

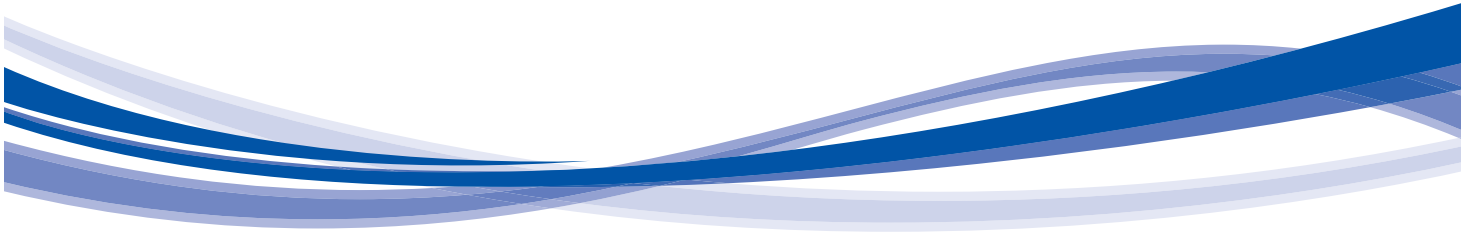


Turn to the experts

## Product Data

# Dedicated Outdoor Air Units

3 to 55 Nominal Tons



62X03-55  
Dedicated Vertical or Horizontal Outdoor Air Units  
with Optional Energy Wheel

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

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

- Capacities up to 55 nominal tons
- Vertical or horizontal supply configurations
- Puron® environmentally balanced refrigerant (R-410A) 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 direct drive, ECM (electronically commutated motor), and VFDs (variable frequency drives)
- Microprocessor control with available touchscreen interface (via accessory)
- Multiple reheat options — cycling, modulating or liquid subcooling
- Remote communication capability
- Lead circuit variable capacity compressor
- 100% outdoor air operation

### High efficiency

The Carrier 62X dedicated outdoor air system (DOAS) uses highly efficient, digital scroll compressors that have been optimally designed for use with Puron® refrigerant (R-410A).

Operating efficiency of the unit may be increased by adding the optional 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.

### Flexibility to suit many applications

The Carrier 62X units are designed to meet customer's requirements for new construction, replacement opportunities, and special applications. The customer can choose from vertical or horizontal supply configurations. The 62X unit has 9 supply and exhaust fan motor horsepower ratings, with back-

ward inclined and airfoil supply fans. Fans will have optional spring vibration isolation. Staged or modulating heat sources are available, including gas heat, electric insert or hot water coil.

Also available are modulating heat, hot gas reheat, power exhaust, 2 or 4-in. filters, and rotary energy recovery wheel.

Roof curbs that follow the NRCA (National Roofing Contractors Association) guidelines are available for vertical applications in 14-in. heights and are installed and weatherproofed by the roofing contractor. Units with horizontal connections may be either curb or slab mounted.

All 62X units bring in 100% outdoor air through the outdoor air intake hood and do not allow for recirculated air during Occupied mode. The 62X unit has multiple supply and exhaust configurations to allow for vertical or horizontal supply with no exhaust, vertical supply with vertical exhaust or horizontal supply and vertical exhaust.

All 62X units with exhaust may also be equipped with factory-installed power exhaust and/or an energy recovery wheel. The exhaust air to these units is not re-circulated or mixed with the incoming outside air. The exhaust air may be used to transfer energy to the incoming outdoor air via the energy conservation wheel and is then exhausted.

### Durable construction

Cabinets are constructed of heavy gage galvanized steel with a pre-painted 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, which adds rigidity to the structure and resists moisture intrusion.

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### 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 (size 10 and larger) 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® refrigerant (R-410A).

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 gage formed galvanized steel base rails with rigging openings to simplify handling and lifting at the job site.

### Indoor air quality

The Carrier dedicated outdoor air unit offers 2 and 4-in. filter tracks that accept a variety of filter types and filter MERV ratings.

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 gage 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.

### Heating systems

Carrier dedicated outdoor air units may be equipped with a variety of heat system types: gas heat (natural gas), 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 62X gas heaters are available from 75 up to 1200 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.

### Microprocessor control

The microprocessor-based 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 microprocessor control may be accomplished via the accessory Equipment Touch™ touchscreen display. The Equipment Touch is a wall-mounted user interface with a 4.3-in. touchscreen display. Interface can also be accomplished through the Android Equipment App on the Google Play store.

In addition, the microprocessor control has the following features:

- simple access to set points, time schedules, status values, and unit configuration parameters
- supports communications with BACnet<sup>1</sup>, Modbus<sup>2</sup>, and optionally with LonWorks<sup>3</sup> building automation protocols
- alarm history is recorded and may be accessed via the Equipment Touch accessory

- password protection
- compressor minimum off time (5 minutes) feature
- service test and a service Diagnostic mode

### 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, 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 can either have cycling or 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.

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1. BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers).  
 2. Modbus is a registered trademark of Schneider Electric.  
 3. LonWorks is a registered trademark of Echelon Corporation.

# Model number nomenclature



**62X B 07 D H K C - D G R B R A E**

**62X** – Dedicated Outdoor Air Unit

**Cabinet, Supply, Discharge**

- A** – 100% OA / Cabinet A / Vertical Supply / No Exhaust
- B** – 100% OA / Cabinet B / Vertical Supply / No Exhaust
- C** – 100% OA / Cabinet C / Vertical Supply / No Exhaust
- D** – 100% OA / Cabinet D / Vertical Supply / No Exhaust
- E** – 100% OA / Cabinet A / Horizontal Supply / No Exhaust
- F** – 100% OA / Cabinet B / Horizontal Supply / No Exhaust
- G** – 100% OA / Cabinet C / Horizontal Supply / No Exhaust
- H** – 100% OA / Cabinet D / Horizontal Supply / No Exhaust
- J** – 100% OA / Cabinet A / Vertical Supply / Vertical Exhaust
- K** – 100% OA / Cabinet B / Vertical Supply / Vertical Exhaust
- M** – 100% OA / Cabinet C / Vertical Supply / Vertical Exhaust
- N** – 100% OA / Cabinet D / Vertical Supply / Vertical Exhaust
- P** – 100% OA / Cabinet A / Horizontal Supply / Vertical Exhaust
- Q** – 100% OA / Cabinet B / Horizontal Supply / Vertical Exhaust
- R** – 100% OA / Cabinet C / Horizontal Supply / Vertical Exhaust
- S** – 100% OA / Cabinet D / Horizontal Supply / Vertical Exhaust
- T** – 100% OA / Cabinet BXL / Horizontal Supply / No Exhaust
- U** – 100% OA / Cabinet CXL / Vertical Supply / No Exhaust
- V** – 100% OA / Cabinet DXL / Vertical Supply / No Exhaust
- W** – 100% OA / Cabinet BXL / Horizontal Supply / No Exhaust
- X** – 100% OA / Cabinet CXL / Horizontal Supply / No Exhaust
- Y** – 100% OA / Cabinet DXL / Horizontal Supply / No Exhaust
- Z** – 100% OA / Cabinet BXL / Vertical Supply / Vertical Exhaust
- 2** – 100% OA / Cabinet CXL / Vertical Supply / Vertical Exhaust
- 3** – 100% OA / Cabinet DXL / Vertical Supply / Vertical Exhaust
- 4** – 100% OA / Cabinet BXL / Horizontal Supply / Vertical Exhaust
- 5** – 100% OA / Cabinet CXL / Horizontal Supply / Vertical Exhaust
- 6** – 100% OA / Cabinet DXL / Horizontal Supply / Vertical Exhaust
- 7** – 100% OA / Cabinet CL / Vertical Supply / No Exhaust
- 8** – 100% OA / Cabinet CL / Horizontal Supply / No Exhaust

**Unit Size – Nominal Capacity (MBH)**

|                 |                 |                 |
|-----------------|-----------------|-----------------|
| <b>03</b> – 36  | <b>12</b> – 150 | <b>40</b> – 480 |
| <b>04</b> – 48  | <b>15</b> – 180 | <b>45</b> – 540 |
| <b>05</b> – 60  | <b>18</b> – 210 | <b>50</b> – 600 |
| <b>06</b> – 72  | <b>20</b> – 240 | <b>55</b> – 660 |
| <b>07</b> – 84  | <b>25</b> – 300 |                 |
| <b>08</b> – 96  | <b>30</b> – 360 |                 |
| <b>10</b> – 120 | <b>35</b> – 420 |                 |

**Energy Recovery Ventilator (ERV) Wheel**

| Wheel #  | Diameter | Thickness | Bypass |
|----------|----------|-----------|--------|
| –        | –        | –         | –      |
| <b>A</b> | 24       | 4         | Yes    |
| <b>B</b> | 32       | 4         | Yes    |
| <b>C</b> | 36       | 4         | Yes    |
| <b>D</b> | 42       | 4         | Yes    |
| <b>E</b> | 48       | 4         | Yes    |
| <b>F</b> | 48       | 6         | Yes    |
| <b>G</b> | 54       | 4         | Yes    |
| <b>H</b> | 60       | 4         | Yes    |
| <b>J</b> | 60       | 6         | Yes    |
| <b>K</b> | 66       | 4         | Yes    |
| <b>M</b> | 66       | 6         | Yes    |
| <b>N</b> | 24       | 4         | No     |
| <b>P</b> | 32       | 4         | No     |
| <b>Q</b> | 36       | 4         | No     |
| <b>R</b> | 42       | 4         | No     |
| <b>S</b> | 48       | 4         | No     |
| <b>T</b> | 48       | 6         | No     |
| <b>U</b> | 54       | 4         | No     |
| <b>V</b> | 60       | 4         | No     |
| <b>W</b> | 60       | 6         | No     |
| <b>X</b> | 66       | 4         | No     |
| <b>Y</b> | 66       | 6         | No     |

**SEE NEXT PAGE  
FOR REMAINDER  
OF MODEL NUMBER  
NOMENCLATURE**

**Supply Fan Motor Options**

- A** – 1 HP ODP with VFD
- B** – 1 1/2 HP ODP with VFD
- C** – 2 HP ODP with VFD
- D** – 3 HP ODP with VFD
- E** – 5 HP ODP with VFD
- F** – 7 1/2 HP ODP with VFD
- G** – 10 HP ODP with VFD
- H** – 15 HP ODP with VFD
- J** – 1 HP TEFC with VFD
- K** – 1 1/2 HP TEFC with VFD
- M** – 2 HP TEFC with VFD
- N** – 3 HP TEFC with VFD
- P** – 5 HP TEFC with VFD
- Q** – 7 1/2 HP TEFC with VFD
- R** – 10 HP TEFC with VFD
- S** – 15 HP TEFC with VFD
- T** – ECM
- U** – Dual ECM (D Cabinet Only)

**Coil and Reheat Options**

| Evaporator Coil Rows | HGRH    | HGRH Circuit | Sub-Cooling | Condenser Fans |
|----------------------|---------|--------------|-------------|----------------|
| <b>G</b> – 6         | Cycling | Lead         | —           | Var Speed      |
| <b>H</b> – 6         | Cycling | Dual         | —           | Var Speed      |
| <b>J</b> – 6         | Mod     | Lead         | —           | Var Speed      |
| <b>K</b> – 6         | Mod     | Dual         | —           | Var Speed      |
| <b>M</b> – 6         | Mod     | Lead         | SubCooling  | Var Speed      |
| <b>N</b> – 6         | Cycling | Lead         | SubCooling  | Var Speed      |

**Heat Options**

|          | MBtuh input    | Temperature Rise* | E-Heat kW |
|----------|----------------|-------------------|-----------|
| –        | –              | None              |           |
| <b>A</b> | 75             | Standard          | n/a       |
| <b>B</b> | 100            | Standard          | n/a       |
| <b>C</b> | 150            | Standard          | n/a       |
| <b>D</b> | 200            | Standard          | n/a       |
| <b>E</b> | 250            | Standard          | n/a       |
| <b>F</b> | 300            | Standard          | n/a       |
| <b>G</b> | 350            | Standard          | n/a       |
| <b>H</b> | 400            | Standard          | n/a       |
| <b>I</b> | 200            | High (XL)         | n/a       |
| <b>J</b> | 300            | High (XL)         | n/a       |
| <b>K</b> | 400            | High (XL)         | n/a       |
| <b>L</b> | 500            | High (XL)         | n/a       |
| <b>M</b> | 600            | High (XL)         | n/a       |
| <b>N</b> | 700            | High (XL)         | n/a       |
| <b>O</b> | 800            | High (XL)         | n/a       |
| <b>P</b> | 1000           | High (XL)         | n/a       |
| <b>Q</b> | 1200           | High (XL)         | n/a       |
| <b>S</b> | n/a            | n/a               | 5         |
| <b>T</b> | n/a            | n/a               | 10        |
| <b>U</b> | n/a            | n/a               | 15        |
| <b>V</b> | n/a            | n/a               | 20        |
| <b>W</b> | n/a            | n/a               | 25        |
| <b>X</b> | n/a            | n/a               | 30        |
| <b>Y</b> | n/a            | n/a               | 35        |
| <b>Z</b> | n/a            | n/a               | 40        |
| <b>1</b> | n/a            | n/a               | 50        |
| <b>2</b> | n/a            | n/a               | 60        |
| <b>3</b> | n/a            | n/a               | 70        |
| <b>4</b> | n/a            | n/a               | 80        |
| <b>5</b> | n/a            | n/a               | 100       |
| <b>6</b> | n/a            | n/a               | 110       |
| <b>7</b> | n/a            | n/a               | 120       |
| <b>8</b> | Hot Water Coil |                   |           |

\* 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.

