

On demand to temper outdoor air to room neutral conditions, the controller modulates the gas heater controller to control the gas flow in order to maintain the SAT heating set point (70°F, adjustable).

<u>Modulating Hot Water Heat:</u>

On demand to temper outdoor air to room neutral conditions, the controller modulates the hot water valve to control the hot water flow in order to maintain the SAT heating set point (70°F, adjustable).

Unoccupied mode

When the Occupancy Control indicates the end of the Occupied mode, the compressor(s) and outdoor fan(s) will turn off (subject to minimum run-time) or the heating system will turn off. The SF and EF will continue to run for 2 minutes before turning off. After this, the ECW will turn off and the OA damper will close. The unit is now off.

Safety Switches

High Pressure Switch (HPS1)

If HPS1 is open, compressor no. 1 will turn off and the controller will issue an alarm. After manually resetting HPS1, the HPS1 alarm will reset. Following a minimum time off delay, compressor no. 1 will turn on. If the controller records 3 high pressure start/restart failure incidents within 1 hour, compressor no. 1 is locked out and the controller will issue an alarm. The compressor lockout can be reset in the Equipment Touch display pad or by cycling the power of the controller. This sequence is the same for compressor no. 2, Y2, and HPS2.

Low Pressure Switch (LPS1)

If LPS1 is open after the LPS1 bypass time, the controller will issue an alarm and compressor no. 1 turns off. After 30 seconds (fixed), the LPS1 alarm will reset. Following a minimum time off delay, compressor no. 1 will turn on. If the controller records 3 low pressure start/restart failure incidents within 1 hour, compressor no. 1 is locked out and the controller will issue an alarm. The compressor lockout can be reset in the Equipment Touch display pad or by cycling the power of the controller. This sequence is the same for compressor no. 2, Y2, and LPS2.

Condensate Overflow Switch

When the condensate overflow switch (COFS) detects an overflow condition at the drain pan, the contact closes at the unit controller and the unit will disable the cooling system and issue an alarm.

Safety Shutdown

Smoke Detector

When a smoke detector (SD) is provided, it is wired directly to the controller. If smoke is detected, the controller will shut down the unit. Other instances where shutdown will occur are as follows. If a compressor fails to start 3 times in an hour due to high pressure switch lock out; If a compressor fails to start 3 times in an hour due to low pressure switch lock out; If a compressor fails to start 3 times in an hour due to DX leaving air temperature lock out; and if the controller detects an SAT sensor failure.

Energy Management Relay

The energy management relay (EMR) can be configured to force unoccupied mode or to force an emergency shutdown. When the EMR contact is open, the EMR signal is triggered and the unit will shutdown or go into unoccupied mode (depending on the configuration).

Guide specifications

Dedicated Outdoor Air Unit with DX Cooling or DX Cooling with Optional DX Heat Pump, Gas, Electric or Hot Water Heat

HVAC Guide Specifications — Section 62L

Size Range: **40 to 140 Tons Nominal**

Carrier Model Number: **62L**

Part 1 — General

1.01 SYSTEM DESCRIPTION:

Outdoor roof curb or slab mounted, electronically controlled, cooling or cooling/heating unit utilizing hermetic scroll compressors with crankcase heaters for cooling and heating duty and gas combustion or electric resistance heaters for heating duty. Units shall discharge supply air vertically or horizontally as shown on contract drawings.

1.02 QUALITY ASSURANCE

A. Unit shall be designed to conform to ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers) 15 (latest edition), ASHRAE 62, and UL (Underwriters Laboratories) Standard 60335-2-40.

B. Unit shall be listed as a total package by ETL and ETL, Canada.

C. Gas heat equipped units shall be designed to conform to ANSI Standard Z83.8, Gas-Fired heaters (U.S.A.) / CSA Standard 2.6-2013 (Canada).

D. Roof curb shall be designed to NRCA (National Roofing Contractors Association) criteria per Bulletin B-1986.

E. Insulation and adhesive shall meet NFPA (National Fire Protection Association) 90A requirements for flame spread and smoke generation.

