DAIKIN

Catalog 220-1

RoofPak® Applied Rooftop Systems with Energy Recovery Wheels

Packaged Heating and Cooling Units
Type RFS/RPS – 15 to 75 Tons
Type RDT – 45 to 75 Tons

Rooftop Air Handlers
Type RAH/RDS – 4,000 to 30,000 CFM

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Daikin Energy Recovery Systems

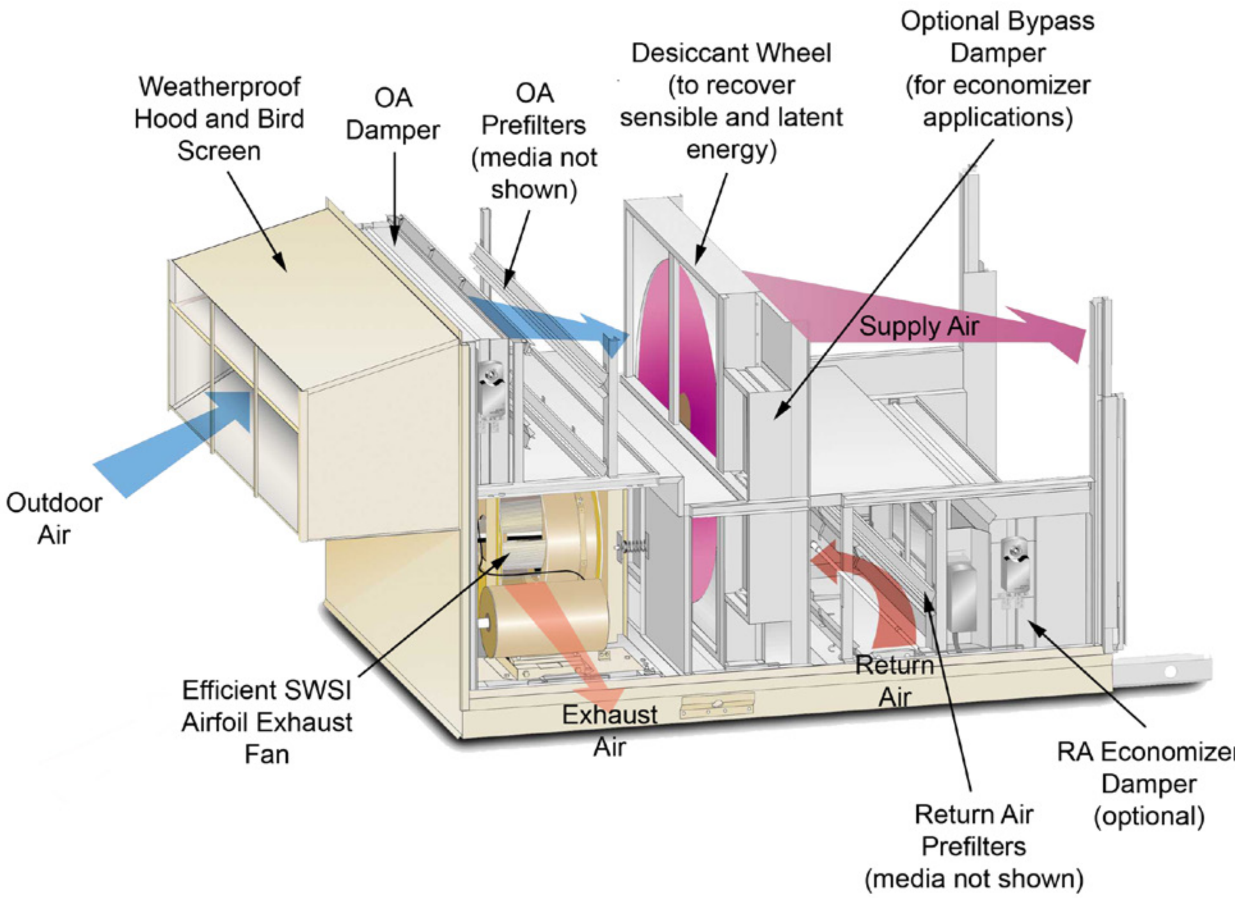
Our energy recovery device transfers both heat and moisture energy between the exhaust and ventilation air. In doing so, it conditions the incoming ventilation air. This total energy device offers a cost-effective and efficient method for containing energy costs while meeting the ventilation requirements of ASHRAE Standard 62.1-1999.

Factory-Installed and Tested Package

Daikin energy recovery systems are provided as a one-piece, factory-installed and tested package. The package includes an AHRI certified enthalpy wheel, exhaust fan with VFD, prefilters, and, for economizer applications, optional bypass dampers and controls (see Figure 1). This helps to eliminate field coordination and leakage problems associated with field installation.

The outdoor and exhaust air flows are arranged in counterflow for better efficiency, and to reduce field cleaning requirements. Exhaust contaminants cannot enter the ventilation air because the exhaust air static pressure is always less than the ventilation air static pressure. Frost protection and purge options are also available.

Figure 1: Energy Recovery Module



Energy Savings

Daikin energy wheels normally recover 70–75% both sensible and latent energy. The result can be considerable energy savings:

- They provide twice as much summer energy recovery as sensible only alternatives such as plate frame heat exchangers and run-around loops.
- Energy recovery increases the air conditioning capacity by 25% if minimum outdoor air design is 33%. Therefore, a 75 ton unit with energy recovery provides about 90 tons of cooling capacity. The cost savings on mechanical heating and cooling components offset the additional cost of energy recovery.
- Winter humidification energy costs may be cut up to 60%.
- Winter latent energy recovery lowers the dew point of exhaust air, compared to sensible only alternatives and allows frost-free operation to lower ambient temperatures.

Satisfies ASHRAE 90.1-2004 Energy Recovery Requirements

- ASHRAE 90.1-2004 usually requires energy recovery if the design requires more than 5000 total CFM and more than 70% minimum outdoor air.
- The Daikin energy recovery effectiveness exceeds ASHRAE 90.1-2004 requirements.

A Complete, Factory-Tested Package

Outdoor and Return Air Prefilters

2" pre-filters are provided in both the outdoor and return air, to minimize the need for cleaning the wheel.

AHRI and UL Conformance

The Daikin energy recovery wheel is AHRI certified for performance and UL recognized for safety.

Integrated Cooling, Heating and Recovery Control

Mechanical heating and cooling are supplied as necessary to supplement the wheel and maintain space conditions.

Free Cooling

Units with economizers include bypass dampers that are opened when “free cooling” is available. The wheel is simultaneously turned OFF.

Proper Exhaust

Exhaust fan speed is controlled for proper exhaust, using a factory installed Variable Frequency Drive (VFD) and space building pressure sensor.

Enthalpy Wheel Design

The unique composition of the Daikin energy wheel (see Figure 2) provides significant advantages. Composed of synthetic fiber, it allows moisture-absorbing desiccant to be uniformly and permanently dispersed throughout the wheel, maximizing its life expectancy. The desiccant forms a molecular sieve that attracts water and minimizes contamination. The honeycombed design and small aperture sizes of our wheel provide even air flow and minimize internal wheel bypass - unlike other energy recovery wheels that can separate or be spread apart by air flow and risk contamination of ventilation air from the exhaust air. Other benefits include:

- Homogenous media - not coated or bonded and will not delaminate
- Synthetic wheel media is completely corrosion resistant
- Unitary wheel construction maximizes face flatness
- Fluted geometry minimizes internal cross leakage
- Molecular sieve desiccant reduces cross contamination
- Wheel is completely water washable

Cassette Design

- Heavy duty galvanized steel construction with removable side panels
- No-maintenance bearings standard on small cassettes
- Flanged outboard bearings used on larger cassettes
- Full contact brush seals minimize leakage
- AC drive motor with Power Twist link belt
- Optional variable speed drive motor available
- Adjustable purge section, provided as standard, reduces cross-contamination

Figure 2: Energy Wheel Construction

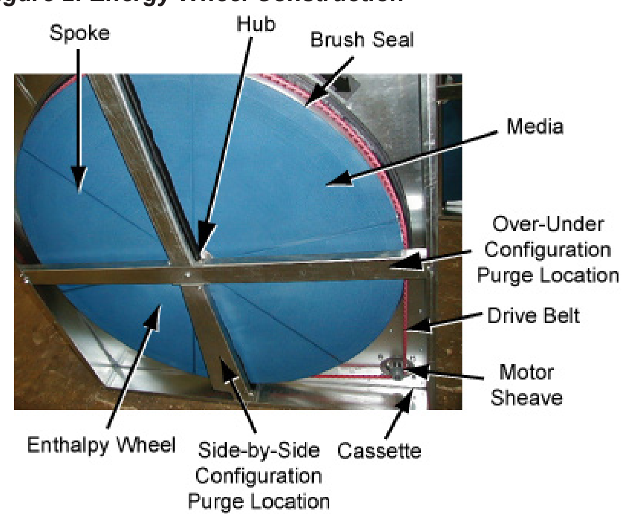


Figure 3: Adjustable Purge

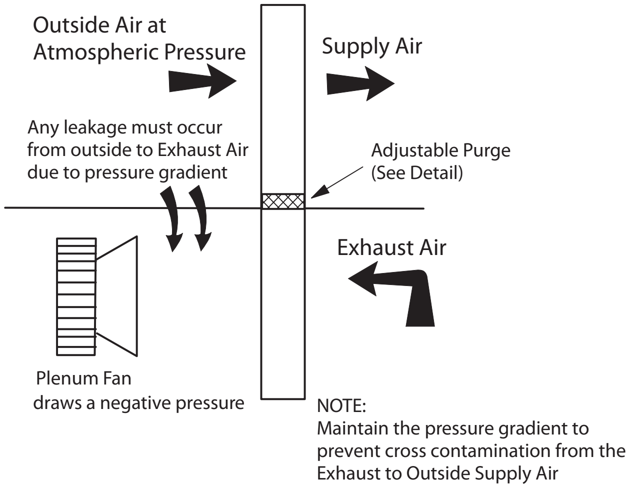
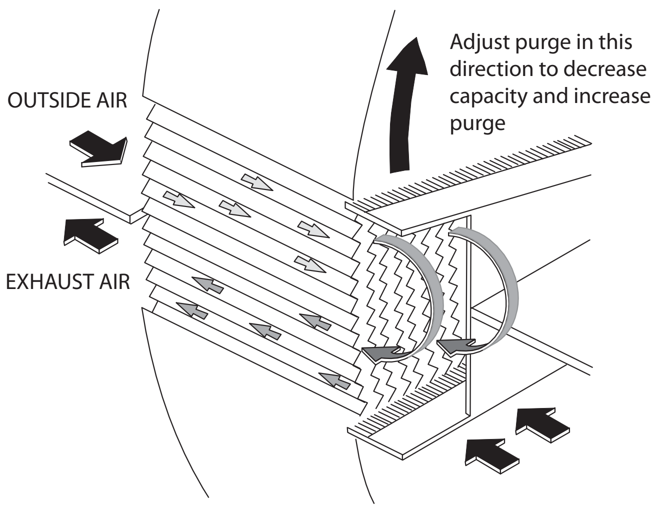


Figure 4: Purge Detail



Return/Exhaust Air Fan

A return/exhaust air fan is provided in a typical exhaust fan configuration. This allows the exhaust to be at a lower pressure than the OA intake and minimizes cross-contamination. However, this fan has characteristics of both a return air fan (RAF) and an exhaust air fan (EAF).