NOTE: Please see latest version of Carrier's Dedicated Outdoor Air Systems Builder program for any size and option restrictions.

62X B 07 D J K C - D G R B R AE

**SEE PREVIOUS PAGE  
FOR REMAINDER  
OF MODEL NUMBER  
NOMENCLATURE**

**Control Options and Filters**

| 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 14 |
| 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 14 |

**Voltage Options, Compressor and Condenser Fans**

| Voltage      | Compressor       | Condenser Fans<br>(Min, High Efficiency) |
|--------------|------------------|--|
| A - 208-3-60 | VCC Lead Circuit | Standard Efficiency                      |
| C - 208-3-60 | VCC Lead Circuit | High Efficiency                          |
| E - 230-3-60 | VCC Lead Circuit | Standard Efficiency                      |
| G - 230-3-60 | VCC Lead Circuit | High Efficiency                          |
| J - 460-3-60 | VCC Lead Circuit | Standard Efficiency                      |
| M - 460-3-60 | VCC Lead Circuit | High Efficiency                          |
| P - 575-3-60 | VCC Lead Circuit | Standard Efficiency                      |
| R - 575-3-60 | VCC Lead Circuit | High Efficiency                          |

**Design Series**

G - Revision G Controls

**Factory Installed Options**

Refer to table 3 for available option codes

**Exhaust Fan**

- - None
- A - 280 mm, BI
- B - 355 mm, BI
- C - 450 mm, BI
- D - 10 in., BI
- E - 11 in., BI
- F - 12 in., BI
- G - 14 in., BI
- H - 16 in., BI
- J - 18 in., BI
- K - 20 in., BI
- M - 22 in., BI
- N - 25 in., BI
- P - 12 in., AF
- Q - 14 in., AF
- R - 16 in., AF
- S - 18 in., AF
- T - 20 in., AF
- U - 22 in., AF
- V - 25 in., AF

**Power Exhaust Fan Motor Options**

- - None
- A - 1 HP ODP with VFD
- B - 1 1/2 HP ODP with VFD
- C - 2 HP ODP with VFD
- D - 3 HP ODP with VFD
- E - 5 HP ODP with VFD
- F - 7 1/2 HP ODP with VFD
- G - 10 HP ODP with VFD
- H - 15 HP ODP with VFD
- J - 1 HP TEFC with VFD
- K - 1 1/2 HP TEFC with VFD
- M - 2 HP TEFC with VFD
- N - 3 HP TEFC with VFD
- P - 5 HP TEFC with VFD
- Q - 7 1/2 HP TEFC with VFD
- R - 10 HP TEFC with VFD
- S - 15 HP TEFC with VFD
- T - ECM
- U - Dual ECM (D Cabinet Only)

**Supply Fan**

- A - 280 mm, BI
- B - 355 mm, BI
- C - 450 mm, BI
- D - 10 in., BI
- E - 11 in., BI
- F - 12 in., BI
- G - 14 in., BI
- H - 16 in., BI
- J - 18 in., BI
- K - 20 in., BI
- M - 22 in., BI
- N - 25 in., BI
- P - 12 in., AF
- Q - 14 in., AF
- R - 16 in., AF
- S - 18 in., AF
- T - 20 in., AF
- U - 22 in., AF
- V - 25 in., AF

**LEGEND**

- AF - Airfoil
- BI - Backward Inclined
- ECM - Electronically Commutated Motor
- N/A - Not Applicable
- ODP - Open Drip Proof
- TEFC - Totally Enclosed Fan Cooled
- VFD - Variable Frequency Drive

## 62X 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 62X unit is a direct expansion (DX) DOAS unit with auxiliary heating and optional energy recovery. The 62X unit is designed and built for optimal performance in ventilation applications. While the 62X 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 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 is that outdoor air 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 zone conditioning 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. 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 microprocessor controller, controlling multiple aspects of the DOAS units. To enable cooling, dehumidification, or heating, the microprocessor 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 growth.

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.

## Heating mode

When the outdoor air temperature is cold, the DOAS unit will enter Heating mode. The heater is enabled and will operate to maintain a heating supply air temperature set point, typically 65°F to 75°F.

## Cooling/Dehumidification mode

When the outdoor air is humid or hot, 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 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. Below 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)

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

$$V_{BZ} = (10 \text{ CFM/Person} \cdot 25 \text{ People}) + (1000\text{ft}^2 \cdot .12 \text{ CFM/ft}^2)$$

$$V_{BZ} = (10 \cdot 25) + (1000 \cdot .12) = 370 \text{ CFM}$$

### 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 a dehumidification 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 to 250 CFM 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 applications. 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 dehumidification conditions for the project location as follows:

1. Base the design of the dry bulb and wet bulb temperatures upon the design dehumidification day (max latent load) for the project location. The DOAS unit must be sized based on the design dehumidification day. If the conditions listed on the schedule are not the design dehumidification 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 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.

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 62X 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.

If the DOAS unit will be discharging directly to the space (parallel application), modulating reheat control is recommended for precise supply air temperature control. If the DOAS unit is discharging into the return of an ancillary HVAC unit (series application), cycling HGRH (hot gas reheat) may be acceptable.

A DOAS unit should have at least one variable capacity (digital) compressor on the lead circuit, due to the wide load range of outdoor air. The digital compressor allows for proper minimum load control.

For a DOAS unit in humid climates or applications requiring low supply air dew point temperatures, using digital compressors on all circuits is recommended. This allows for full coil operation to ensure proper dehumidification.

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 (10:1) 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 subcooling is active anytime the unit calls for reheat, potentially allowing the unit to be downsized.

## GAS HEAT CAPACITIES

| 62X UNIT CABINET SIZE* | UNIT CAPACITY (tons)* | INPUT (Btuh) | OUTPUT (Btuh) | XL CABINET REQUIRED | NO. OF GAS HEAT SECTIONS | NO. OF STAGES | MODULATION RANGE (%)† | MAXIMUM TEMP RISE (F) (HORIZONTAL/VERTICAL SUPPLY)** |
|------------------------|-----------------------|--------------|---------------|---------------------|--------------------------|---------------|-----------------------|--|
| A                      | 3-8                   | 75,000       | 60,000        | —                   | 1                        | 2             | 5:1                   | 80/100   |
|                        | 3-8                   | 100,000      | 80,000        | —                   | 1                        | 2             | 5:1                   | 80/100   |
| B                      | 3-20                  | 75,000       | 60,000        | —                   | 1                        | 2             | 5:1                   | 80/100   |
|                        | 3-20                  | 100,000      | 80,000        | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 3-20                  | 150,000      | 120,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 3-20                  | 200,000      | 160,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
| B XL                   | 3-20                  | 200,000      | 160,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 3-20                  | 300,000      | 240,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 3-20                  | 400,000      | 320,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
| C                      | 7-35                  | 75,000       | 60,000        | —                   | 1                        | 2             | 5:1                   | 80/100   |
|                        | 7-35                  | 100,000      | 80,000        | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 7-35                  | 150,000      | 120,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 7-35                  | 200,000      | 160,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 7-35                  | 250,000      | 200,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 7-35                  | 300,000      | 240,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
| CL                     | 10-35                 | 350,000      | 280,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 10-35                 | 400,000      | 320,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
| C XL                   | 7-35                  | 300,000      | 240,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 7-35                  | 200,000      | 160,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 7-35                  | 400,000      | 320,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 7-35                  | 500,000      | 400,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 7-35                  | 600,000      | 480,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 7-35                  | 700,000      | 560,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 7-35                  | 800,000      | 640,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
| D                      | 20-40                 | 150,000      | 120,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 20-40                 | 200,000      | 160,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 20-40                 | 250,000      | 200,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 20-40                 | 300,000      | 240,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 20-40                 | 350,000      | 280,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
|                        | 20-40                 | 400,000      | 320,000       | —                   | 1                        | 2             | 5:1, 10:1             | 80/100   |
| D XL                   | 20-55                 | 400,000      | 320,000       | XL                  | 1                        | 2             | 5:1, 10:1             | 130/160  |
|                        | 20-55                 | 500,000      | 400,000       | XL                  | 1                        | 2             | 5:1, 10:1             | 130/160  |
|                        | 20-55                 | 600,000      | 480,000       | XL                  | 1                        | 2             | 5:1, 10:1             | 130/160  |
|                        | 20-55                 | 700,000      | 560,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 20-55                 | 800,000      | 640,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 20-55                 | 1,000,000    | 800,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |
|                        | 20-55                 | 1,200,000    | 960,000       | XL                  | 2                        | 4             | 10:1                  | 130/160  |

\* Unit cabinet and tonnage matches are dependent on presence of ERV.

† Standard gas heaters are either 2 or 4 stage heaters. 5:1 and 10:1 modulation turn down is optional.

\*\* Maximum temperature rise dependent on unit supply configuration.



### MULTIPLE CABINET OPTIONS

| TONS | 62X CABINETS           |                        |                        |                        |
|------|------------------------|------------------------|------------------------|------------------------|
|      | A                      | B/BXL                  | C/CL/CXL               | D/DXL                  |
| 3    | X                      | X                      |                        |                        |
| 4    | X                      | X                      |                        |                        |
| 5    | X                      | X                      |                        |                        |
| 6    | Not Available with ERV | X                      |                        |                        |
| 7    | Not Available with ERV | X                      | ERV Required           |                        |
| 8    | Not Available with ERV | X                      | ERV Required           |                        |
| 10   |                        | X                      | X                      |                        |
| 12   |                        | X                      | X                      |                        |
| 15   |                        | Not Available with ERV | X                      |                        |
| 17.5 |                        |                        | X                      |                        |
| 20   |                        |                        | X                      | X                      |
| 25   |                        |                        | X                      | X                      |
| 30   |                        |                        | Not Available with ERV | X                      |
| 35   |                        |                        | Not Available with ERV | X                      |
| 40   |                        |                        |                        | Not Available with ERV |
| 45   |                        |                        |                        | Not Available with ERV |
| 50   |                        |                        |                        | Not Available with ERV |
| 55   |                        |                        |                        | Not Available with ERV |

### ENERGY CONSERVATION WHEEL CAPACITIES

| 62X CABINET SIZE | WHEEL DIAMETER (in.) | WHEEL THICKNESS (in.) |
|------------------|----------------------|-----------------------|
| A                | 24                   | 4                     |
|                  | 32                   | 4                     |
|                  | 36                   | 4                     |
| B<br>BXL         | 24                   | 4                     |
|                  | 32                   | 4                     |
|                  | 36                   | 4                     |
|                  | 42                   | 4                     |
| C<br>CXL         | 32                   | 4                     |
|                  | 36                   | 4                     |
|                  | 42                   | 4                     |
|                  | 48                   | 4<br>6                |
| D<br>DXL         | 48                   | 4<br>6                |
|                  | 54                   | 4                     |
|                  | 60                   | 4<br>6                |
|                  |                      | 4<br>6                |
|                  | 66                   | 4<br>6                |