1.03 DELIVERY, STORAGE AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT

A. General:

The unit shall be a packaged, factory-assembled direct expansion cooling and optional heating unit for outdoor installation. The unit shall consist of all factory wiring with a single point power connection, refrigerant piping and charge (R-454B), operating oil charge, dual refrigerant circuits (sizes 40-140), with a factory-installed and programmed digital control system. The unit shall, based on project requirements, include all special features necessary to provide fully conditioned ventilation air at neutral conditions to the building.

B. Unit Cabinet:

1. Double wall design, constructed of G-90 galvanized steel, bonderized and pre-coated with a polyester pre-coat finish.
   a. Top cover shall be a minimum of 18-gauge sheet metal for E Cabinet with 2.0 in. thick, closed cell polyisocyanurate foam insulation with an R-13 rating and a 24-gauge sheet metal interior liner.
   b. Access panels and doors shall be a minimum of 20-gauge sheet metal with 2.0 in. thick, closed cell polyisocyanurate foam insulation with an R-13 rating with a 24-gauge sheet metal interior liner. Access doors shall be equipped with stainless steel hinges and quarter turn, adjustable, draw tight cam-action latches.
   c. Corner and center posts shall be 16 or 18-gauge galvanized steel.
   d. Basepans shall be 16 or 18-gauge galvanized steel. All openings through the basepan shall have upturned flanges at least 0.5 in. in height.
   e. Basepans shall be insulated with 0.375 in. thick closed cell foam insulation.
   f. Condensate pan shall be 20-gauge stainless steel insulated with closed cell neoprene insulation.
   g. Base rail shall be double flanged 12-gauge galvanized steel or welded closed section structural steel tubing.
   h. Roof sections shall be sloped for proper drainage.
2. Unit casing shall be capable of withstanding 2500-hour salt spray exposure per ASTM (American Society for Testing and Material) B117 (scribed specimen).
3. Unit shall have insulated access doors, hinged for easy access to the controls compartment and all other areas requiring servicing. Each door shall seal against a triple-edge, co-extruded EPDM gasket to help prevent air and water leakage and for ease and safety during servicing.
4. Interior cabinet surfaces shall be lined with 24-gauge galvanized steel.
5. Unit shall have a factory-installed, sloped condensate drain connection fabricated of stainless steel with welded corners and drain connection.
6. Unit shall be equipped with fittings in frame rails to facilitate overhead rigging.
7. Filters shall be accessible through a hinged access panel.
8. The outdoor air opening shall have a factory-provided hood with bird screen.

C. Fans:
1. Indoor Evaporator Fans:
a. Direct drive plenum fan shall be provided and all axial and radial clearances must be equal to or greater than fan manufacturer's recommendations for full-rated fan performance and efficiency.
b. Fan shall be airfoil or backward curve type and will be selected to meet the application airflow and total static pressure.
c. The supply fan shall be capable of either constant volume or modulating control. Supply fan motor shall be induction motor with variable frequency drive (VFD) or EC motor.
d. The exhaust fan (when equipped) shall be capable of either constant volume or modulating control. Exhaust fan motor shall be induction motor with variable frequency drive (VFD) or EC motor.
e. Fan Status Switch: The unit shall be equipped with a current sensing switch to provide proof of airflow.
2. Condenser Fans (air cooled units only):
a. Fans shall be external rotor, direct-driven axial fans with a minimum 5-1/2 in. spun venturi for high efficiency and low noise, with formed and profiled blades.
b. The fan motor assembly shall be end mounted to a structurally rigid welded finger guard.
c. Fans shall discharge air vertically upward and the finger guard shall be powder coated.
d. Fans shall be statically and dynamically balanced as an assembly to a quality level of G=6.3 in accordance with DIN ISO 1940-1.