- EAF characteristic - It only exhausts air and must be sized to handle return duct APD at maximum exhaust cfm.
- RAF characteristic - It always operates whenever the SAF operates and the SAF does not need to be sized for the return duct APD.
- RAF characteristic - The fan will do an excellent job of preventing positive building pressure because it draws a large negative at the return of the unit.

The EAF/RAF must be controlled by building pressure. This control is included with the MicroTech® II controls option.

Handling Moisture

Low space humidity is a common problem in the winter and can cause both discomfort and health problems for tenants. It also leads to increased static electricity, which can be damaging to computer equipment. However, mechanical humidification requires 1,100 btu per pound of humidity. Our energy recovery system provides the added benefit of significantly raising the humidity level of outdoor air in the winter. Not only can this have a dramatic impact on the first cost and operating cost of an HVAC system, it can also dramatically improve indoor air quality and comfort for building occupants.

Summer Performance

Enthalpy wheels provide twice as much summer energy recovery as sensible devices because summer ventilation air involves as much latent load as sensible load. In fact, our wheel normally cools outdoor air down to 67°F wet bulb.

First Cost and Operating Cost Reductions

The charts below illustrate typical energy cost savings from the Daikin RoofPak Energy Recovery System. First cost savings result because the system is factory-installed and tested, eliminating the need for field design, installation and coordination. Because less mechanical cooling is needed, the cooling system can be downsized for additional first cost savings. This also can reduce the unit's electrical requirement, further reducing installed costs.

Table 1: Typical Annual Energy Savings per 10,000 cfm of Ventilation Air with Daikin Energy Recovery Wheel*

	Minneapolis	Phoenix	Miami	Dallas	N.Y.C.	Atlanta	Chicago
With Winter Humidification	$6,609.00	$4,605.00	$8,048.00	$5,545.00	$5,374.00	$4,738.00	$6,010.00
Without Winter Humidification	$5,359.00	$4,579.00	$8,048.00	$5,381.00	$4,625.00	$4,363.00	$5,041.00

* Based on gas fired unit, 4,000 hours, $0.10 per KWHR and $0.50 per Therm)

Table 2: Typical Payback (in years) for Daikin Energy Recovery Wheel*

	Minneapolis	Phoenix	Miami	Dallas	N.Y.C.	Atlanta	Chicago
With Winter Humidification	1.2 – 2.6	2.6 – 7.4	0.7 – 2.7	1.8 – 5.2	2.0 – 6.1	2.6 – 7.1	1.5 – 4.1
Without Winter Humidification	1.9 – 4.9	2.6 – 7.4	0.7 – 2.7	1.9 – 5.4	2.6 – 7.1	2.9 – 7.3	2.1 – 6.0

* Based on gas fired unit, 4,000 hours, $0.10 per KWHR and $0.50 per Therm)

Two Arrangements Offered

Daikin offers two energy recovery arrangements:

1. Make-Up Air unit (up to 16,000 cfm): SAF supplies 100% outside air and all return air is exhausted (see Figure 5).
2. Economizer unit (up to 30,000 total cfm and 16,000 cfm of outdoor air): SAF supplies minimum or economizer outside (mixed) air and some return air is exhausted (see Figure 6).

Figure 5: Energy Recovery Make-Up Air Arrangement (Both Side Return and Bottom Return Offered)

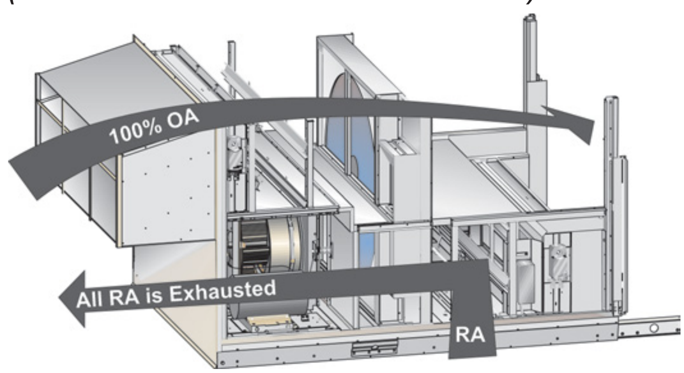
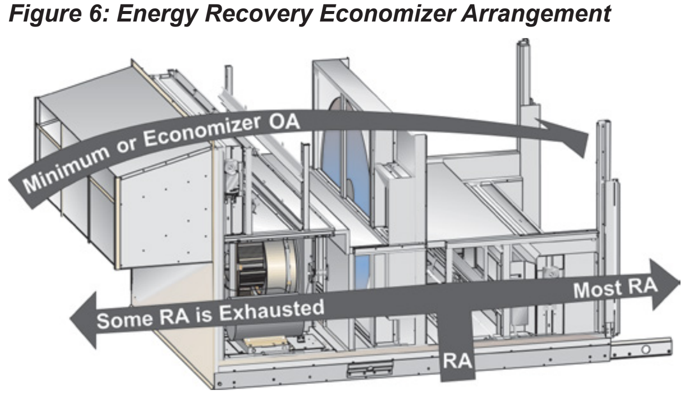


Figure 6: Energy Recovery Economizer Arrangement



Parallel Air Paths on Energy Recovery Wheel Applications

Economizer Units

There are three sets or parallel air flow paths on economizer units:

Set 1: OA and RA paths to the SAF

1. The OA path APD is normally greater than the RA path APD. Therefor, the air balancer must adjust the RA dampers to not open fully so that sufficient OA is achieved.
2. The RA path includes return duct ESP. Normally, the SAF handles both of these paths. Therefore, the EAF need not handle the return duct ESP. However:
    - The RA path is not open during economizer operation, so the EAF must handle return duct ESP during economizer operation or excessive positive building pressure will occur.
    - For VAV units, note that RA cfm during economizer operation normally is less that design return cfm.
    - An energy analysis must be careful not to overwhelm the EAF with return duct ESP except during economizer cooling.

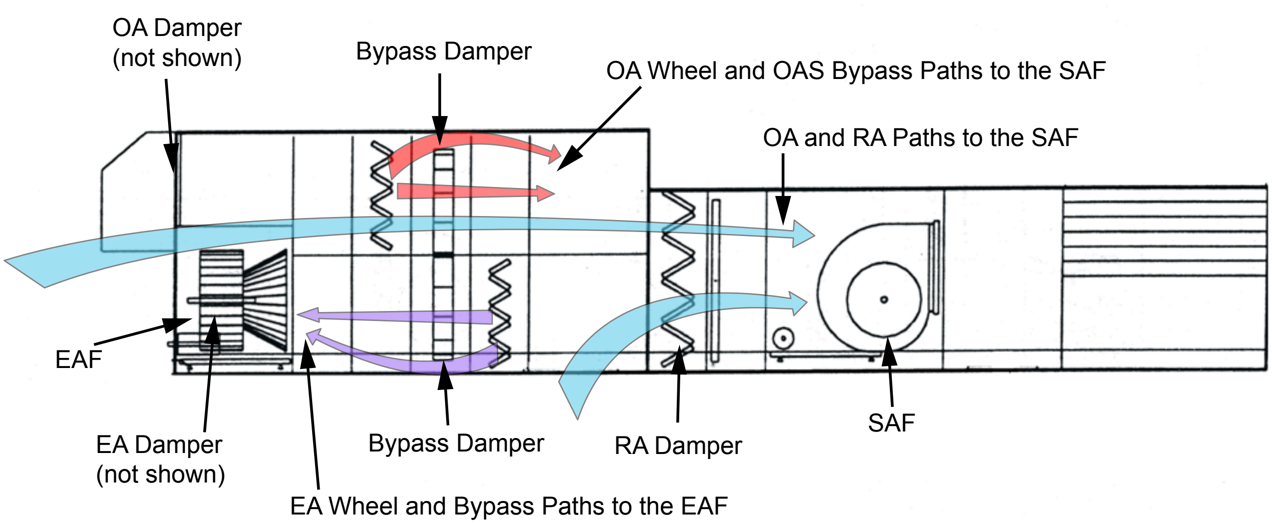
Set 2: OA Wheel and OA Bypass Path to the SAF

Set 3: EA Wheel and Bypass Path to the EAF

100% Outdoor Air Units

There are no parallel flow paths in a 100% OA unit. Instead, there is one counter-flow path (OA and EA paths throughout the wheel). The EAF must be sized for design return duct cfm and ESP.

Figure 7: Parallel Air Paths



Enthalpy Wheel Controls and Wiring

Drive Motor

The enthalpy wheel comes with a constant speed, standard drive motor.

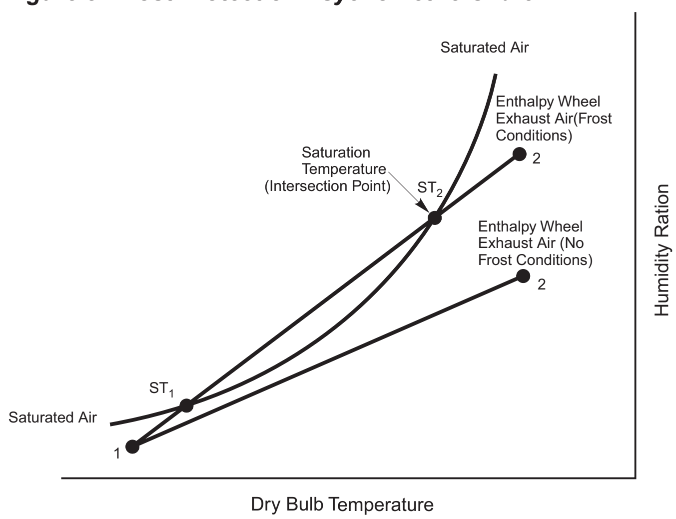
Frost Protection Option

The frost protection option includes the following:

- VFD to vary the speed of the energy recovery wheel (ERW)
- MicroTech II controls and sensors

Frosting can occur when EA is saturated and OAT is below 32°F (Figure 8). MicroTech II senses the RA temperature and humidity, as well at OAT, and determines if frost can occur. If so, the wheel is slowed down so that the wheel LAT is not saturated.