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

# Ratings and capacities (cont)



## ELECTRIC HEAT CAPACITIES

| 62X CABINET AND SIZE*                              | ELECTRIC HEAT kW<br>(240,480 v) | ELECTRIC HEAT kW<br>(208 v) | STAGES | AMPS  |       |       |
|--|---------------------------------|-----------------------------|--------|-------|-------|-------|
|  |                                 |                             |        | 240 v | 480 v | 208 v |
| <b>A Cabinet 03-08</b>                             | 5.0                             | 3.8                         | 1      | 12.0  | 6.0   | 10.4  |
|  | 10.0                            | 7.5                         | 2, SCR | 24.1  | 12.0  | 20.8  |
|  | 15.0                            | 11.3                        | 2, SCR | 36.1  | 18.0  | 31.2  |
|  | 20.0                            | 15.0                        | 2, SCR | 48.1  | 24.1  | 41.6  |
|  | 25.0                            | 18.8                        | 2, SCR | 60.1  | 30.1  | 52.0  |
|  | 30.0                            | 22.5                        | 2, SCR | 72.2  | 36.1  | 62.5  |
| <b>B/BXL Cabinet 03-20<br/>C/CXL Cabinet 07-35</b> | 5.0                             | 3.8                         | 1      | 12.0  | 6.0   | 10.4  |
|  | 10.0                            | 7.5                         | 2, SCR | 24.1  | 12.0  | 20.8  |
|  | 15.0                            | 11.3                        | 2, SCR | 36.1  | 18.0  | 31.2  |
|  | 20.0                            | 15.0                        | 2, SCR | 48.1  | 24.1  | 41.6  |
|  | 25.0                            | 18.8                        | 2, SCR | 60.1  | 30.1  | 52.0  |
|  | 30.0                            | 22.5                        | 2, SCR | 72.2  | 36.1  | 62.5  |
|  | 35.0                            | 26.3                        | 2, SCR | 84.2  | 42.1  | 72.9  |
|  | 40.0                            | 30.0                        | 2, SCR | 96.2  | 48.1  | 83.3  |
|  | 50.0                            | 37.5                        | 4, SCR | 120.3 | 60.1  | 104.1 |
|  | 60.0                            | 45.0                        | 4, SCR | 144.3 | 72.2  | 124.9 |
|  | 70.0                            | 52.5                        | 4, SCR | 168.4 | 84.2  | 145.7 |
|  | 80.0                            | 60.0                        | 4, SCR | 192.5 | 96.2  | 166.5 |
| 100.0  | 75.0                            | 4, SCR                      | 240.6  | 120.3 | 208.2 |       |
| <b>D/DXL Cabinet 20-55</b>                         | 5.0                             | 3.8                         | 1      | 12.0  | 6.0   | 10.4  |
|  | 10.0                            | 7.5                         | 2, SCR | 24.1  | 12.0  | 20.8  |
|  | 15.0                            | 11.3                        | 2, SCR | 36.1  | 18.0  | 31.2  |
|  | 20.0                            | 15.0                        | 2, SCR | 48.1  | 24.1  | 41.6  |
|  | 25.0                            | 18.8                        | 2, SCR | 60.1  | 30.1  | 52.0  |
|  | 30.0                            | 22.5                        | 2, SCR | 72.2  | 36.1  | 62.5  |
|  | 35.0                            | 26.3                        | 2, SCR | 84.2  | 42.1  | 72.9  |
|  | 40.0                            | 30.0                        | 2, SCR | 96.2  | 48.1  | 83.3  |
|  | 50.0                            | 37.5                        | 4, SCR | 120.3 | 60.1  | 104.1 |
|  | 60.0                            | 45.0                        | 4, SCR | 144.3 | 72.2  | 124.9 |
|  | 70.0                            | 52.5                        | 4, SCR | 168.4 | 84.2  | 145.7 |
|  | 80.0                            | 60.0                        | 4, SCR | 192.5 | 96.2  | 166.5 |
|  | 100.0                           | 75.0                        | 4, SCR | 240.6 | 120.3 | 208.2 |
|  | 110.0                           | 82.5                        | 4, SCR | 264.6 | 132.3 | 229.0 |
| 120.0  | 90.0                            | 4, SCR                      | 288.7  | 144.3 | 249.8 |       |

### LEGEND

**SCR** — Silicon-Controlled Rectifier

\*Unit cabinet and tonnage matches are dependent on presence of ERV.

### NOTES:

1. Minimum entering air temperature is -30°F.
2. Maximum entering air temperature is 104°F.
3. Minimum temperature rise is 12°F.
4. Maximum temperature rise is 76°F.
5. Minimum leaving air temperature is N/A.
6. Maximum leaving air temperature is 180°F.
7. SCR optional on all sizes except 5 kW.

# Physical data - 62X, A cabinet



| UNIT 62X A CABINET  | 03                               | 04        | 05        | 06            | 07        | 08        |
|---|----------------------------------|-----------|-----------|---------------|-----------|-----------|
| <b>NOMINAL CAPACITY (TONS)</b>                            | <b>3</b>                         | <b>4</b>  | <b>5</b>  | <b>6</b>      | <b>7</b>  | <b>8</b>  |
| <b>COMPRESSOR</b>   |                                  |           |           |               |           |           |
| <b>Unit without ERV</b>                                   |                                  |           |           |               |           |           |
| Quantity/Unit...Model                                     | 1...ZPD34                        | 1...ZPD42 | 1...ZPD51 | 1...ZPD54     | 1ZPD...72 | 1ZPD...83 |
| <b>Unit with ERV</b>                                      |                                  |           |           |               |           |           |
| Quantity/Unit...Model                                     | 1...ZPD34                        | 1...ZPD42 | 1...ZPD51 | 1...ZPD61     | 1ZPD...72 | 1ZPD...83 |
| <b>Number of Refrigerant Circuits</b>                     | 1                                |           |           |               |           |           |
| <b>Oil</b>  | Pre-Charged                      |           |           |               |           |           |
| <b>REFRIGERANT TYPE</b>                                   | R-410A                           |           |           |               |           |           |
| <b>CONDENSER COIL</b>                                     |                                  |           |           |               |           |           |
| Standard Efficiency Condenser (sq ft)                     | 10.0                             | 10.0      | 10.0      | 13.5          | 13.5      | 13.5      |
| High-Efficiency Condenser (sq ft)                         | —                                | —         | —         | —             | 27        | 27        |
| <b>CONDENSER FAN</b>                                      |                                  |           |           |               |           |           |
| <b>Standard Capacity Condenser</b>                        |                                  |           |           |               |           |           |
| Nominal Cfm (total)                                       | 4000                             | 4000      | 4000      | 5200          | 5200      | 5200      |
| Quantity ... Diameter (mm)                                | 1...630                          |           |           |               |           |           |
| Motor Hp  | 1.3                              | 1.3       | 1.3       | 1.3           | 1.3       | 1.3       |
| <b>High Capacity Condenser</b>                            |                                  |           |           |               |           |           |
| Nominal Cfm (total)                                       | —                                | —         | —         | —             | 11200     | 11200     |
| Quantity ... Diameter (mm)                                | —                                | —         | —         | —             | 2...630   | 2...630   |
| Motor Hp  | —                                | —         | —         | —             | 1.3       | 1.3       |
| <b>HIGH-PRESSURE SWITCH (PSIG)</b>                        |                                  |           |           |               |           |           |
| Cutout  | 640                              |           |           |               |           |           |
| Reset (Manual)  | 595                              |           |           |               |           |           |
| <b>EVAPORATOR COIL</b>                                    |                                  |           |           |               |           |           |
| Face Area without ERV (sq ft)                             | 2.8                              | 2.8       | 2.8       | 4.7           | 4.7       | 4.7       |
| Face Area with ERV (sq ft)                                | 7                                | 7         | 7         | Use B Cabinet |           |           |
| <b>SUPPLY FAN</b>   |                                  |           |           |               |           |           |
| Backward Curved ECM (mm)                                  | 280, 355                         |           |           |               |           |           |
| Airfoil (in.)   | —                                |           |           |               |           |           |
| Backward Inclined (in.)                                   | —                                |           |           |               |           |           |
| Nominal Cfm 100% OA                                       | 450                              | 600       | 750       | 900           | 1050      | 1200      |
| <b>OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL</b> |                                  |           |           |               |           |           |
| Face Area without ERV (sq ft)                             | 2.8                              | 2.8       | 2.8       | 4.7           | 4.7       | 4.7       |
| Face Area with ERV (sq ft)                                | 7                                | 7         | 7         | Use B Cabinet |           |           |
| <b>LOW-PRESSURE SWITCH (PSIG)</b>                         |                                  |           |           |               |           |           |
| Cutout  | 35                               |           |           |               |           |           |
| Reset (Auto)  | 55                               |           |           |               |           |           |
| <b>CONDENSATE DRAIN CONNECTION (NPT) (in.)</b>            | 0.75                             |           |           |               |           |           |
| <b>OPTIONAL GAS HEAT SECTION</b>                          |                                  |           |           |               |           |           |
| Gas Input Sizes (Btuh x 1000)                             | 75, 100                          |           |           |               |           |           |
| <b>Control Type</b>                                       |                                  |           |           |               |           |           |
| Stages (no. of stages)                                    | 2                                |           |           |               |           |           |
| Modulating (% range)*                                     | 5:1, 10:1*                       |           |           |               |           |           |
| Efficiency (Steady State) (%)                             | 80                               |           |           |               |           |           |
| 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 |           |           |               |           |           |
| <b>Manifold Pressure (in. wg)</b>                         |                                  |           |           |               |           |           |
| Natural Gas Std   | 3.5                              |           |           |               |           |           |
| LP Gas Special Order                                      | 10                               |           |           |               |           |           |

# Physical data - 62X, A cabinet (cont)



| UNIT 62X A CABINET                              | 03   | 04                      | 05                      | 06   | 07   | 08   |
|---|--|-------------------------|-------------------------|--|------|------|
| <b>NOMINAL CAPACITY (TONS)</b>                  | 3  | 4                       | 5                       | 6  | 7    | 8    |
| <b>OPTIONAL ELECTRIC HEAT</b>                   |  |                         |                         |  |      |      |
| Size Range (kW)                                 | 5, 10, 15, 20, 25, 30                        |                         |                         |  |      |      |
| Control Type                                    |  |                         |                         |  |      |      |
| Stages (no. of stages)                          | 1, 2, 4                                      |                         |                         |  |      |      |
| SCR (% range)*                                  | 0-100  |                         |                         |  |      |      |
| <b>OPTIONAL HOT WATER HEAT COIL WITH ERV</b>    | 22.5 x 42, 2 row, 10 FPI, with 1/2 in. tubes |                         |                         | Use B Cabinet                                |      |      |
| <b>OPTIONAL HOT WATER HEAT COIL WITHOUT ERV</b> | 17.5 x 20, 2 row, 10 FPI, with 1/2 in. tubes |                         |                         | 17.5 x 34, 2 row, 10 FPI, with 1/2 in. tubes |      |      |
| <b>OUTDOOR AIR FILTERS</b>                      |  |                         |                         |  |      |      |
| <b>Quantity ... Size (in.) with ERV</b>         |  |                         |                         |  |      |      |
| Standard 2-in. MERV 8                           | 2...24x24                                    |                         |                         | Use B Cabinet                                |      |      |
| Optional 4-in.                                  |  |                         |                         |  |      |      |
| MERV 8  | 2...24x24                                    |                         |                         |  |      |      |
| MERV 11   | 2...24x24                                    |                         |                         | Use B Cabinet                                |      |      |
| MERV 14   | 2...24x24                                    |                         |                         |  |      |      |
| <b>Quantity ... Size (in.) without ERV</b>      |  |                         |                         |  |      |      |
| Standard 2-in. MERV 8                           | 1...20x24                                    |                         |                         | 1...16x20, 1...20x20                         |      |      |
| Optional 4-in.                                  |  |                         |                         |  |      |      |
| MERV 8  | 1...20x24                                    |                         |                         | 1...16x20, 1...20x20                         |      |      |
| MERV 11   | 1...20x24                                    |                         |                         | 1...16x20, 1...20x20                         |      |      |
| MERV 14   | 1...20x24                                    |                         |                         | 1...16x20, 1...20x20                         |      |      |
| <b>OPTIONAL ERV</b>                             |  |                         |                         |  |      |      |
| Type  | Molecular Sieve                              |                         |                         | Use B Cabinet                                |      |      |
| Diameter ... depth (in.)                        | 24...4, 32...4, 36...4                       |                         |                         | Use B Cabinet                                |      |      |
| <b>OPTIONAL ERV FILTERS</b>                     |  |                         |                         |  |      |      |
| <b>Quantity ... Size (in.)</b>                  |  |                         |                         |  |      |      |
| with 24 in. ERV                                 | 4...12x24                                    | 4...12x24               | 4...12x24               | Use B Cabinet                                |      |      |
| with 32 in. ERV                                 | 6...18x20                                    | 6...18x20               | 6...18x20               | Use B Cabinet                                |      |      |
| with 36 in. ERV                                 | 2...20x20,<br>2...20x24                      | 2...20x20,<br>2...20x24 | 2...20x20,<br>2...20x24 | Use B Cabinet<br>Use B Cabinet               |      |      |
| <b>OPTIONAL EXHAUST FAN</b>                     |  |                         |                         |  |      |      |
| Backward Curved ECM (mm)                        | 280, 355                                     |                         |                         |  |      |      |
| Airfoil (in.)                                   | —  |                         |                         |  |      |      |
| Backward Inclined (in.)                         | —  |                         |                         |  |      |      |
| Nominal Cfm                                     | 450  | 600                     | 750                     | 900  | 1050 | 1200 |

## LEGEND

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

\* Optional.