D. Compressors:
1. Fully hermetic, scroll type compressors with overload protection and short cycle protection with minimum on and off cycle timers.
2. Compressor shall be installed in a compartment accessible through hinged access doors, isolated from the treated air stream.
3. Line voltage controls, operating controls, refrigerant circuit access points, refrigerant flow control devices and compressors shall be accessible from a single location behind opposed hinged access doors for ease of service.
4. Compressors shall be mounted on rubber in shear isolators and refrigerant lines to include loops to absorb reaction torque.
5. Reverse rotation protection shall be provided for all compressors.
6. Lead circuit compressors shall be variable speed modulation (size 40-140) with HGBP.
7. Lead circuit variable speed compressor (size 40-140 tons) is capable of modulating its output from 100% to 58%.
8. Lag circuit compressors (40-140 tons) shall be fixed speed scroll with hot gas bypass.

E. Coils:
1. Standard evaporator coil shall have enhanced surface aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with brazed tube joints.
2. Standard condenser coil shall be microchannel heat exchanger (MCHX) on Air Cooled units. Standard condenser coil shall have enhanced surface aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with brazed tube joints (RTPF) on ASHP units.
3. MCHX Coils shall be vendor certified for 650 psig prior to unit assembly; leak tested at 300 psig, with a final test at 475 psig.
4. RTPF Coils shall be pressure tested at 650 psig prior to unit assembly; leak tested at 150 psig, with a final test at 475 psig.
5. Coaxial (tube in tube) refrigerant-to-water heat Exchanger with 40-70 ton units. Refrigerant-to-water heat exchangers shall be of copper inner water tube and steel outer refrigerant tube design rated to withstand 600 psig working refrigerant pressure and 400 psig working water pressure. The Coaxial HX inner tube is available in either copper or 90/10 cupronickel surrounded by steel outer tubes.
6. Brazed Plate refrigerant-to-water heat exchanger with 80-140 ton units. The BPHE shall be of 316 stainless steel designed to withstand 600 psig working refrigerant pressure and 400 psig working water pressure. The BPHE includes a stainless 60 mesh filter.
7. Both types of water cooled heat exchangers includes a factory installed and piped thermal dispersion flow switch for proof of fluid flow before energizing both cooling / heating, head pressure control valve for operating at low entering condenser water temperatures.
8. Optional coil coatings for corrosion protection shall be available (not on COAX or BPHE).

F. Refrigerant Components:
1. Unit shall be equipped with dual refrigerant circuits (sizes 40-140), with each circuit containing:
a. Solid core filter drier.
b. Field-adjustable, externally equalized thermostatic expansion valve.
c. Minimum load valve (hot gas bypass) on lead circuit with variable speed compressors and the lag circuit with fixed speed compressors.
d. Service access ports.

2. Air cooled units shall be equipped with condenser fan speed VFD to maintain head pressure. In the Recirculating mode, fan speed control will allow operation of compressors down to 55°F.
3. Reversing Valve: Reversing valves shall be four-way solenoid activated refrigerant valves. The valve will fail to heating operation, should the solenoid fail to function for WSHP units. Reversing valves that fail to the cooling operation shall not be allowed for WSHP units. The valve will fail to cooling operation, should the solenoid fail to function for ASHP units. Reversing valves that fail to the Heating operation shall not be allowed for ASHP units.

G. Filter Section:
1. Standard filter section shall be supplied with 2 in. thick MERV-8 pleated media filters.
2. Dirty Filter Status Switch: The manual reset filter status switch shall be a pressure differential switch and will indicate a dirty filter. The switch shall be factory installed.