Figure 8: Frost Protection Psychometric Chart



Energy Recovery Bypass Damper Control

When a unit is equipped with a 0–100% modulating economizer, the energy recovery option includes a set of bypass dampers that allow air to bypass the energy recovery wheel when the wheel is not operating. The dampers are driven closed for 2 minutes whenever the energy recovery wheel is turned on, forcing the entering and leaving air to go through the wheel. When the outdoor dampers are driven more than 3% above the Minimum Outdoor Damper Position Set Point (as when the unit enters the Economizer operating state) the wheel is shut off and the bypass dampers are driven open allowing the entering and leaving air to bypass the wheel.

General

The following section contains basic application and installation guidelines that must be considered as part of the detailed analysis of any specific project.

Units are intended for use in normal heating, ventilating and air conditioning applications. Consult your local Daikin sales representative for applications involving operation at high ambient temperatures, high altitudes, non-cataloged voltages and for applications requiring modified or special control sequences. Consult your local Daikin sales representative for job specific unit selections that fall outside of the range of the catalog tables, such as 100% outside air applications.

For proper operation, units should be rigged in accordance with instructions stated in the unit installation manual (IM). Fire dampers, if required, must be installed in the ductwork according to local or state codes. No space is allowed for these dampers in the unit.

Follow factory check, test and start procedures explicitly to achieve satisfactory start-up and operation (see IM 738).

Most rooftop applications take advantage of the significant energy savings provided with economizer operation. When an economizer system is used, mechanical refrigeration is typically not required below an ambient temperature of 50°F. Standard RoofPak refrigeration systems are designed to operate in ambient temperatures down to 45°F. For applications where an economizer system cannot be used, Daikin's SpeedTrol™ head pressure control system is available on size 045C to 075C units to permit operation down to 0°F. However, if the condenser coils are not properly shielded from the wind, the minimum ambient conditions stated above must be raised.

Unit Location

The structural engineer must verify that the roof has adequate strength and ability to minimize deflection. Take extreme caution when using a wooden roof structure.

Locate the unit fresh air intakes away from building flue stacks or exhaust ventilators to reduce possible reintroduction of contaminated air to the system. Unit condenser coils should be located to avoid contact with any heated exhaust air.

Allow sufficient space around the unit for maintenance/service clearance as well as to allow for full outside air intake, removal of exhaust air and for full condenser airflow. Refer to Recommended Clearances on page 52 for recommended clearances. Consult your Daikin sales representative if available clearances do not meet minimum recommendations. Where code considerations, such as the NEC, require extended clearances, they take precedence.

In applications utilizing a future cooling unit (RFS), take care in choosing a location of the unit so it will provide proper roof support and service and ventilation clearance necessary for the later addition of a mechanical cooling section (RCS).

Split Units

Units may sometimes have to be split into multiple pieces to accommodate shipping limitations or jobsite lifting limitations. Units exceeding 52 feet in length may need to be split for shipping purposes. Units exceeding the rating of an available crane or helicopter may also need to be split for rigging purposes. Unit can be split at the condensing section or split between the supply fan and heat section. Contact your local Daikin sales representative for more details.

Curb Installation

The roof curb is field assembled and must be installed level (within 1/16 in. per foot side to side). A sub-base has to be constructed by the contractor in applications involving pitched roofs. Gaskets are furnished and must be installed between the unit and curb. For proper installation, follow NRCA guidelines. Typical curb installation is illustrated in Roof Curbs on page 49. In applications requiring post and rail installation, an I-beam securely mounted on multiple posts should support the unit on each side.

Applications in geographic areas that are subjected to seismic or hurricane conditions must meet code requirements for fastening the unit to the curb and the curb to the building structure.

For acoustical considerations, the condensing section is provided with a support rail versus a full perimeter roof curb. When curbs are installed on a built-up roof with metal decking, an inverted 6 in. channel should be provided on both sides of the unit. Acoustical material should be installed over the decking, inside the roof curb. Only the supply and return air ducts should penetrate the acoustical material and decking. Apply appropriate acoustical and vibration design practices during the early stages of design to provide noise compatibility with the intended use of the space. Consult your Daikin sales representative for unit sound power data.

Acoustical Considerations

Good acoustical design is a critical part of any installation and should start at the earliest stages in the design process. Each of the four common sound paths for rooftop equipment must be addressed. These are:

- Radiated sound through the bottom of the unit bottom (air handling section and condensing section) and into the space
- Structure-borne vibration from the unit to the building
- Airborne sound through the supply air duct
- Airborne sound through the return air duct

Locating rooftop equipment away from sound sensitive areas is critical and the most cost effective means of avoiding sound problems. If possible, rooftop equipment should always be located over less sensitive areas such as corridors, toilet facilities or auxiliary spaces and away from office areas, conference rooms and classrooms.

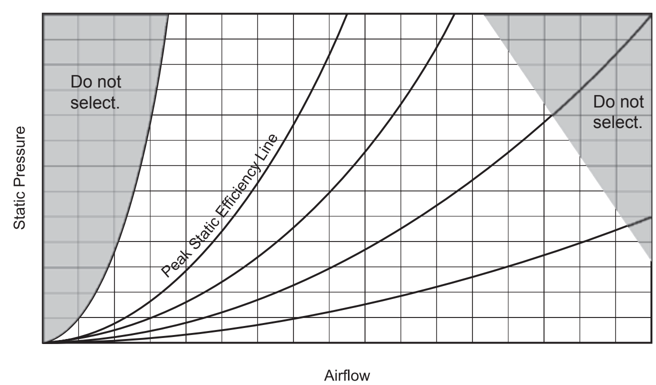
Some basic guidelines for good acoustical performance are:

- Always provide proper structural support under all areas of the unit
- Always locate the unit's center of gravity close to a main support to minimize roof deflection. Maintaining a roof deflection under 1/3 in. minimizes vibration-induced noise
- Use a concrete deck or pad when a unit has to be located over an occupied space where good acoustics are essential
- Only the supply and return air ducts should penetrate the acoustical material and decking within the curb perimeter, and the openings must be sealed once the duct is installed
- Don't overlook the return air path. Never leave a clear "line of sight" into a return or exhaust fan; always include some duct work (acoustically lined tee) at the return inlet
- Place an acoustical material in the area directly beneath the condensing section
- Select acoustic material that does not encourage microbial growth
- Minimize system static pressure losses to reduce fan sound generation
- Select the appropriate fan for the application. Fans should be selected as close as possible to their peak static efficiency. To assist you, peak static efficiency is identified by the first system curve to the right of the shaded "Do not select" region, as illustrated in Figure 9.
- Design duct systems to minimize turbulence
- Account for low frequency duct breakout in system design. Route the first 20 ft. of rectangular duct over non-sensitive areas and avoid large duct aspect ratios. Consider round or oval duct to reduce breakout
- When an added measure of airborne fan sound control is required, sound attenuators can be supplied, factory installed in a unit discharge air section, to treat the supply fan. On the return side, additional attenuation can often be achieved by routing the return duct within the curb area beneath the unit

There are many sound sources in rooftop systems. Fans, compressors, condenser fans, duct take-offs, etc. all generate sound. For guidelines on reducing sound generation in the duct system, refer to the 2003 ASHRAE Applications Handbook, Chapter 47.

Contact your local Daikin sales representative for equipment supply, return and radiated sound power data specific to your application.

Figure 9: Optimal fan selection line



Ductwork

A well-designed duct system is required to allow the rooftop equipment to provide rated performance and to minimize system resistance and sound generation. Duct connections to and from units should allow straight, smooth airflow transitions. Avoid any abrupt change in duct size and sharp turns in the fan discharge. Avoid turns opposed to wheel rotation since they generate air turbulence and result in unwanted sound. If 90° turns are necessary, use turning vanes. Refer to the 2003 ASHRAE Applications Handbook, Chapter 47 for specific guidelines relevant to rooftop equipment.

Return Duct

The return path is the most often overlooked. A section of return duct is required to avoid a “line of sight” to the return air opening and to provide attenuation of return air sound. Install an insulated tee with a maximum duct velocity of 1000 to 1200 feet per minute. Extend the duct 15 feet to provide adequate attenuation.

Supply Duct

Insulate supply air ductwork for at least the first 20 feet from the unit. Consider the use of round or oval ductwork, as it significantly reduces low frequency breakout noise near the equipment. If rectangular duct is used, keep the aspect ratio of the duct as low as possible. The large flat surfaces associated with high aspect ratios increase low frequency breakout to the space and can generate noise, such as “oil canning.” The maximum recommended supply duct velocity is 1800 to 2000 feet per minute.

Duct High Limit

All Daikin RoofPak systems with VAV control include an adjustable duct high limit switch as a standard feature. This is of particular importance when fast acting, normally closed boxes are used. The switch is field adjustable and must be set to meet the specific rating of the system ductwork.

Vibration Isolation

Make duct attachments to the unit with a flexible connection.

Smoke and Fire Protection

Daikin optionally offers factory-installed outdoor air, return air, and exhaust air dampers as well as smoke detectors in the supply and return air opening, complete with wiring and control. These components often are used in the building’s smoke, fume, and fire protection systems. However, due to the wide variation in building design and ambient operating conditions into which our units are applied, we do not represent or warrant that our products are fit and sufficient for smoke, fume, and fire control purposes. The owner and a fully qualified building designer are responsible for meeting all local and NFPA building code requirements with respect to smoke, fume, and fire control. Daikin offers the flexibility to offer these various components and control sequences, as directed by the customer, to help meet code requirements.

Filters

General

Routinely replace filters to minimize filter loading. As filters get dirty, the filter pressure drop increases, causing a decrease in airflow. Depending on fan type, forward curved or airfoil, this airflow change can be significant. The effect of filter loading is the most critical when using 65% and 95% efficient filters.

When making a fan selection, include a pressure drop component in the system total static pressure for filters since they get dirty. Generally, select a value midway between clean and dirty filter ratings. If a minimum airflow is critical, the fan selection should be made using the higher, dirty filter pressure drop value. Following these recommendations should limit airflow fluctuation as the filters load.

Final Filters

The application of final filters (filters downstream of the fan) places special requirements on unit selection. When final filters are employed, cooling coils must be located in the draw-through position so that the filters will not be in a saturated air stream. Also, final filters applications for a unit with gas heat requires the filters to be rated for 500°F. Instruct maintenance personnel to use properly rated replacement filters.

Wheel Cleaning

Daikin energy recovery wheels generally only require periodic and easy cleaning as long as outdoor and return air is relatively clean.