NOTE: For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder. 10:1 gas heat not available for 75 MBH heater.

# Physical data - 62X, B-BXL cabinet



| UNIT 62X B CABINET  | 03   | 04        | 05        | 06        | 07        | 08        | 10  | 12  | 15                                     | 18                                     | 20  |
|---|--|-----------|-----------|-----------|-----------|-----------|---|---|--|--|---|
| <b>NOMINAL CAPACITY (TONS)</b>                            | 3  | 4         | 5         | 6         | 7         | 8         | 10  | 12  | 15                                     | 17.5                                   | 20  |
| <b>COMPRESSOR</b>   |  |           |           |           |           |           |   |   |  |  |   |
| <b>Unit without ERV</b>                                   |  |           |           |           |           |           |   |   |  |  |   |
| Quantity/Unit ... Model                                   | 1...ZPD34  | 1...ZPD42 | 1...ZPD51 | 1...ZPD54 | 1...ZPD72 | 1...ZPD83 | 1...ZPD51,<br>1...ZP51<br>or<br>2...ZPD51 | 1...ZPD61,<br>1...ZP61<br>or<br>2...ZPD61 | 1...ZPD72,<br>1...ZP72 or<br>2...ZPD72 | 1...ZPD91,<br>1...ZP91 or<br>2...ZPD91 | 1...ZPD103,<br>1...ZPD103<br>or<br>2...ZPD103 |
| <b>Unit with ERV</b>                                      |  |           |           |           |           |           |   |   |  |  |   |
| Quantity/Unit ... Model                                   | 1...ZPD34  | 1...ZPD42 | 1...ZPD51 | 1...ZPD61 | 1...ZPD72 | 1...ZPD83 | 1...ZPD51,<br>1...ZP51<br>or<br>2...ZPD51 | 1...ZPD61,<br>1...ZP61<br>or<br>2...ZPD61 | 1...ZPD83,<br>1...ZP83 or<br>2...ZPD83 | 1...ZPD91,<br>1...ZP91 or<br>2...ZPD91 | 1...ZPD103,<br>1...ZPD103<br>or<br>2...ZPD103 |
| <b>Number of Refrigerant Circuits</b>                     | 1  |           |           |           |           |           | 2   |   |  |  |   |
| <b>Oil</b>  | Pre-Charged  |           |           |           |           |           |   |   |  |  |   |
| <b>REFRIGERANT TYPE</b>                                   | R-410A   |           |           |           |           |           |   |   |  |  |   |
| <b>CONDENSER COIL</b>                                     |  |           |           |           |           |           |   |   |  |  |   |
| Standard Efficiency Condenser (sq ft)                     | 10.0   | 10.0      | 10.0      | 13.5      | 13.5      | 13.5      | 27  | 27  | 27                                     | 27                                     | 40  |
| High-Efficiency Condenser (sq ft)                         | —  | —         | —         | —         | 27.0      | 27.0      | —   | —   | 40                                     | 40                                     | 54  |
| <b>CONDENSER FAN</b>                                      |  |           |           |           |           |           |   |   |  |  |   |
| <b>Standard Capacity Condenser</b>                        |  |           |           |           |           |           |   |   |  |  |   |
| Nominal Cfm (total)                                       | 4000   | 4000      | 4000      | 5200      | 5200      | 5200      | 11,200                                    | 11,200                                    | 10,600                                 | 10,600                                 | 15,600  |
| Quantity ... Diameter (mm)                                | 1...630  | 1...630   | 1...630   | 1...630   | 1...630   | 1...630   | 2...630                                   | 2...630                                   | 2...630                                | 2...630                                | 3...630                                       |
| Motor Hp  | 1.3  | 1.3       | 1.3       | 1.3       | 1.3       | 1.3       | 1.3                                       | 1.3                                       | 1.3                                    | 1.3                                    | 1.3   |
| <b>High Capacity Condenser</b>                            |  |           |           |           |           |           |   |   |  |  |   |
| Nominal Cfm (total)                                       | —  | —         | —         | —         | 11,200    | 11,200    | —   | —   | 15,600                                 | 15,600                                 | 20,800  |
| Quantity ... Diameter (in.)                               | —  | —         | —         | —         | 2...630   | 2...630   | —   | —   | 3...630                                | 3...630                                | 4...630                                       |
| Motor Hp  | —  | —         | —         | —         | 1.3       | 1.3       | —   | —   | 1.3                                    | 1.3                                    | 1.3   |
| <b>HIGH-PRESSURE SWITCH (PSIG)</b>                        |  |           |           |           |           |           |   |   |  |  |   |
| Cutout  | 640  |           |           |           |           |           |   |   |  |  |   |
| Reset (Manual)  | 595  |           |           |           |           |           |   |   |  |  |   |
| <b>EVAPORATOR COIL</b>                                    |  |           |           |           |           |           |   |   |  |  |   |
| Face Area without ERV (sq ft)                             | 2.8  | 2.8       | 2.8       | 4.7       | 4.7       | 4.7       | 7   | 7   | 7                                      | 10                                     | 10  |
| Face Area with ERV (sq ft)                                | 7  | 7         | 7         | 10        | 10        | 10        | 12  | 12  | Use C Cabinet                          |  |   |
| <b>SUPPLY FAN</b>   |  |           |           |           |           |           |   |   |  |  |   |
| Backward Curved ECM (mm)                                  | 355, 450   |           |           |           |           |           |   |   |  |  |   |
| Airfoil (in.)   | 12, 14, 16   |           |           |           |           |           |   |   |  |  |   |
| Backward Inclined (in.)                                   | 10, 11, 12, 14, 16                                 |           |           |           |           |           |   |   |  |  |   |
| Nominal Cfm 100% OA                                       | 450  | 600       | 750       | 900       | 1050      | 1200      | 1500                                      | 1800                                      | 2250                                   | 2700                                   | 3000  |
| Motor Hp Range  | ECM, 1, 1.5, 2, 3, 5                               |           |           |           |           |           |   |   |  |  |   |
| <b>OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL</b> |  |           |           |           |           |           |   |   |  |  |   |
| Face Area without ERV (sq ft)                             | 2.8  | 2.8       | 2.8       | 4.7       | 4.7       | 4.7       | 7   | 7   | 7                                      | 10                                     | 10  |
| Face Area with ERV (sq ft)                                | 7  | 7         | 7         | 10        | 10        | 10        | 12  | 12  | Use C Cabinet                          |  |   |
| <b>LOW-PRESSURE SWITCH (PSIG)</b>                         |  |           |           |           |           |           |   |   |  |  |   |
| Cutout  | 35   |           |           |           |           |           |   |   |  |  |   |
| Reset (Auto)  | 55   |           |           |           |           |           |   |   |  |  |   |
| <b>CONDENSATE DRAIN CONNECTION (NPT) (in.)</b>            | 0.75   | 0.75      | 0.75      | 0.75      | 0.75      | 0.75      | 0.75                                      | 0.75                                      | 0.75                                   | 0.75                                   | .75   |
| <b>OPTIONAL GAS HEAT SECTION</b>                          |  |           |           |           |           |           |   |   |  |  |   |
| Gas Input Sizes (Btuh x 1000)                             | 75, 100, 150, 200                                  |           |           |           |           |           |   |   |  |  |   |
| Gas Input Sizes (Btuh x 1000) XL Cabinet                  | 200, 300, 400                                      |           |           |           |           |           |   |   |  |  |   |
| <b>Control Type</b>                                       |  |           |           |           |           |           |   |   |  |  |   |
| Stages (no. of stages)                                    | 2  |           |           |           |           |           |   |   |  |  |   |
| Stages XL Cabinet (no. of stages)                         | 4  |           |           |           |           |           |   |   |  |  |   |
| Modulating (% range)                                      | 5:1, 10:1  |           |           |           |           |           |   |   |  |  |   |
| Efficiency (Steady State) (%)                             | 80   |           |           |           |           |           |   |   |  |  |   |
| 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                   |           |           |           |           |           |   |   |  |  |   |
| <b>Manifold Pressure (in. wg)</b>                         |  |           |           |           |           |           |   |   |  |  |   |
| Natural Gas Std   | 3.5  |           |           |           |           |           |   |   |  |  |   |
| LP Gas Special Order                                      | 10   |           |           |           |           |           |   |   |  |  |   |
| <b>OPTIONAL ELECTRIC HEAT</b>                             |  |           |           |           |           |           |   |   |  |  |   |
| Size Range (kW)   | 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100 |           |           |           |           |           |   |   |  |  |   |
| <b>Control Type</b>                                       |  |           |           |           |           |           |   |   |  |  |   |
| Stages (no. of stages)                                    | 1, 2, 4  |           |           |           |           |           |   |   |  |  |   |
| SCR (% range)   | 0-100  |           |           |           |           |           |   |   |  |  |   |

# Physical data - 62X, B-BXL cabinet (cont)



| UNIT 62X B CABINET                              | 03   | 04                   | 05                   | 06   | 07                   | 08                   | 10                                       | 12                   | 15                                   | 18                             | 20   |  |
|---|--|----------------------|----------------------|--|----------------------|----------------------|--|----------------------|--------------------------------------|--------------------------------|------|--|
| <b>NOMINAL CAPACITY (TONS)</b>                  | 3  | 4                    | 5                    | 6  | 7                    | 8                    | 10                                       | 12                   | 15                                   | 17.5                           | 20   |  |
| <b>OPTIONAL HOT WATER HEAT COIL WITH ERV</b>    | 22.5 x 42, 2 row, 10 FPI, with 1/2 in. tubes |                      |                      | 30x45, 2 row, 10 FPI, with 1/2 in. tubes     |                      |                      | 33.75 x 44, 2 row, 10 FPI, 1/2 in. tubes |                      | Use C Cabinet                        |                                |      |  |
| <b>OPTIONAL HOT WATER HEAT COIL WITHOUT ERV</b> | 17.5 x 20, 2 row, 10 FPI, with 1/2 in. tubes |                      |                      | 17.5 x 34, 2 row, 10 FPI, with 1/2 in. tubes |                      |                      | 22.5 x 42, 2 row, 10 FPI, 1/2 in. tubes  |                      | 30x 45, 2 row, 10 FPI, 1/2 in. tubes |                                |      |  |
| <b>OUTDOOR AIR FILTERS</b>                      |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| <b>Quantity ... Size (in.) with ERV</b>         |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Standard 2-in. MERV 8                           | 2...24x24                                    |                      |                      | 4...16 x 25                                  |                      |                      | 2...16x25, 2...20x25                     |                      | Use C Cabinet                        |                                |      |  |
| <b>Optional 4-in.</b>                           |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| MERV 8  | 2...24x24                                    |                      |                      | 4...16 x 25                                  |                      |                      | 2...16x25, 2...20x25                     |                      | Use C Cabinet                        |                                |      |  |
| MERV 11   | 2...24x24                                    |                      |                      | 4...16 x 25                                  |                      |                      | 2...16x25, 2...20x25                     |                      | Use C Cabinet                        |                                |      |  |
| MERV 14   | 2...24x24                                    |                      |                      | 4...16 x 25                                  |                      |                      | 2...16x25, 2...20x25                     |                      | Use C Cabinet                        |                                |      |  |
| <b>Quantity ... Size (in.) without ERV</b>      |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Standard 2-in. MERV 8                           | 1...20x24                                    |                      |                      | 1...16x20, 1...20x20                         |                      |                      | 2...24x24                                |                      | 4...16x25                            |                                |      |  |
| <b>Optional 4-in.</b>                           |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| MERV 8  | 1...20x24                                    |                      |                      | 1...16x20, 1...20x20                         |                      |                      | 2...24x24                                |                      | 4...16x25                            |                                |      |  |
| MERV 11   | 1...20x24                                    |                      |                      | 1...16x20, 1...20x20                         |                      |                      | 2...24x24                                |                      | 4...16x25                            |                                |      |  |
| MERV 14   | 1...20x24                                    |                      |                      | 1...16x20, 1...20x20                         |                      |                      | 2...24x24                                |                      | 4...16x25                            |                                |      |  |
| <b>OPTIONAL ERV</b>                             |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Type  | Molecular Sieve                              |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Diameter... depth (in.)                         | 24...4, 32...4, 36...4, 42...4               |                      |                      |  |                      |                      |  |                      | Use C Cabinet                        |                                |      |  |
| <b>OPTIONAL ERV FILTERS</b>                     |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| <b>Quantity ... Size (in.)</b>                  |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| with 24 in. ERV                                 | 4...12 x 24                                  | 4...12 x 24          | 4...12 x 24          | 4...12 x 24                                  | 4...12 x 24          | 4...12 x 24          | 4...12 x 24                              | 4...12 x 24          | 4...12 x 24                          | Use C Cabinet                  |      |  |
| with 32 in. ERV                                 | 6...18x20                                    | 6...18x20            | 6...18x20            | 6...18x20                                    | 6...18x20            | 6...18x20            | 6...18x20                                | 6...18x20            | 6...18x20                            | Use C Cabinet                  |      |  |
| with 36 in. ERV                                 | 2...20x20, 2...20x24                         | 2...20x20, 2...20x24 | 2...20x20, 2...20x24 | 2...20x20, 2...20x24                         | 2...20x20, 2...20x24 | 2...20x20, 2...20x24 | 2...20x20, 2...20x24                     | 2...20x20, 2...20x24 | 2...20x20, 2...20x24                 | Use C Cabinet<br>Use C Cabinet |      |  |
| with 42 in. ERV                                 | 2...12x24, 4...20x24                         | 2...12x24, 4...20x24 | 2...12x24, 4...20x24 | 2...12x24, 4...20x24                         | 2...12x24, 4...20x24 | 2...12x24, 4...20x24 | 2...12x24, 4...20x24                     | 2...12x24, 4...20x24 | 2...12x24, 4...20x24                 | Use C Cabinet<br>Use C Cabinet |      |  |
| <b>OPTIONAL EXHAUST FAN</b>                     |  |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Backward Curved ECM - (mm)                      | 355, 450                                     |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Airfoil (in.)                                   | 12, 14, 16                                   |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Backward Inclined - (in.)                       | 10, 11, 12, 14, 16                           |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |
| Nominal Cfm 100%                                | 450  | 600                  | 750                  | 900  | 1050                 | 1200                 | 1500                                     | 1800                 | 2250                                 | 2700                           | 3000 |  |
| Motor Hp Range                                  | ECM, 1,1.5,2,3,5                             |                      |                      |  |                      |                      |  |                      |                                      |                                |      |  |