H. Controls and Safeties:
1. Direct Digital Controller (DDC):
   a. BACnet™[1] protocol capable.
   b. Control program options shall include multiple variations for control priority, night set back (optional) and selectable overrides for field selection.
   c. Shall provide a 5°F temperature difference between cooling and heating set points to meet ASHRAE Standard 90.1-2016.
   d. Unit shall include factory-supplied supply air temperature and R.H. sensor (field install), entering coil or outdoor air temperature and R.H. sensor, and evaporator leaving air temperature sensor.
   e. Shall provide and display a current alarm list and an alarm history list.
   f. Compressor minimum run time (5 minutes) and minimum off time (5 minutes) shall be provided.
   g. Shall have service run test capability.
   h. Shall have a service Diagnostic mode.
   i. Dual circuit system shall have at least (1) compressor with a mechanical method of capacity modulation controlled with system logic to maintain supply-air temperature set point.
   j. Unit shall be complete with self-contained low voltage control circuit.
2. Safeties:
   a. Unit shall incorporate an electronic compressor lockout which provides optional reset capability should any of the following safety devices trip and shut off compressor:
      1) Compressor lockout protection provided for either internal or external overload.
      2) Low-pressure protection.
      3) Freeze protection (evaporator coil).
      4) High-pressure protection.
      5) Loss of charge protection.
      6) Condensate overflow switch
   b. Unit supply air temperature shall be monitored to detect abnormally high or low temperatures and disable the unit if a supply air fault condition exists.
   c. Unit shall be equipped with a supply fan status switch to protect the system in the event of a fan drive failure.
   d. Induced draft heating section shall be provided with the following minimum protections:
      1) High-temperature limit switch.
      2) Differential pressure switch to prove induced draft.
      3) Flame rollout switch.
      4) Flame proving controls.
      5) Redundant style gas valve.

I. Operating Characteristics:
1. Unit shall be capable of starting and running at 115°F outdoor ambient air temperature.
2. Air Cooled Units with standard controls will operate in cooling down to an outdoor ambient temperature of 55°F. WSHP units are capable of operating at flow rates between 1 - 3 GPM (gallons per minute) per ton. Water temperatures entering the unit should be between 40°F and 120°F in cooling mode, and between 30°F and 90°F in heating mode.
3. Units shall be equipped with a motorized two position Class 1A rated outdoor air (OA) damper for 100% OA operation. Control and isolation dampers to have a leakage rate of less than 3 cfm per sq ft at 1 in. pressure differential.

J. Electrical Requirements:
1. All unit power wiring shall enter unit cabinet at a single location with a single power point connection.
2. All units shall have a touch-safe control panel with separate high and low voltage sections.
3. Phase/Voltage Monitor:

   A factory-installed under-voltage and phase loss sensor shall stop the unit whenever voltage is too low, phases are out of sequence, or a phase is dropped. The unit will restart automatically within five minutes after the correct power is supplied.

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K. Motors:
   1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have either internal line break thermal and current overload protection or external current overload modules with compressor temperature sensors.
   2. All condenser fan motors on air cooled units shall be totally enclosed air-over (IP54) with permanently lubricated ball bearings, class F insulation and manual reset overload protection.
   3. All indoor-fan motors shall meet the standard efficiency requirements as established by the Energy Independence and Security Act of 2007 (EISA), effective December 10, 2010.
   4. Standard supply and exhaust fan motor shall be open drip proof (ODP) with variable speed drive (VFD) or EC motor.

L. Optional Features and Accessories:
   1. Hot Gas Reheat:
      A factory-installed hot gas reheat (HGRH) coil shall be available. The HGRH coil shall be available on the lead circuit only or on both refrigerant circuits. Units with HGRH will have variable speed low ambient head pressure control on air cooled units only. Modulating HGRH shall be available.
   2. Energy Recovery:
      a. General Requirements:
         1) The energy recovery cassette shall incorporate a rotary wheel in a cassette frame complete with removable energy transfer media, seals, drive motor, and drive belt.
         2) Energy recovery wheel performance shall be AHRI 1060 certified and bear the AHRI certified label. Components that are independently tested or “rated in accordance with” shall not be acceptable. Manufacturer membership in AHRI is not an acceptable substitute. Certified components must be listed as active in the AHRI Directory (www.ahridirectory.org).
         3) The energy recovery cassette shall be an Underwriters Laboratory UR recognized component for fire and electrical safety and bear the UR symbol. Recognized components shall be listed in the UL directory.
         4) The energy recovery cassette shall comply with NFPA 90A by virtue of UL standard 1812 and UL900 fire test for determination of flammability and smoke density.
      b. Cassette Frame and Wheel Construction:
         1) Cassette frame and structural components shall be constructed of G90 galvanized steel for corrosion resistance.
         2) Wheel structure shall consist of a welded hub, spoke, and continuous rolled rim assembly of stainless steel, and shall be self-supporting without energy transfer segments present.
         3) Wheel structure shall be connected to the shaft by means of taper lock bushings.
         4) Wheel bearings shall be permanently sealed and selected for a minimum 30-year L-10 life of 400,000 hours. Bearings requiring external grease fittings or periodic maintenance are not acceptable.
      c. Energy Transfer Media:
         1) Energy transfer media shall be constructed of a durable synthetic lightweight polymer.
         2) Media shall be wound continuously with one flat and one structural layer in an ideal parallel plate geometry. Airflow across heat exchanger surface shall remain laminar.
      d. Desiccant Material:
         1) Desiccant shall be silica gel and permanently bonded to the energy transfer media without the use of binders or adhesives, which may degrade desiccant performance. Desiccants not permanently bonded are not acceptable due to potential delamination or erosion of the desiccant from the energy transfer media.
         2) Desiccant shall be non-migrating, nor dissolve or deliquesce in the presence of water or high humidity.
         3) Energy transfer media shall be capable of repeated washing without significant degradation of the desiccant bond as documented by an independent third-party.
      e. Removable Energy Transfer Segments:
         1) Wheels 25 inch in diameter and greater shall be provided with removable energy transfer segments.
         2) Segments shall be removable without the use of tools to facilitate maintenance and cleaning.
      f. Seals:
         1) Seals shall be non-contact nylon pile brush seal orientated in a labyrinth-style configuration.