- The counter-flow arrangement causes the wheel to be self-cleaning as long as it rotates
- Daikin provides pre-filters on both the outdoor and return air
- Vacuums or soft brushes should be used to periodically clean the wheel so that dirt does not accumulate and promote microbial growth. Be careful not to force dirt into the interior of the wheel
- If periodic cleaning is forgotten and dirt or mildew persists, then water and mild detergents can be used. However, care must be taken to control the water and keep it out of the floor and other exterior cabinet insulation

Variable Air Volume Application

RoofPak units are available with variable speed drives to provide variable air volume (VAV) control.

In placing a duct static pressure sensor, locate a pressure tap near the end of the main duct trunk. Adjust the static pressure set point so that at minimum airflow all of the terminals receive the minimum static pressure required plus any downstream resistance. Locate the static pressure sensor tap in the ductwork in an area free from turbulence effects and at least ten duct diameters downstream and several duct diameters upstream from any major interference, including branch takeoffs. A second sensor is available and should be used on installations having multiple duct trunks, multiple floors, or significantly varying zones (i.e., east/west). The MicroTech II controller will control the variable speed drive to satisfy the supply duct requiring the most static pressure.

On units with discharge air control, use maximum compressor unloading and hot gas bypass.

Fan Operating Range

The acceptable system operating range of the Daikin rooftop is determined by all of the following characteristics. Each of these limiting factors must be considered for proper performance and component design life.

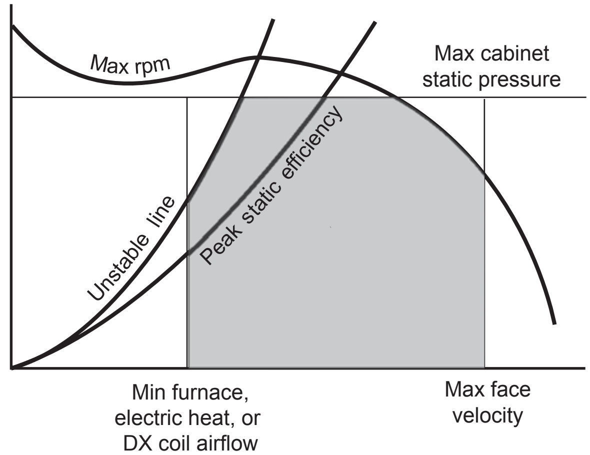
- Unstable fan operation
- Maximum fan rpm
- Maximum cabinet static pressure
- Maximum face velocity (cooling coil is most important)
- Minimum furnace or electric heater velocity
- Turndown capability on VAV applications
- Compressor operating pressures

Figure 10 illustrates these limiting factors with exception of the last two items listed above. The shaded area indicates the design operating range of the fan. For optimal efficiency, select fans as close to the fan's peak static efficiency line as possible. This line is the first system curve to the right of the unstable line illustrated.

All Daikin RoofPak systems feature internally isolated fans. All supply and return air fans are statically and dynamically balanced in the factory and mounted on rubber-in-shear (RIS) or 2 in. deflection spring isolators. Flexible isolation is provided as standard between the fan outlet and the discharge bulkhead to prevent hard contact and vibration transmission. Spring isolated fan assemblies also are available with seismic restraints.

The choice of 2 in. deflection spring isolation or RIS isolation depends on an analysis of the roof structure and whether or not an isolation curb is being provided. When using an isolation curb, consult with the curb manufacturer before selecting spring isolation in the rooftop unit. Doubling or "stacking" spring isolation can generate a resonant vibration.

Figure 10: Fan Selection Boundary



Altitude Adjustments

Fan curve performance is based on 70°F air temperature and sea level elevation. Selections at any other conditions require the following adjustment for air densities listed in Table 3. Higher elevations generally require more rpm to provide a given static pressure but less bhp due to the decrease in air density.

1. Assume 10,000 cfm is required at 3.5" TSP. The elevation is 5000 ft. and 70°F average air temperature is selected. A 20" DWDI airfoil fan is selected.
2. The density adjustment factor for 5000 ft. and 70°F is 0.83.
3. TSP must be adjusted as follows; 3.5" / 0.83 = 4.22"
4. Locate 10,000 cfm and 4.22 on the fan curve. rpm = 2270 and bhp = 11.3. The required fan speed is 900 rpm.
5. The consumed fan power at design = 11.3 bhp × 0.83 = 9.4 bhp

Table 3: Temperature and altitude conversion factors

Air temp (°F)	Altitude (feet)								
	0	1000	2000	3000	4000	5000	6000	7000	8000
-20	1.20	1.16	1.12	1.08	1.04	1.00	0.97	0.93	0.89
0	1.15	1.10	1.08	1.02	0.99	0.95	0.92	0.88	0.85
20	1.11	1.06	1.02	.098	0.95	0.92	0.88	0.85	0.82
40	1.06	1.02	0.98	0.94	0.91	0.88	0.84	0.81	0.78
60	1.02	0.98	0.94	0.91	0.88	0.85	0.81	0.79	0.76
70	1.00	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74
80	0.98	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.72
100	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.70
120	0.92	0.88	0.85	0.81	0.78	0.76	0.72	0.70	0.67
140	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.78	0.65

Condenser Performance

Altitudes greater than sea level require a derate in condenser and cooling performance that can be estimated as follows:

- 0 to 6000 feet
  - Cooling capacity decrease factor (all sizes) = 0.5% per 1000 feet
  - Compressor kW increase factor = 0.6% per 1000 feet

The actual derate varies with each individual unit and design conditions. Your local Daikin representative can provide exact performance data.

Furnace Performance

Gas heat performance data is based on standard 70°F air temperature and zero feet altitude (sea level).

For altitudes of 2000 feet and higher, the gas burner must be derated 4% for ever 1000 feet of altitude.

Example:

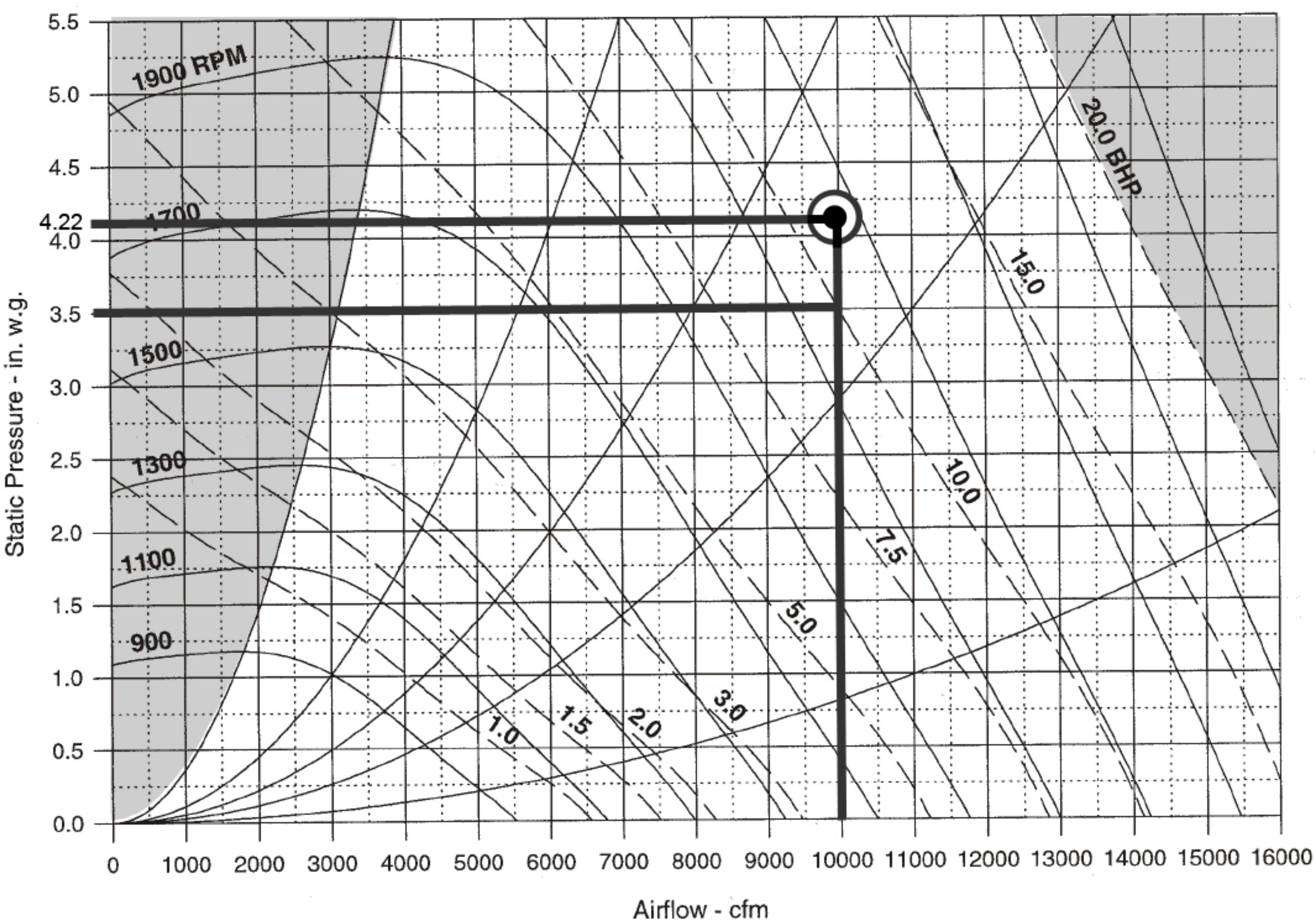
A 1000 MBh furnace at an altitude of 5000 feet is derated (0.04 × 3 = 0.12). At 1000 MBh input (1000 × 0.12 MBh), the actual input is (1000 – 120 = 880 MBh) at 5000 feet.

- Above 6000 feet, consult factory

Wheel Performance

Wheel performance must be adjusted for altitude as shown in Unit Selection on page 14.

Figure 11: RPS/RFS 015C to 030C, 20 in. Airfoil Supply Fan



Achieving the optimal performance of a rooftop system requires both accurate system design and proper equipment selection. Factors that control the unit selection include applicable codes, ventilation and air filtration requirements, heating and cooling loads, acceptable temperature differentials, and installation limitations. Daikin RoofPak units offer a wide selection of component options providing the capability to meet diverse application requirements.

The Daikin Tools™ software selection program allows your local Daikin sales representative to provide you with fast, accurate and complete selection of Daikin RoofPak units. You also can select your unit through reference to physical, performance, dimensional, and unit weight data included in this catalog. Due to the variety of cooling coil options available, only a sample of cooling capacity data is presented in the catalog. To properly select unit equipment:

1. Select unit size and cooling coil
2. Select heating coils and equipment
3. Select fans and motors

Below are examples that illustrate the equations and catalog references used in the unit selection process.

Selection Example:

Constant volume system with DX cooling and natural gas heat.