## LEGEND

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

NOTE: For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder. 10:1 gas heat not available for 75 MBH heater.

# Physical data - 62X, C-CXL cabinet



| UNIT 62X C CABINET  | 07   | 08                                       | 10                                     | 12  | 15  | 18  | 20  | 25   | 30   | 35   |  |
|---|--|--|--|---|---|---|---|--|--|--|--|
| <b>NOMINAL CAPACITY (TONS)</b>                            | 7  | 8  | 10                                     | 12  | 15  | 17.5                                      | 20  | 25   | 30   | 35   |  |
| <b>COMPRESSOR</b>   |  |  |  |   |   |   |   |  |  |  |  |
| Unit without ERV  |  |  |  |   |   |   |   |  |  |  |  |
| Quantity/Unit ... Model                                   | 1...ZPD72  | 1...ZPD83                                | 1...ZPD51,<br>1...ZP51 or<br>2...ZPD51 | 1...ZPD61,<br>1...ZP61<br>or<br>2...ZPD61 | 1...ZPD72,<br>1...ZP72<br>or<br>2...ZPD72 | 1...ZPD91,<br>1...ZP91<br>or<br>2...ZPD91 | 1...ZPD103,<br>1...ZP103 or<br>2...ZPD103 | 1...ZPD120,<br>1...ZP120<br>or<br>2...ZPD120 | 1...ZPD137,<br>1...ZP137<br>or<br>2...ZPD137 | 1...ZPD182,<br>1...ZP182<br>or<br>2...ZPD182 |  |
| Unit with ERV   |  |  |  |   |   |   |   |  |  |  |  |
| Quantity/Unit ... Model                                   | 1...ZPD72  | 1...ZPD83                                | 1...ZPD51,<br>1...ZP51 or<br>2...ZPD51 | 1...ZPD61,<br>1...ZP61<br>or<br>2...ZPD61 | 1...ZPD83,<br>1...ZP83<br>or<br>2...ZPD83 | 1...ZPD91,<br>1...ZP91<br>or<br>2...ZPD91 | 1...ZPD103,<br>1...ZP103 or<br>2...ZPD103 | 1...ZPD137,<br>1...ZP137<br>or<br>2...ZPD137 | 1...ZPD154,<br>1...ZP154<br>or<br>2...ZPD154 | 1...ZPD182,<br>1...ZP182<br>or<br>2...ZPD182 |  |
| Number of Refrigerant Circuits                            | 1  | 1  | 2                                      | 2   | 2   | 2   | 2   | 2  | 2  | 2  |  |
| Oil   | Pre-Charged  |  |  |   |   |   |   |  |  |  |  |
| <b>REFRIGERANT TYPE</b>                                   | R-410A   |  |  |   |   |   |   |  |  |  |  |
| <b>CONDENSER COIL</b>                                     |  |  |  |   |   |   |   |  |  |  |  |
| Standard Efficiency Condenser (sq ft)                     | —  | —  | 27                                     | 27  | 27  | 27  | 40  | 40   | 54   | 54   |  |
| High-Efficiency Condenser (sq ft)                         | 27   | 27                                       | —                                      | —   | 40  | 40  | 54  | 54   | 80   | 80   |  |
| <b>CONDENSER FAN</b>                                      |  |  |  |   |   |   |   |  |  |  |  |
| Standard Capacity Condenser                               |  |  |  |   |   |   |   |  |  |  |  |
| Nominal Cfm (total)                                       | —  | —  | 10,600                                 | 10,600                                    | 10,600                                    | 10,600                                    | 15,600                                    | 15,600                                       | 20,800                                       | 20,800                                       |  |
| Quantity ... Diameter (mm)                                | —  | —  | 2...630                                | 2...630                                   | 2...630                                   | 2...630                                   | 3...630                                   | 3...630                                      | 4...630                                      | 4...630                                      |  |
| Motor Hp  | —  | —  | 1.3                                    | 1.3                                       | 1.3                                       | 1.3                                       | 1.3                                       | 1.3  | 1.3  | 1.3  |  |
| High Capacity Condenser                                   |  |  |  |   |   |   |   |  |  |  |  |
| Nominal Cfm (total)                                       | 11,200   | 11,200                                   | —                                      | —   | 15,600                                    | 15,600                                    | 20,800                                    | 20,800                                       | 31,200                                       | 31,200                                       |  |
| Quantity ... Diameter (mm)                                | 2...630  | 2...630                                  | —                                      | —   | 3...630                                   | 3...630                                   | 4...630                                   | 4...630                                      | 6...630                                      | 6...630                                      |  |
| Motor Hp  | 1.3  | 1.3                                      | —                                      | —   | 1.3                                       | 1.3                                       | 1.3                                       | 1.3  | 1.3  | 1.3  |  |
| <b>HIGH-PRESSURE SWITCH (PSIG)</b>                        |  |  |  |   |   |   |   |  |  |  |  |
| Cutout  | 640  |  |  |   |   |   |   |  |  |  |  |
| Reset (Manual)  | 595  |  |  |   |   |   |   |  |  |  |  |
| <b>EVAPORATOR COIL</b>                                    |  |  |  |   |   |   |   |  |  |  |  |
| Face Area without ERV (sq ft)                             | Use B Cabinet                                      |  | 7                                      | 7   | 7   | 10  | 12  | 12   | 16   | 16   |  |
| Face Area with ERV (sq ft)                                | 10   | 10                                       | 12                                     | 12  | 16  | 16  | 16  | Use D Cabinet                                |  |  |  |
| <b>SUPPLY FAN</b>   |  |  |  |   |   |   |   |  |  |  |  |
| Backward Curved ECM (mm)                                  | 450  |  |  |   |   |   |   |  |  |  |  |
| Airfoil (in.)   | 14, 16, 18, 20                                     |  |  |   |   |   |   |  |  |  |  |
| Backward Inclined (in.)                                   | 14, 16, 18, 20                                     |  |  |   |   |   |   |  |  |  |  |
| Nominal Cfm 100% OA                                       | 1050   | 1200                                     | 1500                                   | 1800                                      | 2250                                      | 2700                                      | 3000                                      | 3750   | 4500   | 5250   |  |
| Motor Hp Range  | ECM, 1, 1.5, 2, 3, 5, 7, 5, 10                     |  |  |   |   |   |   |  |  |  |  |
| <b>OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL</b> |  |  |  |   |   |   |   |  |  |  |  |
| Face Area w/o Wheel (sq ft)                               | Use B Cabinet                                      |  | 7                                      | 7   | 7   | 10  | 12  | 12   | 16   | 16   |  |
| Face Area w/ Wheel (sq ft)                                | 10   | 10                                       | 12                                     | 12  | 16  | 16  | 16  | Use D Cabinet                                |  |  |  |
| <b>LOW-PRESSURE SWITCH (PSIG)</b>                         |  |  |  |   |   |   |   |  |  |  |  |
| Cutout  | 35   |  |  |   |   |   |   |  |  |  |  |
| Reset (Auto)  | 55   |  |  |   |   |   |   |  |  |  |  |
| <b>CONDENSATE DRAIN CONNECTION (NPT) (in.)</b>            | .75  |  |  |   |   |   |   |  |  |  |  |
| <b>OPTIONAL GAS HEAT SECTION</b>                          |  |  |  |   |   |   |   |  |  |  |  |
| Gas Input Sizes (Btuh x 1000)                             | 75, 100, 150, 200, 250, 300                        |  |  |   |   |   |   |  |  |  |  |
| Gas Input Sizes (Btuh x 1000) XL Cabinet                  | 200, 300, 400, 600, 700, 800                       |  |  |   |   |   |   |  |  |  |  |
| <b>Control Type</b>                                       |  |  |  |   |   |   |   |  |  |  |  |
| Stages (no. of stages)                                    | 2  |  |  |   |   |   |   |  |  |  |  |
| Stages XL Cabinet (no. of stages)                         | 4  |  |  |   |   |   |   |  |  |  |  |
| Modulating (% range)                                      | 5:1, 10:1*   |  |  |   |   |   |   |  |  |  |  |
| Efficiency (Steady State) (%)                             | 80   |  |  |   |   |   |   |  |  |  |  |
| Supply Line Pressure Range (in. wg)                       | 5.0 min. - 13.5 max                                |  |  |   |   |   |   |  |  |  |  |
| <b>Manifold Pressure (in. wg)</b>                         |  |  |  |   |   |   |   |  |  |  |  |
| Natural Gas Std   | 3.5  |  |  |   |   |   |   |  |  |  |  |
| LP Gas Special Order                                      | 10   |  |  |   |   |   |   |  |  |  |  |
| <b>OPTIONAL ELECTRIC HEAT</b>                             |  |  |  |   |   |   |   |  |  |  |  |
| Size Range (kW)   | 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100 |  |  |   |   |   |   |  |  |  |  |
| <b>Control Type</b>                                       |  |  |  |   |   |   |   |  |  |  |  |
| Stages (no. of stages)                                    | 1,2,4  |  |  |   |   |   |   |  |  |  |  |
| SCR (% range)   | 0-100  |  |  |   |   |   |   |  |  |  |  |
| <b>OPTIONAL HOT WATER HEAT COIL WITH ERV</b>              | 30 x 45, 2 row, 10 FPI, with 1/2 in. tubes         | 33.75 x 44, 2 row, 10 FPI, 1/2 in. tubes |  |   | 46.25 x 44, 2 row, 10 FPI, 1/2 in. tubes  |   |   |  | Use D Cabinet                                |  |  |
| <b>OPTIONAL HOT WATER HEAT COIL WITHOUT ERV</b>           | Use B Cabinet                                      | 22.5 x 42, 2 row, 10 FPI, 1/2 in. tubes  |  |   | 30 x 45, 2 row, 10 FPI, 1/2 in. tubes     |   | 33.75 x 44, 2 row, 10 FPI, 1/2 in. tubes  |  | 46.25 x 44, 2 row, 10 FPI, 1/2 in. tubes     |  |  |