2) Diameter seals shall be fully adjustable and easily accessible.
3) Perimeter seals shall be permanently mounted to the wheel rim and not require adjustment. Seals that mount to the frame are not acceptable.

g. Drive System:
1) The wheel drive motor shall be an Underwriters Laboratory Recognized Component and shall be mounted in the cassette frame and supplied with a service connector or junction box.
2) Wheels 52 in. and smaller shall use a urethane stretch belt for wheel rim drive without the need for an external tensioner.
3) Wheels 58 in. and larger shall use a urethane non-stretch belt with integral cord and constant tensioner.
4) Wheel drive system shall not require periodic adjustment.
5) Energy wheel VFD defrost control is a standard feature. Air bypass option shall be available.

h. Maintenance:
1) Energy recovery segments shall be cleanable outside of the cabinet with detergent or alkaline coil cleaner and water.
2) Energy transfer segments shall be capable of submersion in a cleaning solution. Submersion shall be capable of restoring latent performance to within AHRI certified performance limits.

i. Purge:
1) A mechanical purge shall be available as an optional accessory as to avoid excessive fan power.
2) When required the mechanical purge sector shall be factory-installed and field adjustable.

3. Gas Heating:
a. Gas heat shall be induced-draft combustion type with energy saving direct spark ignition systems and redundant main gas valves.
b. The heat exchanger shall be of the tubular section type constructed of a minimum of 20-gauge 409 stainless steel.
c. Burners shall be of the in-shot type constructed of aluminum coated steel.
d. All gas piping shall enter the unit cabinet at a single location.
e. Gas heat shall be available in staged (2, 4, or 8 stages) or modulating (10:1 or 20:1 turndown) control, depending on the capacity.

4. Induced-Draft Fans:
a. Shall be direct-driven, single inlet, forward-curved centrifugal type.
b. Shall be statically and dynamically balanced.
c. Shall be made from steel with a corrosion-resistant finish.
d. High-corrosion areas such as flue gas collection and exhaust areas shall be lined with corrosion resistant material.

5. Electric Heat:
a. Electric resistance heaters shall be factory-installed, nichrome element type, open wire coils with 0.375 in. inside diameter, insulated with ceramic bushings, and include operating and safety controls. Coil ends shall be staked and welded to terminal screw slots.
b. Factory-installed electric heat shall have staged heat control (1, 2, or 4 stages) or SCR (silicon controlled rectifier) control providing infinite capacity adjustment.

6. Hot Water Heat:

Unit shall have a 4-row hot water coil, aluminum fin construction, installed downstream of the evaporator coil. Coil connection stubs will be located inside the unit cabinet. Hot water control valve to be field provided and installed. Unit controller shall provide valve modulation signal.

7. Liquid Subcooling Coil:

The unit can be equipped with a factory-installed liquid subcooling coil on all circuits.