System Design:

Supply air volume . . . . 20,000 cfm
Return air volume. . . . . 20,000 cfm
Minimum outside air volume . . . . 7000 cfm
Maximum face velocity. . . . . 550 fpm
Supply fan external SP . . . . 2.00 in. w.g.
Return fan external SP. . . . . 1.00 in. w.g.
Altitude. . . . . Sea level
Economizer with return air fan
Energy recovery wheel
30% throw-away filters
460V/60Hz/3Ph
Fully modulating heat

Summer Design:

(RAT) Return air temperature . . . . 75°F/62°F
(OAT) Outdoor air temperature . . . . 95°F/75°F
(WLAT) Wheel leaving air temperature . . . . 80°F/65.5°F
DX coil capacity 700MBh

Winter Design:

Return air temperature. . . . . 72°F dB
Outdoor air temperature. . . . . 33°F dB
Wheel leaving air temperature. . . . . 61°F dB
Gas heat MBh output 380 . . . . MBh

Maximum Motor HP:

Supply fan . . . . 20 hp
Return/exhaust fan. . . . . 15 hp

Selecting Unit Size to Satisfy Summer Design

Unit size is based on coil face area and cooling capacity requirements. Supply air capacity and maximum face velocity constraints should serve as a guide for selecting coil dimensions and cabinet size. Many model sizes are available with a standard and a high airflow coil selection. This flexibility prevents the need to increase cabinet size to accommodate high airflow per ton applications.

Based on the given data, the appropriate coil face area may be determined as follows:

Minimum face area = supply air volume/maximum face velocity

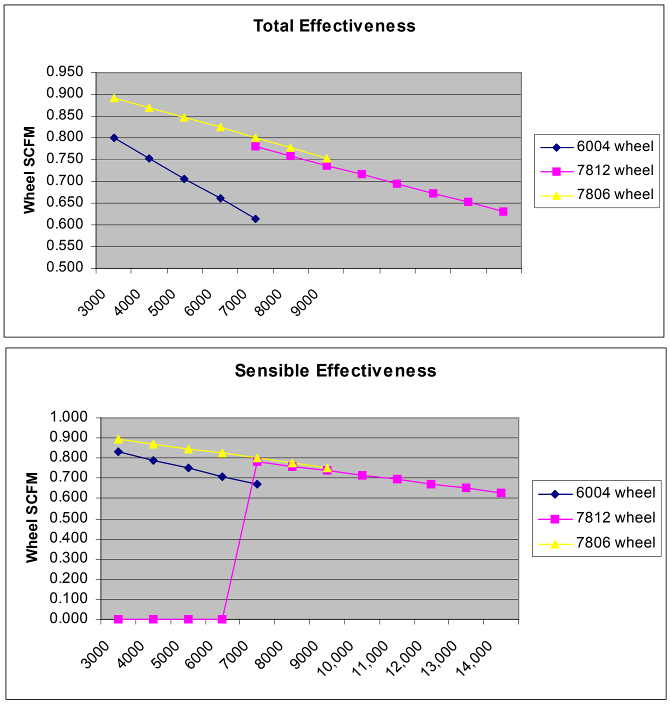
= 20,000 cfm/550 fpm

= 36.4 square feet

Referring to Physical Data on page 18, the 39.5 square foot, small face area coil of the RPS 045C to 75C units satisfies the required face velocity.

Wheel Cooling Capacity

Figure 12: Total and Sensible Effectiveness Charts



NOTE: Based on equal intake and exhaust air flow, minimum purge, and no frost conditions. The 7812 wheel should normally be used if wheel cfm > 8000 cfm.

Refer to below. The 7806 wheel is normally used at 7000 cfm. Wheel sensible and total effectiveness = 80%. Therefore, WLAT, both dry bulb and wet bulb, can be calculated by Equation 1.

Equation 1:

WLAT - RAT + 80% × (OAT - RAT) when adjusted for SCFM

Adjusting for SCFM is done with air density (see table) 95°F air density = 96% x 75°F air density as shown in Equation 2 below.

Equation 2:

WLAT - RAT = 80% × 96% × (OAT - RAT)

Solving Equation 2 indicates WLAT = 79.6 / 65.0°F. This is acceptable (80 / 65.5 is specified).

Total energy recovery wheel cooling capacity is approximately 247 MBh based on enthalpy charts.

DX Cooling Coil Capacity

DX coil entering air temperature (EAT) must first be calculated and is equal to mixed air temperature (MAT) on a draw-through cooling coil. MAT, both dry bulb and wet bulb, is found through using psychometric chart mixing calculations (Equation 3).

Equation 3:

MAT - RAT = (OA cfm / total cfm) × (WLAT - RAT)

Solving Equation 3 indicates DX coil EAT and MAT = 76.6 / 63.0°F.

DX coil capacity is specified to be 700 MBh and the RPS 60 is the most likely selection. RPS 60 DX capacity for a small face area coil is 707 MBh per the table (compressor KW = 63.7) and is acceptable (700 MBh is specified).

Total unit cooling capacity = 247 + 707 = 956 MBh.

R-407C versus R-22

The cooling tables (Table 7 on page 20 through Table 22 on page 27) document the R-22 cooling capacity and compressor kW. The R-407C performance correction factors vary slightly with unit size and operating conditions but can be estimated as shown in the table below. Use the Daikin Tools computer selection program to get the exact R-407C performance.

Table 4: R-407C versus R-22

Compressor capacity	Compressor kW
1.00–1.01	1.07–1.10

Selecting the Unit Heating System

Gas Heat

When selecting a gas furnace, the system heating load, minimum airflow and maximum temperature rise constraints are needed. Refer to Figure 13 on page 28 for furnace model size selection.

For all heat exchangers, there exist a maximum temperature rise. This limitation is determined by the heat exchanger surface area to airflow ratio. Refer to Table 24 on page 29 for verification of the temperature rise capability of the furnace selected. Also, use this table when specifying baffle position based on minimum airflow design. Refer to Altitude Adjustments on page 12.

NOTE: In VAV applications, consider range of airflow modulation when selecting furnace model and baffle position.

Wheel Heating Capacity

Refer to (Figure 12 on page 15) for the 7806 wheel. Wheel sensible effectiveness = 80%. Therefore, WLAT dry bulb can be calculated by using Equation 3.

Equation 3:

WLAT - OAT = 80% × (RAT - OAT) when adjusted for SCFM

Adjusting for SCFM is done with air density (see table). 33°F air density = 91.5% x 72°F air density. Therefore, Equation 3 must be modified and Equation 4 is used instead.

Equation 4:

WLAT - OAT = 80% × 91.5% × (RAT - OAT)

Solving Equation 4 indicates WLAT = 61.5°F. This is acceptable (61°F is specified).

Energy recovery wheel heating capacity is calculated by Equation 5.

Equation 5:

SMBh = 1.085 × (cfm / 1000) × (WLAT - OAT) = 618 MBh

Furnace Capacity

Furnace output capacity is specified to be 380 MBh and the 400 MBh furnace is the most likely selection. Minimum airflow (12,000 cfm with baffle C) is less than design cfm for this constant volume unit. Therefore, the 400 MBh furnace is the proper selection.

Total unit heating capacity = 618 + 400 = 1018 MBh.

Selecting Fans and Motors

Fan and motor selections are based on total static pressure drop and design airflow. Total static pressure includes internal air pressure drops of unit components and external air pressure drops in supply and return ducts. Refer to Component Pressure Drops on page 32 for internal pressure drops of unit components.

Fan curves provided in Supply Fans on page 35 and Airfoil Return Fans on page 40 should be used when selecting unit fans and motors. To optimize fan performance, select the fan size having design airflow and static pressure intersecting as close to the first system curve after the shaded Do Not Select region as possible. Refer to Application Considerations on page 9.

When selecting motor size, select the motor just below the horsepower curve. An oversized motor (large horsepower to load ratio) can greatly increase electric consumption due to the reduction in motor performance.

Return/Exhaust Fan Selection

The return/exhaust fan ISP varies depending on whether or not the optional economizer and bypass damper will be utilized.

RAF / EAF TSP = return duct ESP + internal pressure drop (ISP)

1. 100% OA unit (no economizer or bypass) - ISP = wheel + wheel prefilter + damper + hood pressure drop (see tables)
2. Economizer unit with bypass - The larger of two parallel path ISP values should be used. The bypass path will be larger unless design OA / EA > 70% of the total design cfm.
    a. Wheel path: ISP = wheel + wheel prefilter + hood pressure drop and is based on exhaust DFM at design.
    b. Bypass path: ISP = bypass damper + wheel prefilter + hood pressure drop and is based on maximum exhaust cfm during economizer operation.

Therefore, for our example:

- Fan cfm = design exhaust cfm
- RAF / EAF TSP = 1.00. ESP + 1.71. ISP
- RAF / EAF cfm = 20,000 cfm
- 14.2 bhp and a 15 hp motor are required

Supply Fan and Motor

Supply fan TSP = supply duct ESP + ISP (see tables). The return duct static pressure drop is not added to the supply fan pressure drop. Therefore, the total static pressure for the supply fan in the example is as follows:

Internal pressure drops:

Hood, wheel prefilter, wheel and damper .0.71 in. w.g.
30% angular filters . . . . .0.14 in. w.g.
Gas furnace . . . . .0.20 in. w.g.
Evaporative coil (small 5-row, 12 fpi) . . . . .0.81 in. w.g.
Total internal pressure drop . . . . .1.86 in. w.g.

External pressure drops:

Supply duct . . . . .2.00 in. w.g.
Total external pressure drop . . . . .3.86 in. w.g.

NOTE: When gas or electric heat is provided, do not add the cooling coil diffuser pressure drop. In VAV applications with gas heat, consult your Daikin sales representative for design pressure drop determinations.

For a constant volume system a forward curve or airfoil type fan can be selected. Reference Application Considerations on page 9 for discussion on acoustical consideration. Considering its favorable brake horsepower, an airfoil type fan will be selected.

Entering the standard 30 in. airfoil fan curve (see Figure 21 on page 38) at 20,000 cfm and 3.86 in. w.g., the required fan motor size is 20 hp operating at 1266 rpm. Fan brake horsepower is 17.7 horsepower.

Supply Power Wiring for Units Without Electric Heat

Sizing supply power wire for a unit is based on the circuit with the largest amperage draw. All electrical equipment is wired to a central panel for single or optional multipower connections. Refer to Electrical Data on page 53 for FLA and RLA ratings of equipment. Determination of Minimum Circuit Ampacity (MCA) is as follows:

Fans and Cooling

MCA = 1.25 × RLA or FLA of largest motor + 1.00 × FLA of other loads

Example	**FLA/RLA**
Compressors 1 - 4 15 hp ea	23.7 amps each
Condenser fan motors, (6) 1 hp 2	amps each
Supply fan motor, 20 hp	25 amps
Return fan motor, 15 hp	20.3 amps

Therefore,

MCA = (1.25 × 25) + 1.00 × [(4)23.7 + (6)2 + 20.3]
= 160 amps

Select power supply wire based on 160 amperes.