# Physical data - 62X, C-CXL cabinet (cont)



| UNIT 62X C CABINET                  | 07                                     | 08   | 10                   | 12   | 15   | 18            | 20                   | 25   | 30            | 35   |
|-------------------------------------|--|------|----------------------|------|------|---------------|----------------------|------|---------------|------|
| <b>NOMINAL CAPACITY (TONS)</b>      | 7                                      | 8    | 10                   | 12   | 15   | 17.5          | 20                   | 25   | 30            | 35   |
| <b>OUTDOOR AIR FILTERS</b>          |  |      |                      |      |      |               |                      |      |               |      |
| Quantity ... Size (in.) with ERV    |  |      |                      |      |      |               |                      |      |               |      |
| Standard 2-in. MERV 8               | 4...16x25                              |      | 2...16x25, 2...20x25 |      |      | 4...24x24     |                      |      | Use D Cabinet |      |
| Optional 4-in.                      |  |      |                      |      |      |               |                      |      |               |      |
| MERV 8                              | 4...16x25                              |      | 2...16x25, 2...20x25 |      |      | 4...24x24     |                      |      | Use D Cabinet |      |
| MERV 11                             | 4...16x25                              |      | 2...16x25, 2...20x25 |      |      | 4...24x24     |                      |      | Use D Cabinet |      |
| MERV 14                             | 4...16x25                              |      | 2...16x25, 2...20x25 |      |      | 4...24x24     |                      |      | Use D Cabinet |      |
| Quantity ... Size (in.) without ERV |  |      |                      |      |      |               |                      |      |               |      |
| Standard 2-in. MERV 8               | Use B Cabinet                          |      | 2...24x24            |      |      | 4...16x25     | 2...16x25, 2...20x25 |      | 4...24x24     |      |
| Optional 4-in.                      |  |      |                      |      |      |               |                      |      |               |      |
| MERV 8                              | Use B Cabinet                          |      | 2...24x24            |      |      | 4...16x25     | 2...16x25, 2...20x25 |      | 4...24x24     |      |
| MERV 11                             | Use B Cabinet                          |      | 2...24x24            |      |      | 4...16x25     | 2...16x25, 2...20x25 |      | 4...24x24     |      |
| MERV 14                             | Use B Cabinet                          |      | 2...24x24            |      |      | 4...16x25     | 2...16x25, 2...20x25 |      | 4...24x24     |      |
| <b>OPTIONAL ERV</b>                 |  |      |                      |      |      |               |                      |      |               |      |
| Type                                | Molecular Sieve                        |      |                      |      |      |               |                      |      |               |      |
| Diameter ... depth (in.)            | 32...4, 36...4, 42...4, 48...4, 48...6 |      |                      |      |      |               |                      |      | Use D Cabinet |      |
| <b>OPTIONAL ERV FILTERS</b>         |  |      |                      |      |      |               |                      |      |               |      |
| Quantity ... Size (in.)             |  |      |                      |      |      |               |                      |      |               |      |
| with 32 in. ERV                     | 6...18x20                              |      |                      |      |      | Use D Cabinet |                      |      |               |      |
| with 36 in. ERV                     | 2...20x20, 2...20x24                   |      |                      |      |      | Use D Cabinet |                      |      |               |      |
| with 42 in. ERV                     | 2...12x24, 4...20x24                   |      |                      |      |      | Use D Cabinet |                      |      |               |      |
| with 48 in. ERV                     | 6...18x25                              |      |                      |      |      | Use D Cabinet |                      |      |               |      |
| <b>OPTIONAL EXHAUST FAN</b>         |  |      |                      |      |      |               |                      |      |               |      |
| Backward Curved ECM - (mm)          | 450                                    |      |                      |      |      |               |                      |      |               |      |
| Airfoil (in.)                       | 14, 16, 18, 20                         |      |                      |      |      |               |                      |      |               |      |
| Backward Inclined - (in.)           | 14, 16, 18, 20                         |      |                      |      |      |               |                      |      |               |      |
| Nominal Cfm 100%                    | 1050                                   | 1200 | 1500                 | 1800 | 2250 | 2700          | 3000                 | 3750 | 4500          | 5250 |
| Motor Hp Range                      | ECM, 1, 1.5, 2, 3, 5, 7.5, 10          |      |                      |      |      |               |                      |      |               |      |

## LEGEND

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

NOTE: For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder.

\* XL gas heater only available in 10:1 modulation.

# Physical data - 62X, D-DXL cabinet



| UNIT 62X, D CABINET                                       | 20   | 25  | 30  | 35  |
|---|--|---|---|---|
| <b>NOMINAL CAPACITY (TONS)</b>                            | 20   | 25  | 30  | 35  |
| <b>COMPRESSOR</b>   |  |   |   |   |
| Unit without ERV  |  |   |   |   |
| Quantity/Unit ... Model                                   | 1...ZPD103,<br>1...ZP103 or<br>2...ZPD103                    | 1...ZPD120,<br>1...ZP120 or<br>2...ZPD120 | 1...ZPD137,<br>1...ZP137 or<br>2...ZPD137 | 1...ZPD182,<br>1...ZP182 or<br>2...ZPD182 |
| Unit with ERV   |  |   |   |   |
| Quantity/Unit ... Model                                   | 1...ZPD103,<br>1...ZP103 or<br>2...ZPD103                    | 1...ZPD137,<br>1...ZP137 or<br>2...ZPD137 | 1...ZPD154,<br>1...ZP154 or<br>2...ZPD154 | 1...ZPD182,<br>1...ZP182 or<br>2...ZPD182 |
| Number of Refrigerant Circuits                            | 2  |   |   |   |
| Oil   | Pre-charged  |   |   |   |
| <b>REFRIGERANT TYPE</b>                                   | R-410A   |   |   |   |
| <b>CONDENSER COIL</b>                                     |  |   |   |   |
| Standard Efficiency Condenser (sq ft)                     | —  | —   | 54  | 54  |
| High-Efficiency Condenser (sq ft)                         | 54   | 54  | 80  | 80  |
| <b>CONDENSER FAN</b>                                      |  |   |   |   |
| Standard Capacity Condenser                               |  |   |   |   |
| Nominal Cfm (total)                                       | 15,600   | 15,600                                    | 20,800                                    | 20,800                                    |
| Quantity ... Diameter (mm)                                | 3...630  | 3...630                                   | 4...630                                   | 4...630                                   |
| Motor Hp  | 1.3  |   |   |   |
| High Capacity Condenser                                   |  |   |   |   |
| Nominal Cfm (total)                                       | 20,800   | 20,800                                    | 31,200                                    | 31,200                                    |
| Quantity...Diameter (mm)                                  | 4...630  | 4...630                                   | 6...630                                   | 6...630                                   |
| Motor Hp  | 1.3  |   |   |   |
| <b>HIGH-PRESSURE SWITCH (PSIG)</b>                        |  |   |   |   |
| Cutout  | 640  |   |   |   |
| Reset (Manual)  | 595  |   |   |   |
| <b>EVAPORATOR COIL</b>                                    |  |   |   |   |
| Face Area without ERV (sq ft)                             | 12   | 12  | 16  | 16  |
| Face Area with ERV (sq ft)                                | 16   | 28.9                                      | 28.9                                      | 28.9                                      |
| <b>SUPPLY FAN</b>   |  |   |   |   |
| Backward Curved ECM (mm)                                  | DUAL - 280, 355; SINGLE - 450                                |   |   |   |
| Airfoil (in.)   | 18, 20, 22, 25   |   |   |   |
| Backward Inclined (in.)                                   | 18, 20, 22, 25   |   |   |   |
| Nominal Cfm 100% OA                                       | 3000   | 3750                                      | 4500                                      | 5250                                      |
| Motor Hp Range  | ECM, 1.5, 2, 3, 5, 7.5, 10, 15                               |   |   |   |
| <b>OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL</b> |  |   |   |   |
| Face Area without ERV (sq ft)                             | 12   | 12  | 16  | 16  |
| Tube Size with ERV (in.)                                  | 16   | 28.9                                      | 28.9                                      | 28.9                                      |
| <b>LOW-PRESSURE SWITCH (PSIG)</b>                         |  |   |   |   |
| Cutout  | 35   |   |   |   |
| Reset (Auto)  | 55   |   |   |   |
| <b>CONDENSATE DRAIN CONNECTION (NPT) (in.)</b>            |  |   |   |   |
| 1   |  |   |   |   |
| <b>OPTIONAL GAS HEAT SECTION</b>                          |  |   |   |   |
| Gas Input Sizes (Btuh x 1000)                             | 100, 150, 200, 250, 300, 350, 400                            |   |   |   |
| Gas Input Sizes (Btuh x 1000) XL Cabinet                  | 400, 500, 600, 700, 800, 1000, 1200                          |   |   |   |
| <b>Control Type</b>                                       |  |   |   |   |
| Stages (no. of stages)                                    | 2  |   |   |   |
| Stages XL Cabinet (no. of stages)                         | 4  |   |   |   |
| Modulating (% range)                                      | 5:1, 10:1*   |   |   |   |
| Efficiency (Steady State) (%)                             | 80   |   |   |   |
| 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                             |   |   |   |
| <b>Manifold Pressure (in. wg)</b>                         |  |   |   |   |
| Natural Gas Std   | 3.5  |   |   |   |
| LP Gas Special Order                                      | 10   |   |   |   |
| <b>OPTIONAL ELECTRIC HEAT</b>                             |  |   |   |   |
| Size Range (kW)   | 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100, 110, 120 |   |   |   |
| <b>Control Type</b>                                       |  |   |   |   |
| Stages (no. of stages)                                    | 1,2,4  |   |   |   |
| SCR (% range)   | 0-100  |   |   |   |
| <b>OPTIONAL HOT WATER HEAT COIL WITH ERV</b>              | 46.25 x 44, 2 row 10 FPI, 1/2 in. tubes                      | 60 x 65, 2 rows, 10 FPI, 1/2 in. tubes    |   |   |
| <b>OPTIONAL HOT WATER HEAT COIL WITHOUT ERV</b>           | 30 x 44, 2 row, 10 FPI, 1/2 in. tubes                        | 33.75 x 44, 2 rows, 10 FPI, 1/2 in. tubes | 46.25 x 44, 2 rows 10 FPI, 1/2 in. tubes  |   |

# Physical data - 62X, D-DXL cabinet (cont)



| UNIT 62X, D CABINET                 | 20   | 25                              | 30         | 35         |
|-------------------------------------|--|---------------------------------|------------|------------|
| <b>NOMINAL CAPACITY (TONS)</b>      | 20   | 25                              | 30         | 35         |
| <b>OUTDOOR AIR FILTERS</b>          |  |                                 |            |            |
| Quantity ... Size (in.) with ERV    |  |                                 |            |            |
| Standard 2-in. MERV 8               | 4...24x24  | 2...24x24, 2...20x20, 5...20x24 |            |            |
| Optional 4-in.                      |  |                                 |            |            |
| MERV 8                              | 4...24x24  | 2...24x24, 2...20x20, 5...20x24 |            |            |
| MERV 11                             | 4...24x24  | 2...24x24, 2...20x20, 5...20x24 |            |            |
| MERV 14                             | 4...24x24  | 2...24x24, 2...20x20, 5...20x24 |            |            |
| Quantity ... Size (in.) without ERV |  |                                 |            |            |
| Standard 2-in. MERV 8               | 2...16x25, 2...20x25                                   |                                 | 4...24x24  |            |
| Optional 4-in.                      |  |                                 |            |            |
| MERV 8                              | 2...16x25, 2...20x25                                   |                                 | 4...24x24  |            |
| MERV 11                             | 2...16x25, 2...20x25                                   |                                 | 4...24x24  |            |
| MERV 14                             | 2...16x25, 2...20x25                                   |                                 | 4...24x24  |            |
| <b>OPTIONAL ERV</b>                 |  |                                 |            |            |
| Type                                | Molecular Sieve  |                                 |            |            |
| Diameter ... depth (in.)            | 48...4, 48...6, 54...4, 60...4, 60...6, 66...4, 66...6 |                                 |            |            |
| <b>OPTIONAL ERV FILTERS</b>         |  |                                 |            |            |
| Quantity ... Size (in.)             |  |                                 |            |            |
| with 48 in. ECW                     | 6...18x25  | 6...18x25                       | 6...18x25  | 6...18x25  |
| with 54 in. ECW                     | 6...20x30  | 6...20x30                       | 6...20x30  | 6...20x30  |
| with 60 in. ECW                     | 10...16x32   | 10...16x32                      | 10...16x32 | 10...16x32 |
| with 66 in. ECW                     | 8...36x20  | 8...36x20                       | 6...36x20  | 8...36x20  |
| <b>OPTIONAL EXHAUST FAN</b>         |  |                                 |            |            |
| Backward Curved ECM (mm)            | DUAL - 280, 355  |                                 |            |            |
| Airfoil (in.)                       | 18, 20, 22, 25   |                                 |            |            |
| Backward Inclined (in.)             | 18, 20, 22, 25   |                                 |            |            |
| Nominal Cfm 100%                    | 3000   | 3750                            | 4500       | 5250       |
| Motor Hp Range                      | ECM, 1.5, 2, 3, 5, 7.5, 10, 15                         |                                 |            |            |

## LEGEND

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

\* 10:1 modulating control available on DXL Cabinet (400-1200 MBtuh only). 5 kW SCR electric heater not available.

NOTE: For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder.