8. Convenience Outlet:

Shall be factory-installed and externally mounted with a 115-v, 15 amp female GFI receptacle with hinged cover. The outlet shall be factory wired from a transformer and shall include a 15A breaker. The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect (if equipped).

9. Non-Fused Disconnect Switch:

Shall be factory-installed, externally mounted rotary or externally mounted blade type disconnect that is UL registered. Non-fused switch shall provide unit power shutoff and shall be accessible from outside the unit. The switch shall provide power off lockout capability.

10. 4 Inch Filters:

Optional filter section shall be supplied with 4 in. thick MERV-8, 11, or 13 pleated media filters.

Guide specifications (cont)

11. Commissioning User Interface:

    The commissioning display unit shall be Equipment Touch™, Field Assistant, or the Equipment Touch app.

12. Roof Curb with Sleeper Rail:

    Curb shall be formed of 14-gauge galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.

13. Exhaust Air Smoke Detector:

    A factory-installed smoke detector shall be mounted in the unit exhaust air intake.

14. Harsh Environment Coating:

    Unit shall be equipped with a factory-applied "Harsh Environment Protection" designed to combat the corrosive effects of industrial and commercial atmospheric conditions including: salt air, salt water, acid rain, chlorine and chlorides, hydrochloric, nitric, hydrofluoric, sulfuric and uric acid fumes, hydrogen sulfide gas, lye, sulfur dioxide, methane gas, hydrocarbons, chlorinated solvents and aromatic solvents. The Harsh Environment Protection shall include the following features, where applicable, to provide extra protection against corrosive atmospheric conditions:

    a. Vinyl-coated condenser fan guards (Air Cooled units only).
    b. Non-corroding condenser fan motor mounts (Air Cooled units only).
    c. Totally enclosed, single-speed, three-phase condenser fan motors (Air Cooled units only).
    d. Coated, refrigerant-to-air condenser with corrosion-resistant coil coating, composed of aluminum-impregnated polyurethane, rated for 10,000 hour salt spray (Air Cooled units only).
    e. Coated, refrigerant-to-air evaporator with corrosion-resistant coil-coating, composed of aluminum-impregnated polyurethane, rated for 10,000 hour salt spray.
    f. Coated, refrigerant-to-air hot gas reheat coil with corrosion-resistant coil coating, composed of polyurethane, rated for 10,000 hour salt spray.
    g. Coated, refrigerant-to-air subcooling coil with corrosion-resistant coil coating, composed of aluminum impregnated polyurethane, rated for 10,000 hour salt spray.
    h. All interior (un-insulated) cabinet panels coated with corrosion-resistant cabinet coating, composed of polyurethane, rated for 10,000 hour salt spray.
    i. All exterior surfaces of the cabinet coated with corrosion-resistant cabinet coating, composed of polyurethane, rated for 10,000 hour salt spray.
    j. All compressors, accumulators, factory-installed receivers, control device covers and refrigerant piping coated with corrosion-resistant cabinet coating, composed of polyurethane, rated for 10,000 hour salt spray. (Excludes dampers and blower fan blades.)

15. High Efficiency Condenser:

    Unit shall include condenser assembly with at least one additional condenser fan or at least one additional condenser fan with additional condenser surface area to provide improved unit efficiency and performance.

16. Airflow Monitor Control:

    Unit shall include a factory installed airflow monitor on the supply fan or the supply and exhaust fan. Unit control shall modulate the supply and exhaust fan to maintain the airflow set points.

17. Pressure Control:

    Unit shall include a supply duct pressure transducer (factory-supplied, field-installed). Control shall modulate the supply fan to maintain the supply duct pressure set point. Units with an exhaust fan will also include an building pressure transducer (factory-supplied, field-installed). Unit shall modulate the exhaust fan to maintain the building pressure set point.

18. TEFC Fan Motor:

    Unit shall include a totally enclosed supply or supply and exhaust fan motor.

19. Spring Vibration Isolation:

    Unit supply or supply and exhaust fan shall be mounted on spring vibration isolation (ODP or TEFC motors only).