Calculating Unit Length

Referring to unit "Dimensional Data" on page 41 for a draw-through RPS 060C:

Total unit length = energy recovery + angular filter + DX coil section + fan section + heat section + discharge plenum + condensing unit
= 192in. + 24 in. + 24 in. + 72in. + 48 in. + 48 in. + 83 in.
= 491 inches.

NOTE: When selecting unit curb length, do not include the length of the condensing unit.

Table 5: Physical Data, RPS/RFS 015C to 040C and RDS 800 to 802

Data		Unit Size						
		RDS 800					RDS 802	
		RFS/RPS 015C	RFS/RPS 018C	RFS/RPS 020C	RFS/RPS 025C	RFS/RPS 030C	RFS/RPS 036C	RFS/RPS 040C
Nominal Airflow (cfm)		6000	7000	8000	10000	12000	14000	16000
Compressor	Type	Scroll						
	Quantity – hp	1–4.5, 1–10	1–6,7, 1–10	1–6.7, 1–15	2–6.7, 1–13	2–6.7, 1–15	2–6.7, 2–10	4–10
	Std. capacity control	100-65-35-0	100-60-40-0	100-69-31-0	100-75-50-25-0	100-75-50-25-0	100-70-50-20-0	100-75-50-25-0
Condenser Coil (Aluminum Fins)	Rows/FPI	2/16	2/16	2/16	3/16	3/16	2/16	2/16
	Face area (sq.ft.)	36.8	36.8	36.8	36.8	36.8	76.2	76.2
Condenser Fans	No. – dia. (in.)	2–26	2–26	2–26	3–26	3–26	4–26	4–26
	Std. airflow (cfm)	14552	14552	14552	16047	16047 29376	29376	
Cond. Fan Motors	No. – Hp	2–1.0	2–1.0	2–1.0	3–1.0	3–1.0	4–1.0	4–1.0
Supply Fans	Type	Forward Curved LP					Forward Curved LP/MP	
	No. – dia. (in.)	2 – 15×6	2 – 15×6	2 – 15×6	2 – 15×6	2 – 15×6	1 – 24	1 – 24
	No. – dia. (in.)	2 – 15×15	2 – 15×15	2 – 15×15	2 – 15×15	2 – 15×15	–	–
	Type	DWDI Airfoil						
	No. – dia. (in.)	1 – 20	1 – 20	1 – 20	1 – 20	1 – 20	1 – 24	1 – 24
RAF/EAF	Type	SWSI Airfoil						
	No. – dia. (in.)	1 – 24	1 – 24	1 – 24	1 – 24	1 – 24	1 – 24	1 – 24
Evaporator Coils	Rows	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5
	FPI	8, 10, 12	8, 10, 12	8, 10, 12	8, 10, 12	8, 10, 12	8, 10, 12	8, 10, 12
	F.A., small (sq.ft.)	18.5	18.5	18.5	27.0	27.0	27.0	27.0
Hot Water Coils	Type – rows	5WH–1	5WH–1	5WH–1	5WH–1	5WH–1	5WH–1	5WH–1
	Type – rows	5WS–2	5WS–2	5WS–2	5WS–2	5WS–2	5WS–2	5WS–2
	FPI	9	9	9	9	9	9	9
	Face area (sq.ft.)	20.3	20.3	20.3	20.3	20.3	20.3	20.3
Steam Coils	Type – rows	5JA–1	5JA–1	5JA–1	5JA–1	5JA–1	5JA–1	5JA–1
	FPI	6, 12	6, 12	6, 12	6, 12	6, 12	6, 12	6, 12
	Face area (sq.ft.)	20.3	20.3	20.3	20.3	20.3	20.3	20.3
Gas Furnace	Input (MBh)	250, 312, 400, 500, 625, 800, 812, 988, 1000, 1250						
	Nom. output (MBh)	200, 250, 320, 400, 500, 640, 650, 790, 800, 1000						
Electric Heat	Nom. output (kW)	20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240						
Panel Filters	Type	30% Pleated						
	Area (sq.ft.)	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Prefilters (for Cartridge Filters)	Type	Prefilter, Standard Flow						
	Area (sq.ft.)	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Cartridge Filters	Type	65% or 95%, Standard Flow						
	Area (sq.ft.)	24.0	24.0	24.0	24.0	24.0	24.0	24.0
EA or OA Prefilters	Type	30% Pleated						
	Area (sq.ft.)	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Wheel	Quantity	1 (2 Available without Economizer Bypass)						
	Diameter (in.)	60.0	60.0	60.0	60.0	60.0	60.0	60.0
	Depth (in.)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Drive motor (hp)	3/4	3/4	3/4	3/4	3/4	3/4	3/4

Table 6: Physical Data, RPS/RFS/RDT 045C to 75C, RAH 047C

Data		Unit Size				
		RAH 047C				
		RDT/RFS/RPS 045C	RDT/RFS/RPS 050C	RDT/RFS/RPS 060C	RDT/RFS/RPS 070C	RDT/RFS/RPS 075C
Nominal Airflow (cfm)		16000	20000	24000	28000	30000
Compressor	Type	Scroll				
	Quantity—hp	4—10	4—13	4—15	6—10	6—13
	Std. capacity control	100-75-50-25-0			100-83-67-50-33-17-0	100-83-67-50-33-17-0
	Opt. capacity control	—	—	—	—	—
Condenser Coil (Aluminum Fins)	Rows/FPI	2/16	2/16	2/16	2/16	2/16
	Face area (sq.ft.)	78.0	78.0	78.0	117.0	117.0
Condenser Fan Motors	Qty—hp	4—1.0	4—1.0	6—1.0	6—1.0	8—1.0
Supply Fans	Type	Forward Curve, LP/MP				
	Qty—diameter (in)	1—27	1—27	1—27	1—27	1—27
	Type	DWDI Airfoil, with or without Variable Inlet Vanes				
	Qty—diameter (in)	1—27, 30	1—27, 30	1—30, 33	1—30, 33	1—30, 33
RAF/EAF Fans	Type	SWSI Airfoil, with or without Variable Inlet Vanes				
	Qty—diameter (in)	1—40	1—40	1—40	1—40	1—40
Evaporator Coils	Rows	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5
	FPI	8, 10, 12	8, 10, 12	8, 10, 12	8, 10, 12	8, 10, 12
	F.A., small (sq. ft.)	39.5	39.5	39.5	39.5	39.5
	F.A., large (sq. ft.)	—	47.1	47.1	47.1	47.1
Hot Water Coils	Type—rows	5WH—1	5WH—1	5WH—1	5WH—1	5WH—1
		5WS—2	5WS—2	5WS—2	5WS—2	5WS—2
	FPI	9	9	9	9	9
	Face area (sq.ft.)	29.7	29.7	29.7	29.7	29.7
Steam Coils	Type—rows	5JA—1, 2	5JA—1, 2	5JA—1, 2	5JA—1, 2	5JA—1, 2
	FPI	6, 12	6, 12	6, 12	6, 12	6, 12
	Face area (sq.ft.)	29.7	29.7	29.7	29.7	29.7
Gas Furnace	Input (MBh)	250, 312, 400, 500, 625, 800, 812, 988, 1000, 1250				
	Nom. output (MBh)	200, 250, 320, 400, 500, 640, 650, 790, 800, 1000				
Electric Heat	Nom. output (kW)	40, 60, 80, 100, 120, 160, 200, 240				
Panel Filters	Type	30% Pleated				
	Area (sq.ft.)	73.9	73.9	73.9	73.9	73.9
Prefilters (for Cartridge Filters)	Type	Prefilter, Standard Flow				
	Area (sq.ft.)	40.0	40.0	40.0	40.0	40.0
	Type	Prefilter, Medium Flow				
	Area (sq.ft.)	48.0	48.0	48.0	48.0	48.0
Cartridge filters	Type	65% or 95%, Standard Flow				
	Area (sq.ft.)	40.0	40.0	40.0	40.0	40.0
	Type	65% or 95%, Medium Flow				
	Area (sq.ft.)	48.0	48.0	48.0	48.0	48.0
EA or OA Prefilters	Type	30% Pleated				
	Area (sq.ft.)	73.9	73.9	73.9	73.9	73.9
Wheel	Diameter (in.)	78.0	78.0	78.0	78.0	78.0
	Depth (in.)	6 or 12	6 or 12	6 or 12	6 or 12	6 or 12
	Drive motor (hp)	1	1	1	1	1

Table 7: RPS 015C, R22–Low Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW[a]	TH	SH	kW [a]
5000 cfm 5 row 12 fpi	75	63	184	136	11.3	178	134	124	171	63	13.8
		67	197	113	11.5	190	110	12.6	18.3	107	14.0
		71	212	90	11.8	204	87	12.9	—	—	—
	80	63	185	164	11.3	178	161	12.4	171	158	13.8
		67	198	141	11.5	191	138	12.6	183	135	14.0
		71	212	117	11.7	204	114	11.9	—	—	—
	85	63	189	189	11.4	183	183	12.5	178	178	13.9
		67	198	169	11.5	191	166	12.7	184	163	14.0
		71	212	145	11.8	204	142	12.9	—	—	—
6000 cfm 5 row 12 fpi	75	63	190	150	11.4	183	147	12.5	175	144	13.8
		67	203	122	11.6	196	120	12.7	188	116	14.0
		71	—	—	—	—	—	—	—	—	—
	80	63	191	183	11.4	185	181	12.6	178	177	13.9
		67	203	155	11.6	196	153	12.8	188	150	14.1
		71	—	—	—	—	—	—	—	—	—
	85	63	201	201	11.6	195	195	12.7	188	188	14.1
		67	205	189	11.7	197	186	12.8	140	183	14.1
		71	—	—	—	—	—	—	—	—	—
7000 cfm 5 row 12 fpi	75	63	194	164	11.4	187	161	12.6	179	158	13.9
		67	207	131	11.7	200	128	12.8	191	125	14.1
		71	—	—	—	—	—	—	—	—	—
	80	63	198	198	11.5	192	192	12.7	185	185	14.0
		67	207	170	11.7	200	167	12.8	192	16.4	14.1
		71	—	—	—	—	—	—	—	—	—
	85	63	210	210	11.7	203	203	12.8	—	—	—
		67	210	208	11.8	204	204	12.9	—	—	—
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 8: RPS 018C, R22–Low Airflow Coil,
575 volts—multiply TH and SH by approximately 0.97 and kW by approximately 0.94