# Physical data - 62X, D-DXL cabinet



| UNIT 62X, D CABINET                                | 40   | 45   | 50   | 55   |
|--|--|--|--|--|
| NOMINAL CAPACITY (TONS)                            | 40   | 45   | 50   | 55   |
| COMPRESSOR   |  |  |  |  |
| Unit without ERV                                   |  |  |  |  |
| Quantity/Unit ... Model                            | 1...ZPDT21,<br>1...ZPT206 or<br>2...ZPDT21                   | 1...ZPDT24,<br>1...ZPT240 or<br>2...ZPDT24   | 1...ZPDT27,<br>1...ZPT274 or<br>2...ZPDT27 | 1...ZPDT31,<br>1...ZPT308 or<br>2...ZPDT31 |
| Unit with ERV                                      |  |  |  |  |
| Quantity/Unit ... Model                            | —  | —  | —  | —  |
| Number of Refrigerant Circuits                     | 2  |  |  |  |
| Oil  | Pre-charged  |  |  |  |
| REFRIGERANT TYPE                                   | R-410A   |  |  |  |
| CONDENSER COIL                                     |  |  |  |  |
| Standard Efficiency Condenser (sq ft)              | 54   | 80   | 80   | 80   |
| High-Efficiency Condenser (sq ft)                  | 80   | 121  | 121  | 121  |
| CONDENSER FAN                                      |  |  |  |  |
| Standard Capacity Condenser                        |  |  |  |  |
| Nominal Cfm (total)                                | 20,800   | 31,200                                       | 31,200                                     | 31,200                                     |
| Quantity ... Diameter (mm)                         | 4...630  | 6..630                                       | 6...630                                    | 6...630                                    |
| Motor Hp   | 1.3  |  |  |  |
| High Capacity Condenser                            |  |  |  |  |
| Nominal Cfm (total)                                | 31,200   | 52,800                                       | 52,800                                     | 52,800                                     |
| Quantity...Diameter (mm)                           | 6...630  | 6...710                                      | 6...710                                    | 6...710                                    |
| Motor Hp   | 1.3  |  |  |  |
| HIGH-PRESSURE SWITCH (PSIG)                        |  |  |  |  |
| Cutout   | 640  |  |  |  |
| Reset (Manual)                                     | 595  |  |  |  |
| EVAPORATOR COIL                                    |  |  |  |  |
| Face Area without ERV (sq ft)                      | 28.9   | 28.9   | 28.9                                       | 28.9                                       |
| Face Area with ERV (sq ft)                         | —  | —  | —  | —  |
| SUPPLY FAN   |  |  |  |  |
| Backward Curved ECM (mm)                           | DUAL - 280, 355; SINGLE - 450                                |  |  |  |
| Airfoil (in.)                                      | 18, 20, 22, 25   |  |  |  |
| Backward Inclined (in.)                            | 18, 20, 22, 25   |  |  |  |
| Nominal Cfm 100% OA                                | 6000   | 6750   | 7500                                       | 8250                                       |
| Motor Hp Range                                     | ECM, 1.5, 2, 3, 5, 7.5, 10, 15                               |  |  |  |
| OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL |  |  |  |  |
| Face Area without ERV (sq ft)                      | 28.9   | 28.9   | 28.9                                       | 28.9                                       |
| Face Area with ERV (in.)                           | —  | —  | —  | —  |
| LOW-PRESSURE SWITCH (PSIG)                         |  |  |  |  |
| Cutout   | 35   |  |  |  |
| Reset (Auto)                                       | 55   |  |  |  |
| CONDENSATE DRAIN CONNECTION (NPT) (in.)            | 1  |  |  |  |
| OPTIONAL GAS HEAT SECTION                          |  |  |  |  |
| Gas Input Sizes (Btuh x 1000)                      | 100, 150, 200, 250, 300, 350, 400                            |  |  |  |
| Gas Input Sizes (Btuh x 1000) XL Cabinet           | 400, 500, 600, 700, 800, 1000, 1200                          |  |  |  |
| Control Type                                       |  |  |  |  |
| Stages (no. of stages)                             | 2  |  |  |  |
| Stages XL Cabinet (no. of stages)                  | 4  |  |  |  |
| Modulating (% range)                               | 5:1, 10:1*   |  |  |  |
| Efficiency (Steady State) (%)                      | 80   |  |  |  |
| 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)                                    | 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100, 110, 120 |  |  |  |
| Control Type                                       |  |  |  |  |
| Stages (no. of stages)                             | 1,2,4  |  |  |  |
| SCR (% range)                                      | 0-100  |  |  |  |
| OPTIONAL HOT WATER HEAT COIL WITH ERV              | —  |  |  |  |
| OPTIONAL HOT WATER HEAT COIL WITHOUT ERV           | 30 x 44, 2 row, 10<br>FPI, 1/2 in. tubes                     | 33.75 x 44, 2 rows,<br>10 FPI, 1/2 in. tubes | 46.25 x 44, 2 rows 10 FPI, 1/2 in. tubes   |  |

# Physical data - 62X, D-DXL cabinet (cont)



|  |           |                                 |           |           |
|--|-----------|---------------------------------|-----------|-----------|
| <b>UNIT 62X, D CABINET</b>                 | <b>40</b> | <b>45</b>                       | <b>50</b> | <b>55</b> |
| <b>NOMINAL CAPACITY (TONS)</b>             | <b>40</b> | <b>45</b>                       | <b>50</b> | <b>55</b> |
| <b>OUTDOOR AIR FILTERS</b>                 |           |                                 |           |           |
| <b>Quantity ... Size (in.) with ERV</b>    |           |                                 |           |           |
| Standard 2-in. MERV 8                      |           | —                               |           |           |
| Optional 4-in.                             |           | —                               |           |           |
| MERV 8                                     |           | —                               |           |           |
| MERV 11                                    |           | —                               |           |           |
| MERV 14                                    |           | —                               |           |           |
| <b>Quantity ... Size (in.) without ERV</b> |           |                                 |           |           |
| Standard 2-in. MERV 8                      |           | 2...24x24, 2...20x20, 5...20x24 |           |           |
| Optional 4-in.                             |           |                                 |           |           |
| MERV 8                                     |           | 2...24x24, 2...20x20, 5...20x24 |           |           |
| MERV 11                                    |           | 2...24x24, 2...20x20, 5...20x24 |           |           |
| MERV 14                                    |           | 2...24x24, 2...20x20, 5...20x24 |           |           |
| <b>OPTIONAL ERV</b>                        |           |                                 |           |           |
| <b>Type</b>                                |           |                                 |           |           |
| Diameter ... depth (in.)                   |           | —                               |           |           |
| <b>OPTIONAL ERV FILTERS</b>                |           |                                 |           |           |
| <b>Quantity ... Size (in.)</b>             |           |                                 |           |           |
| with 48 in. ECW                            |           | —                               |           |           |
| with 54 in. ECW                            |           | —                               |           |           |
| with 60 in. ECW                            |           | —                               |           |           |
| with 66 in. ECW                            |           | —                               |           |           |
| <b>OPTIONAL EXHAUST FAN</b>                |           |                                 |           |           |
| Backward Curved ECM (mm)                   |           | DUAL - 280, 355                 |           |           |
| Airfoil (in.)                              |           | 18, 20, 22, 25                  |           |           |
| Backward Inclined (in.)                    |           | 18, 20, 22, 25                  |           |           |
| Nominal Cfm 100%                           | 6000      | 6750                            | 7500      | 8250      |
| Motor Hp Range                             |           | ECM, 1.5, 2, 3, 5, 7.5, 10, 15  |           |           |

**LEGEND**

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

\* 10:1 modulating control available on DXL Cabinet (400-1200 MBtuh only). 5 kW SCR electric heater not available.

NOTE: For unit and component weights, refer to the latest edition of Carrier's Dedicated Outdoor Air Systems Builder.

# Options and accessories



| ITEM  | STANDARD | OPTION* | ACCESSORY† |
|---|----------|---------|------------|
| <b>Heat Options</b>                         |          |         |            |
| Staged Gas Heat (NG)                        |          | 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       |            |
| <b>Control Options</b>                      |          |         |            |
| Filter Status Switch                        | X        |         |            |
| Exhaust Air Smoke Detector                  |          | X       |            |
| Wired Convenience Outlet                    |          | X       |            |
| Non-fused Disconnect Switch                 |          | X       |            |
| Lead Circuit Digital Compressor             | X        |         |            |
| Dual Circuit Digital Compressor             |          | X       |            |
| DDC Controls                                | X        |         |            |
| Equipment Touch Keypad/Display              |          |         | X          |
| LonWorks Communication Card                 |          |         | X          |
| Condensate Overflow Switch                  | X        |         |            |
| Variable Speed Condenser Fans               | X        |         |            |
| <b>Coil Options</b>                         |          |         |            |
| Cycling Hot Gas Reheat                      | X        |         |            |
| Modulating Hot Gas Reheat                   |          | X       |            |
| Liquid Subcooling Coil                      |          | X       |            |
| Corrosion Protection                        |          | X       |            |
| <b>Filter Options</b>                       |          |         |            |
| 2-in. MERV 8 Filters                        |          | X       | X          |
| 4-in. MERV 8 Filters                        |          | X       | X          |
| 4-in. MERV 11 Filters                       |          | X       | X          |
| 4-in. MERV 14 Filters                       |          | X       | X          |
| <b>Supply Fan Options</b>                   |          |         |            |
| Airfoil Fan                                 |          | X       |            |
| Backward Inclined Fan                       |          | X       |            |
| ECM   |          | X       |            |
| VFD Control (Not on ECM)                    | X        |         |            |
| <b>Exhaust Fan Options</b>                  |          |         |            |
| 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                   |          | X       |            |
| OA 2 Position Motorized Damper              | X        |         |            |
| Airflow Monitoring Station                  |          | X       |            |
| Duct Pressure Transducer                    |          | X       |            |

**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

\*Factory-installed.

†Field-installed.

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

## Performance data

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

## Controls

### Control components

The 62X Series of dedicated outdoor air units use a micro-processor 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 all major building automation protocols including BACnet, Modbus, and LonWorks (option) protocols.

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 — 62X

The 62X unit is designed to condition 100% outdoor air to room neutral conditions for ventilation purposes. As such, the 62X unit is not designed to, nor will the 62X 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 Equipment Touch Schedule calls for the start of the Occupied mode, and the controller has verified that there are no fault 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)

The SF Air Monitoring Station (SF-AMS) is included to monitor the SF air flow only. 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.

### SF-VSC: Supply Fan with Variable Speed Control

The SF-VSC will modulate its speed based upon the SF Differential Pressure Transmitter (SF-DPT) signal to maintain the supply duct static pressure set point.

*Optional* — For constant air volume (CAV), select "Manual Override" in the Equipment Touch keypad and input the required speed (%) as determined in the field by Test and Balancing.

### 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.

### EF-VSC: Exhaust Fan with Variable Speed Control

If the EF Differential Pressure Transmitter (EF-DPT) signal is above the building static pressure set point, the EF-VSC will modulate its speed based upon the EF-DPT to maintain the set point. If the EF-DPT signal is below the building static pressure set point, the EF will modulate down to 0% (adjustable) speed.

*Optional* — For constant air volume (CAV), select "Manual Override" in the Equipment Touch keypad and input the required speed (%) as determined in the field by Test and Balancing.

### Energy conservation wheel (ECW)

After the OA damper opens and the SF turns on, the ECW turns on. The ECW By-Pass Damper will open when the ECW is off and it will close when the ECW is on.

### ECW Standard Operation

When the OAT is 3°F (adjustable) or more above or below the RAT, the ECW will be on, otherwise it is off.

### 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 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 (72°F, adjustable), compressor no. 1 turns on. When the SAT is 2°F (adjustable) or more above the SAT cooling set point (72°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 (72°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 (72°F, adjustable), compressor no. 1 turns off.

*Optional* — When enabled, if there is a call for first stage cooling, second stage cooling will be enabled after a 10-minute (adjustable) delay. Both compressors modulate to maintain the cooling set point. Default is “OFF.” Compressor enabling logic includes a 5-minute (fixed) minimum runtime and a 5-minute (fixed) minimum time off delay to prevent compressor short cycling.

#### Digital Compressors

The controller regulates the capacity of the digital compressors by rapidly loading and unloading the compressors in 15-second intervals. The digital compressor will modulate based upon the DX Leaving Air Temperature (DX LAT) sensor and set point (55°F, adjustable). If the DX LAT drops to 38°F or less, the controller will fix the compressor at 10% (adjustable). If the DX LAT drops to 35°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) – On/Off

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

#### 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.

#### Switchable subcooling

When either of the compressors are enabled and the SAT is equal to or below the SAT cooling set point (72°F, adjustable), the subcooling coil is enabled. When the SAT is 1°F (adjustable) or more above the SAT cooling set point (72°F, adjustable), the subcooling coil is disabled.

#### **Dehumidification mode**

Dehumidification mode is available if the ECAT is greater than 60°F (adjustable) and there is no call for heating. If there is no demand for cooling, when the Entering Coil Relative Humidity (EC-RH) is 1% (adjustable) or more above the Supply Air Relative Humidity (SA-RH) set point (55% RH, adjustable), Dehumidification mode is enabled. After the minimum time-off delay, compressor no. 1 turns on. If there is a current demand for cooling, when the SA-RH is 1%

(adjustable) or more above the SA-RH set point (55% RH, adjustable), Dehumidification mode is enabled. When SA-RH is 2% (adjustable) or more above the SA-RH set point (55% RH, adjustable), and after minimum time-off delay, compressor no. 2 turns on — not less than 10 minutes (adjustable) after compressor no. 1 turned on. Both compressors respond in sequence and run at full cooling. HGRH is enabled to operate as necessary to maintain the SAT cooling set point (72°F, adjustable). When SA-RH is 1% (adjustable) or more below SA-RH set point (55% RH, adjustable), compressor no. 2 turns off. If there is still no demand for cooling, when the EC-RH is 2% (adjustable) or more below the SA-RH set point (55% RH, adjustable), compressor no. 1 turns off and Dehumidification mode is disabled. If there is a current demand for cooling, when the SA-RH is 2% (adjustable) or more below the SA-RH set point (55% RH, adjustable), Dehumidification mode is disabled.

#### Digital Compressors

The controller controls the capacity of the digital compressors by rapidly loading and unloading the compressor in 15-second intervals. The digital compressor will modulate based upon the DX LAT sensor and the DX LAT Dehumidification set point (48°F, adjustable). If the DX LAT drops to 38°F or less, the controller will fix the compressor at 10% (adjustable).

#### Hot Gas Reheat (HGRH) – On/Off

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

#### 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 SAT is 2°F (adjustable) or more above the SAT cooling set point, HGRH turns off.

#### Switchable Subcooling

When either of the compressors are enabled and the SAT is equal to or below the SAT cooling set point (72°F, adjustable), the subcooling coil is enabled. When the SAT is 1°F (adjustable) or more above the SAT cooling set point (72°F, adjustable), the subcooling coil is disabled.

#### **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 auxiliary 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 auxiliary heating is turned off. All other stages operate as above.

## Modulated Heat

SCR Electric Heat: 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).

Modulating Gas heater: 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).

Modulating Hot Water Heat: 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.

## **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.

## TYPICAL CONTROLLER INPUTS AND OUTPUTS

### INPUTS

| NUMBER | NAME   | TYPE   | SENSOR TYPE                                 |
|--------|--|--------|---|
| UI-01  | Outside Air Temperature  | Analog | Type II Thermistor 10kΩ at 77°F*            |
| UI-02  | Outside Air Humidity   | Analog | 0-10 vdc                                    |
| UI-03  | Leaving Air Temperature  | Analog | Type II Thermistor 10kΩ at 77°F*            |
| UI-04  | Zone Relative Humidity   | Analog | 0-10 vdc                                    |
| UI-05  | Supply Fan Static Pressure Transmitter   | Analog | 0-10 vdc                                    |
| UI-06  | Exhaust Fan Static Pressure Transmitter  | Analog | 0-10 vdc                                    |
| UI-07  | —  | —      | —   |
| UI-08  | Compressor 2 Suction Line Temperature  | Binary | Type II Thermistor 10kΩ at 77°F             |
| UI-09  | Compressor 1 Suction Line Temperature  | Analog | Type II Thermistor 10kΩ at 77°F             |
| UI-10  | Smoke Detector (NC), EMR (NC), LP1 (NO), LP2 (NO)                                    | Analog | LP1-5kΩ, LP2-10kΩ, SD-20kΩ, EMR-40kΩ (FIOP) |
| UI-11  | Clogged Filter Indicator (NO), C1 Current Sensor (NO), C2 Current Sensor (NO)        | Analog | C1CS-5kΩ, C2CS-10kΩ, CFD-20kΩ (STD)         |
| UI-12  | ERV Wheel Motion Sensor (NO), SF Air Proving Switch (NO), EF Air Proving Switch (NO) | Analog | ERV CS-5kΩ, SFAPS-10kΩ, EFAPS-20kΩ          |

### OUTPUTS

| NUMBER | NAME   | OUTPUT TYPE          |
|--------|--|----------------------|
| AO-01  | Supply Fan VFD Modulation                        | 0-10 vdc             |
| AO-02  | Exhaust Fan VFD Modulation                       | 0-10 vdc             |
| AO-03  | Digital Compressor 2 Modulation                  | 0-10 vdc             |
| AO-04  | Hot Gas Reheat (HGRH)/Discharge Valve Modulation | 0-10 vdc             |
| AO-05  | Digital Compressor 1 Modulation                  | 0-10 vdc             |
| AO-06  | SCR Heat or Modulating Gas Heat                  | 0-10 vdc             |
| BO-01  | Supply Fan, Exhaust Fan                          | Relay / Triac Output |
| BO-02  | Compressor (Y1)                                  | Relay / Triac Output |
| BO-03  | Compressor (Y2)                                  | Relay / Triac Output |
| BO-04  | Hot Gas Reheat Valve (HGRH)                      | Relay / Triac Output |
| BO-05  | Stage 1 Heat (W1) or Heat Pump Heat              | Relay / Triac Output |
| BO-06  | OA Damper, ERV Motor, ERV Damper, Exhaust Fan    | Relay / Triac Output |

#### LEGEND

|   |                                       |
|---|---------------------------------------|
| <b>AO</b> — Analog Output               | <b>NC</b> — Normally Closed (contact) |
| <b>BO</b> — Binary Output               | <b>NO</b> — Normally Open (contact)   |
| <b>EF</b> — Exhaust Fan                 | <b>OA</b> — Outdoor Air               |
| <b>EMR</b> — Energy Management Relay    | <b>SF</b> — Supply Fan                |
| <b>ERV</b> — Energy Recovery Ventilator | <b>UI</b> — Universal Input           |
| <b>HGRH</b> — Hot Gas Reheat            | <b>VFD</b> — Variable Frequency Drive |
| <b>LP</b> — Low Pressure Switch         |                                       |

\* Factory-supplied.

## Dedicated Outdoor Air Unit with DX Cooling or DX Cooling and Heating

### HVAC Guide Specifications — Section 62X

Size Range: **3 to 55 Tons Nominal**

Carrier Model Number: **62X**

#### 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 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 1995.
- 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 heating and/or cooling system. The unit shall consist of all factory wiring with a single point power connection, refrigerant piping and charge (R-410A), operating oil charge, single refrigerant circuit (sizes 03-08) or dual refrigerant circuits (sizes 10-55), with a microprocessor-based 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-gage sheet metal for D Cabinet and a minimum of

20-gage sheet metal for A, B, and C Cabinet, with 2.0-in. thick, closed cell polyisocyanurate foam insulation with an R-13 rating and a 24-gage sheet metal interior liner.

- b. Access panels and doors shall be a minimum of 20-gage sheet metal with 2.0-in. thick, closed cell polyisocyanurate foam insulation with an R-13 rating with a 24-gage 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-gage galvanized steel.
  - d. Basepans shall be 16 or 18-gage galvanized steel. All openings through the basepan shall have upturned flanges at least 0.5 inch in height.
  - e. Basepans shall be insulated with 0.375-in. thick closed cell foam insulation.
  - f. Condensate pan shall be 20-gage stainless steel insulated with closed cell neoprene insulation.
  - g. Base rail shall be double flanged 12-gage galvanized steel (16-gage for A cabinet) or welded closed section structural steel tubing.
  - h. Roof sections shall be sloped for proper drainage.
2. Unit casing shall be capable of withstanding 1000-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-gage 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. Base mounted and external rotor fans with electronic communication motors shall be statically and dynamically balanced at the factory as a single rotating assembly to a quality level of G=2.5 in accordance with DIN ISO 1940-1.
  - c. Modulating Supply Fan: Package shall include a VFD (variable frequency drive) (or optional EC motor on smaller sizes) controlled direct drive supply fan hard mounted (or on optional spring vibration isolation).
  - d. Modulating Exhaust Fan: Package shall include a VFD (or optional EC motor on smaller sizes) controlled direct drive exhaust fan hard mounted (or on optional spring vibration isolation). VFD and ECM control shall be based on return duct pressure.
  - e. Fan Status Switch: The unit shall be equipped with a current sensing switch to provide proof of airflow.
2. Condenser Fans:
- 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 compressor shall be variable capacity type, capable of modulating output from 100% down to 50% of nominal capacity (20-55 tons), or 20% of nominal capacity (3-18 tons).
  - 7. Lag circuit compressor (10-55 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).
  - 3. 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. Optional coil coatings for corrosion protection shall be available.
- F. Refrigerant Components:
- 1. Unit shall be equipped with single refrigerant circuit (sizes 03-08) or dual refrigerant circuits (sizes 10-55), with each circuit containing:
    - a. Solid core filter drier.
    - b. Field-adjustable, externally equalized thermostatic expansion valve.
    - c. Minimum load valve (hot gas bypass).
    - d. Service access ports.
  - 2. Unit 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 35°F.
- 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. Microprocessor Controls:
    - a. BACnet<sup>1</sup>, Modbus<sup>2</sup>, and LonWorks<sup>3</sup> protocol capable.
    - b. Control program options shall include multiple variations for control priority, night set back 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. Shall provide an alarm indicator and an audible alarm signal.
    - 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
- 
1. BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers).  
2. Modbus is a registered trademark of Schneider Electric.  
3. LonWorks is a registered trademark of Echelon Corporation.

- h. Shall have a service Diagnostic mode.
  - i. Single circuit systems shall have a mechanical method of capacity modulation and 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.
  - b. Supply-air sensor shall be located in the unit and shall be used for compressor stage and modulation control.
  - 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. Unit with standard controls will operate in cooling down to an outdoor ambient temperature of 55°F.
  - 3. Units shall be equipped with a motorized two position outdoor air (OA) damper for 100% OA operation. Control and isolation dampers to have a leakage rate of less than 5 scfm per sq ft at 1 in. pressure differential.
  - 4. For systems with gas heat, unit shall be provided with fan time delay to prevent cold air delivery.
- 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.

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 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 indoor fan motors (except for EC motors) shall be open drip proof design with optional totally enclosed fan motors available.

L. Optional Features:

- 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. Cycling or modulating HGRH shall be available.
- 2. Energy Recovery:
  - a. The factory-installed enthalpy wheel shall be certified to meet the requirements of AHRI Standard 1060 and shall be AHRI listed.
  - b. The enthalpy wheel shall be constructed of corrugated synthetic fibrous media with a desiccant intimately bound and uniformly and permanently dispersed throughout the matrix structure of the media.
  - c. The desiccant material shall be molecular sieve, 4 angstrom or smaller.
  - d. The rotor shall be constructed of alternating layers of flat and corrugated media.
  - e. Wheel construction shall be fluted or formed honeycomb geometry so as to eliminate internal wheel bypass.
  - f. The wheel frames shall be evenly spaced steel spokes with a galvanized steel outer band and rigid center hub.
  - g. The wheel seals shall be full contact nylon brush type.
  - h. The wheel shall slide out of the cabinet side for service.
  - i. Wheel cassettes shall be constructed of galvanized steel. Cassettes shall have integral purge section.

- j. The wheel bearings shall be inboard mounted permanently sealed roller bearings or externally flanged bearings.
  - k. The wheel shall be driven by a fractional horsepower AC motor via multilink drive belts.
  - l. Energy wheel defrost control and air bypass shall be available.
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-gage 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.
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.
  - e. Gas heat control shall be staged (2 or 4 stages) or optional modulating control with 5:1 or 10:1 minimum effective turn-down.
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 2-row hot water coil, aluminum fin construction, installed downstream of the evaporator coil. Coil connection stubs will be located inside the unit cabinet.
7. Liquid Subcooling Coil:
- The unit can be equipped with a factory-installed liquid subcooling coil circuit.
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 powered by the load side of the disconnect and shall include a 15A breaker.
9. Non-Fused Disconnect Switch:
- Shall be factory-installed, internally 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 14 pleated media filters.
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-gage 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.
  - b. Non-corroding condenser fan motor mounts.
  - c. Totally enclosed, single-speed, three-phase condenser fan motors.
  - d. Coated, refrigerant-to-air condenser with corrosion-resistant coil coating, composed of aluminum-impregnated polyurethane, rated for 10,000 hour salt spray.
  - 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 coat-

ing, 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.)