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kWa	TH	SH	kW [a]
6000 cfm 5 row 12 fpi	75	63	226	166	14.8	217	162	16.4	208	158	18.2
		67	242	138	15.2	233	134	16.7	223	130	18.6
		71	259	110	15.5	249	106	17.1	239	102	18.9
	80	63	227	199	14.9	218	196	16.4	209	192	18.2
		67	242	171	15.2	233	168	16.7	223	164	18.6
		71	259	143	15.5	249	139	17.1	239	135	18.9
	85	63	231	228	14.9	224	222	16.5	216	216	18.4
		67	242	204	15.2	233	201	16.8	224	197	18.6
		71	259	176	15.5	249	172	17.1	239	169	18.9
7000 cfm 5 row 12 fpi	75	63	232	180	15	223	176	16.5	213	172	18.3
		67	248	147	15.3	238	143	16.9	228	140	18.7
		71	264	114	15.7	254	111	17.2	243	107	19
	80	63	233	218	15	225	215	16.6	216	210	18.4
		67	248	186	15.3	238	182	16.9	228	178	18.7
		71	264	153	15.7	254	149	17.2	243	145	19
	85	63	242	242	15.2	234	234	16.8	226	226	18.6
		67	249	225	15.3	240	221	16.9	230	217	18.7
		71	265	191	15.7	254	188	17.2	244	184	19
8000 cfm 5 row 12 fpi	75	63	236	193	15.1	227	189	16.6	217	185	18.4
		67	252	156	15.4	242	152	17	232	148	18.8
		71	269	119	15.8	258	115	17.3	—	—	—
	80	63	240	234	15.1	232	228	16.7	223	221	18.5
		67	252	200	15.4	243	196	17	232	193	18.8
		71	269	163	15.8	258	159	17.3	—	—	—
	85	63	252	252	15.4	244	244aa	17	235	235	18.8
		67	255	244	15.4	246	239	17	236	232	18.9
		71	269	207	15.8	259	203	17.3	—	—	—

a. Compressor kW

Table 9: RPS 020C, R22–Low Airflow Coil,
575 volts—multiply TH and SH by approximately 0.97 and kW by approximately 0.95

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
6000 cfm 5 row 12 fpi	75	63	268	185	19.6	257	180	21.9	246	175	24.5
		67	287	157	20	276	152	22.3	264	147	24.9
		71	308	128	20.4	296	124	22.7	283	119	25.3
	80	63	268	218	19.6	258	213	21.9	247	208	24.5
		67	287	190	20	276	185	22.3	264	180	24.9
		71	308	161	20.4	296	157	22.7	283	152	25.3
	85	63	269	252	19.6	259	247	21.9	248	242	24.5
		67	287	223	20	276	219	22.3	265	214	24.9
		71	307	194	20.4	296	190	22.7	283	185	25.3
8000 cfm 5 row 12 fpi	75	63	283	213	19.9	271	208	22.2	259	203	24.8
		67	302	176	20.3	290	171	22.6	277	166	25.2
		71	323	138	20.7	310	133	23	—	—	—
	80	63	284	257	19.9	272	252	22.2	260	247	24.8
		67	303	220	20.3	290	215	22.6	277	210	25.2
		71	323	182	20.7	310	177	23	—	—	—
	85	63	291	291	20.1	281	281	22.4	271	271	25.1
		67	303	264	20.3	291	259	22.6	278	254	25.2
		71	323	226	20.7	310	221	23	—	—	—
10000 cfm 5 row 12 fpi	75	63	292	239	20.1	280	234	22.4	267	229	24.9
		67	311	193	20.5	298	188	22.8	285	183	25.4
		71	—	—	—	—	—	—	—	—	—
	80	63	296	290	20.2	284	283	22.5	273	273	25.1
		67	312	248	20.5	299	243	22.8	285	238	25.4
		71	—	—	—	—	—	—	—	—	—
	85	63	311	311	20.5	301	301	22.8	289	289	25.5
		67	314	301	20.5	302	295	22.9	290	287	25.5
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 10: RPS 025C, R22–Low Airflow Coil,
575 volts—multiply TH and SH by approximately 0.96 and kW by approximately 0.93

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
8000 cfm 5 row 12 fpi	75	63	330	234	23.3	318	229	26	303	222	29
		67	354	197	23.8	340	191	26.5	325	185	29.6
		71	379	159	24.3	364	153	27	348	147	30.2
	80	63	331	279	23.3	318	273	26	304	267	29.1
		67	354	241	23.8	340	235	26.5	325	229	29.6
		71	379	203	24.3	364	197	27	348	191	30.2
	85	63	333	323	23.3	321	317	26	308	308	29.2
		67	354	285	23.8	340	280	26.5	326	274	29.6
		71	379	247	24.3	364	242	27	348	236	30.2
10000 cfm 5 row 12 fpi	75	63	344	262	23.6	330	256	26.2	315	250	29.3
		67	367	215	24.1	352	210	26.8	336	203	29.9
		71	392	168	24.6	377	163	27.3	—	—	—
	80	63	345	318	23.6	332	312	26.3	317	305	29.4
		67	367	271	24.1	353	265	26.8	337	259	29.9
		71	393	224	24.6	377	218	27.3	—	—	—
	85	63	356	356	23.8	345	345	26.6	332	332	29.8
		67	369	326	24.1	354	320	26.8	338	314	29.9
		71	393	279	24.6	377	273	27.3	—	—	—
12000 cfm 5 row 12 fpi	75	63	352	289	23.8	338	283	26.4	323	276	29.5
		67	376	233	24.3	360	227	27	344	221	30.1
		71	—	—	—	—	—	—	—	—	—
	80	63	357	353	23.8	344	343	26.6	330	330	29.7
		67	377	299	24.3	361	294	27	345	287	30.1
		71	—	—	—	—	—	—	—	—	—
	85	63	377	377	24.3	364	364	27	350	350	30.2
		67	380	365	24.3	365	358	27.1	350	349	30.2
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 11: RPS 030C, R22–Low Airflow Coil, 575 volts—multiply TH and SH by approximately 0.96 and kW by approximately 0.94

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
10000 cfm 5 row 12 fpi	75	63	366	272	26.1	351	266	29.1	335	259	32.6
		67	391	225	26.7	375	219	29.7	358	212	33.2
		71	418	178	27.2	401	171	30.3	—	—	—
	80	63	367	327	26.1	352	321	29.2	336	314	32.6
		67	391	280	26.6	375	274	29.7	358	267	33.2
		71	418	233	27.2	401	227	30.3	—	—	—
	85	63	374	374	26.3	362	362	29.4	349	349	33
		67	392	336	26.7	376	329	29.7	359	322	33.2
		71	418	288	27.2	401	282	30.3	—	—	—
12000 cfm 5 row 12 fpi	75	63	376	299	26.3	360	292	29.4	344	285	32.8
		67	401	243	26.9	384	236	29.9	366	230	33.4
		71	—	—	—	—	—	—	—	—	—
	80	63	379	364	26.4	364	357	29.4	349	347	32.9
		67	402	309	26.9	385	303	29.9	367	296	33.4
		71	—	—	—	—	—	—	—	—	—
	85	63	397	397	26.8	383	383	29.9	368	368	33.5
		67	404	375	26.9	388	368	30	370	360	33.5
		71	—	—	—	—	—	—	—	—	—
14000 cfm 5 row 12 fpi	75	63	384	325	26.5	367	318	29.5	350	311	33
		67	409	261	27	391	254	30.1	373	247	33.6
		71	—	—	—	—	—	—	—	—	—
	80	63	392	391	26.7	377	377	29.8	362	362	33.3
		67	410	337	27.1	392	331	30.1	374	324	33.6
		71	—	—	—	—	—	—	—	—	—
	85	63	414	414	27.2	399	399	30.3	—	—	—
		67	415	409	27.2	399	398	30.3	—	—	—
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 12: RPS 036C, R22–Low Airflow Coil, 575 volts—multiply TH and SH by approximately 0.96 and kW by approximately 0.95

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
12000 cfm 5 row 12 fpi	75	63	437	325	28.9	420	318	32.3	403	310	36.1
		67	468	270	29.4	450	262	32.8	431	255	36.6
		71	502	213	30	—	—	—	—	—	—
	80	63	439	392	29	423	384	32.3	405	376	36.1
		67	469	336	29.4	451	329	32.8	431	321	36.6
		71	502	280	30	482	272	33.4	—	—	—
	85	63	450	443	29.1	434	432	32.5	418	418	36.3
		67	470	402	29.5	452	395	32.8	433	387	36.6
		71	502	346	30	—	—	—	—	—	—
14000 cfm 5 row 12 fpi	75	63	448	352	29.1	431	345	32.5	412	337	36.3
		67	480	288	29.6	461	281	33	440	273	36.8
		71	—	—	—	—	—	—	—	—	—
	80	63	453	426	29.2	437	415	32.5	419	403	36.4
		67	480	365	29.6	461	357	33	441	350	36.8
		71	—	—	—	—	—	—	—	—	—
	85	63	470	470	29.4	455	455	32.9	439	439	36.7
		67	484	440	29.7	465	432	33	446	421	36.9
		71	—	—	—	—	—	—	—	—	—
16000 cfm 5 row 12 fpi	75	63	457	378	29.2	439	370	32.6	420	362	36.4
		67	488	305	29.7	468	298	33.1	447	290	36.9
		71	—	—	—	—	—	—	—	—	—
	80	63	466	451	29.4	448	439	32.8	431	427	36.6
		67	489	393	29.8	470	385	33.1	449	377	36.9
		71	—	—	—	—	—	—	—	—	—
	85	63	488	488	29.8	—	—	—	—	—	—
		67	496	470	29.9	—	—	—	—	—	—
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 13: RPS 040C, R22–Low Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
12000 cfm 5 row 12 fpi	75	63	498	352	36.1	479	344	40.4	458	334	45.2
		67	535	296	36.7	514	288	41	491	279	45.9
		71	573	240	37.3	551	231	41.7	527	222	46.6
	80	63	500	419	36.1	480	410	40.4	459	401	45.2
		67	535	363	36.6	514	354	41	491	345	45.9
		71	573	306	37.3	550	297	41.7	526	288	46.6
	85	63	502	485	36.1	484	475	40.5	465	463	45.3
		67	535	429	36.6	514	420	41	492	411	45.9
		71	573	372	37.3	551	363	41.7	527	355	46.6
14000 cfm 5 row 12 fpi	75	63	513	380	36.3	492	371	40.6	470	361	45.4
		67	549	315	36.9	527	306	41.2	503	297	46.1
		71	588	249	37.5	564	241	41.9	539	232	46.8
	80	63	514	457	36.3	495	448	40.6	473	438	45.5
		67	549	392	36.9	527	383	41.2	504	374	46.1
		71	588	326	37.5	564	317	41.9	539	308	46.8
	85	63	524	524	36.5	507	507	40.9	489	489	45.8
		67	551	469	36.9	529	460	41.3	506	450	46.1
		71	588	403	37.5	564	394	41.9	539	385	46.8
16000 cfm 5 row 12 fpi	75	63	524	406	36.5	502	397	40.8	480	388	45.6
		67	560	333	37.1	537	324	41.4	513	315	46.3
		71	599	259	37.7	575	250	42.1	549	241	47
	80	63	527	493	36.5	506	483	40.9	484	472	45.7
		67	561	420	37.1	538	411	41.4	513	402	46.3
		71	599	346	37.7	575	337	42.1	548	328	47
	85	63	546	546	36.8	528	528	41.3	509	509	46.2
		67	563	507	37.1	540	497	41.5	516	487	46.4
		71	599	433	37.7	575	424	42.1	549	415	47

a. Compressor kW

Table 14: RPS 045C, R-22–Low Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
12000 cfm 5 row 12 fpi	75	63	512	359	36.4	491	350	40.8	470	340	45.7
		67	550	303	37	527	294	41.4	504	284	46.4
		71	590	246	37.6	566	237	42.1	540	227	47.1
	80	63	512	426	36.4	492	416	40.8	470	407	45.7
		67	550	370	37	528	360	41.4	504	351	46.4
		71	589	313	37.6	565	303	42.1	540	294	47.1
	85	63	515	493	36.4	495	483	40.8	474	473	45.8
		67	550	436	37	528	427	41.4	504	417	46.4
		71	589	379	37.6	565	370	42.1	539	360	47.1
16000 cfm 5 row 12 fpi	75	63	540	415	36.8	517	405	41.2	492	395	46.1
		67	577	341	37.4	553	331	41.8	527	321	46.8
		71	618	266	38	592	256	42.5	564	246	47.6
	80	63	542	503	36.8	519	493	41.3	496	483	46.2
		67	578	429	37.4	553	419	41.8	528	409	46.8
		71	618	354	38	592	345	42.5	564	335	47.6
	85	63	561	561	37.1	542	542	41.7	522	522	46.7
		67	580	517	37.4	556	508	41.9	531	497	46.9
		71	618	442	38	592	433	42.5	564	423	47.6
20000 cfm 5 row 12 fpi	75	63	556	468	37.1	532	458	41.5	507	447	46.4
		67	594	376	37.7	568	366	42.1	541	356	47.1
		71	—	—	—	—	—	—	—	—	—
	80	63	567	567	37.2	546	546	41.7	524	524	46.8
		67	596	486	37.7	570	476	42.1	543	466	47.1
		71	—	—	—	—	—	—	—	—	—
	85	63	600	600	37.7	578	578	42.3	555	555	47.4
		67	603	592	37.8	579	578	42.3	555	555	47.4
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 15: RPS 050C, R-22–Low Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
18000 cfm 5 row 12 fpi	75	63	635	479	48.6	608	467	54.2	578	454	60.7
		67	680	395	49.6	651	383	55.3	618	371	61.9
		71	727	310	50.7	696	299	56.5	661	286	63.2
	80	63	639	578	48.6	612	566	54.3	582	553	60.8
		67	681	494	49.6	651	483	55.3	619	470	61.9
		71	726	409	50.7	695	398	56.5	661	385	63.1
	85	63	654	654	49	632	632	54.8	606	606	61.5
		67	682	593	49.6	653	581	55.4	621	569	62
		71	726	508	50.6	695	497	56.4	660	484	63.1
20000 cfm 5 row 12 fpi	75	63	646	505	48.8	618	494	54.5	587	481	61
		67	690	413	49.8	660	401	55.6	627	388	62.2
		71	738	319	50.9	705	308	56.7	—	—	—
	80	63	650	614	48.9	622	602	54.6	593	587	61.1
		67	691	523	49.8	661	511	55.6	627	498	62.2
		71	737	429	50.9	705	418	56.7	—	—	—
	85	63	676	676	49.5	652	652	55.3	625	625	62.1
		67	694	632	49.9	663	620	55.6	632	606	62.3
		71	737	539	50.9	706	527	56.7	—	—	—
22000 cfm 5 row 12 fpi	75	63	655	532	49	626	520	54.7	594	506	61.2
		67	699	430	50	668	419	55.8	634	406	62.4
		71	746	328	51.1	—	—	—	—	—	—
	80	63	661	648	49.1	634	633	54.9	607	607	61.5
		67	700	551	50	668	539	55.8	634	526	62.4
		71	746	449	51.1	—	—	—	—	—	—
	85	63	695	695	49.9	670	670	55.8	642	642	62.6
		67	705	669	50.1	675	656	55.9	643	640	62.6
		71	747	569	51.1	—	—	—	—	—	—

a. Compressor kW

Table 16: RPS 050C, R-22–High Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
16000 cfm 5 row 12 fpi	75	63	631	455	48.5	605	444	54.1	575	431	60.6
		67	676	380	49.5	647	369	55.2	616	356	61.8
		71	724	304	50.6	693	293	56.4	659	280	63.1
	80	63	632	544	48.5	606	532	54.2	577	519	60.7
		67	676	469	49.5	648	457	55.2	615	444	61.8
		71	723	393	50.6	692	381	56.4	659	369	63.1
	85	63	637	632	48.6	614	614	54.4	590	590	61.1
		67	677	558	49.5	648	546	55.2	617	533	61.8
		71	723	481	50.6	692	469	56.4	659	457	63.1
20000 cfm 5 row 12 fpi	75	63	656	510	49	627	498	54.7	596	485	61.2
		67	700	417	50	668	405	55.8	636	392	62.4
		71	748	323	51.1	—	—	—	—	—	—
	80	63	658	620	49.1	631	608	54.8	601	593	61.4
		67	701	527	50	670	516	55.8	636	503	62.4
		71	748	433	51.1	—	—	—	—	—	—
	85	63	685	685	49.7	661	661	55.6	633	633	62.3
		67	703	638	50.1	673	625	55.9	640	612	62.5
		71	748	544	51.2	—	—	—	—	—	—
24000 cfm 5 row 12 fpi	75	63	671	563	49.4	643	551	55.1	610	537	61.6
		67	715	452	50.4	683	440	56.2	648	427	62.8
		71	—	—	—	—	—	—	—	—	—
	80	63	683	683	49.6	657	657	55.5	628	628	62.2
		67	718	584	50.4	686	572	56.2	651	559	62.8
		71	—	—	—	—	—	—	—	—	—
	85	63	722	722	50.5	695	695	56.4	665	665	63.3
		67	725	712	50.6	696	695	56.5	665	665	63.3
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 17: RPS 060C, R-22–Low Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW[a]	TH	SH	kW[a]	TH	SH	kW[a]
16000 cfm 5 row 12 fpi	75	63	707	490	56.4	678	476	63.1	647	462	70.6
		67	759	415	57.3	727	402	64.1	695	388	71.8
		71	813	339	58.4	780	326	65.3	745	312	73
	80	63	708	578	56.4	680	565	63.1	649	551	70.6
		67	758	503	57.3	727	490	64.1	694	476	71.8
		71	812	427	58.4	779	414	65.2	744	400	73
	85	63	710	667	56.4	683	654	63.1	653	639	70.7
		67	760	592	57.3	729	579	64.1	695	564	71.8
		71	812	515	58.4	778	502	65.3	745	489	73
20000 cfm 5 row 12 fpi	75	63	738	545	57	706	531	63.7	673	517	71.2
		67	790	452	57.9	756	439	64.8	721	425	72.5
		71	845	358	59	809	345	65.9	772	332	73.7
	80	63	740	655	57	709	641	63.7	676	627	71.3
		67	790	562	57.9	756	548	64.7	721	535	72.4
		71	844	468	59	809	455	65.9	771	441	73.7
	85	63	752	752	57.2	726	726	64.1	699	699	71.9
		67	791	672	58	758	658	64.8	723	644	72.5
		71	844	577	59	808	564	65.9	771	551	73.7
24000 cfm[b] 5 row 12 fpi	75	63	759	598	57.4	726	584	64.1	691	569	71.7
		67	811	488	58.4	776	474	65.2	739	460	72.9
		71	867	376	59.5	829	363	66.4	790	349	74.2
	80	63	763	727	57.4	732	712	64.2	698	694	71.8
		67	811	619	58.4	776	605	65.2	740	591	72.9
		71	866	507	59.4	829	494	66.3	790	480	74.2
	85	63	796	796	58.1	768	768	65	738	738	72.8
		67	816	748	58.4	781	734	65.3	745	719	73
		71	867	638	59.4	830	625	66.3	791	611	74.2

a. Compressor kW
b. Maximum airflow is 23,700 cfm

Table 18: RPS 060C, R-22–High Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW[a]	TH	SH	kW[a]	TH	SH	kW[a]
20000 cfm 5 row 12 fpi	75	63	751	552	57.2	719	538	63.9	685	523	71.5
		67	804	458	58.2	769	445	65	734	430	72.7
		71	860	364	59.3	823	350	66.2	785	337	74.1
	80	63	752	662	57.2	721	648	64	687	633	71.6
		67	804	569	58.2	770	555	65	734	541	72.7
		71	859	474	59.3	823	460	66.2	785	447	74
	85	63	763	763	57.4	737	737	64.3	710	710	72.1
		67	805	679	58.2	772	665	65.1	736	651	72.8
		71	860	584	59.3	822	571	66.2	784	557	74
24000 cfm 5 row 12 fpi	75	63	773	606	57.6	739	591	64.4	704	577	72
		67	826	494	58.6	790	481	65.5	752	466	73.2
		71	882	382	59.8	844	369	66.7	—	—	—
	80	63	778	736	57.7	744	721	64.5	711	704	72.2
		67	827	626	58.6	791	613	65.5	753	598	73.2
		71	882	514	59.8	844	500	66.7	—	—	—
	85	63	809	809	58.3	781	781	65.3	750	750	73.2
		67	830	757	58.7	794	742	65.6	758	728	73.3
		71	882	645	59.7	845	632	66.7	—	—	—
28000 cfm 5 row 12 fpi	75	63	790	657	57.9	755	643	64.7	718	628	72.3
		67	842	529	59	805	516	65.8	766	501	73.6
		71	—	—	—	—	—	—	—	—	—
	80	63	800	799	58.1	770	770	65	739	739	72.9
		67	844	682	59	805	667	65.8	767	653	73.6
		71	899	553	60.1	—	—	—	—	—	—
	85	63	846	846	59	815	815	66	782	782	74
		67	851	830	59.1	816	812	66.1	782	782	74
		71	—	—	—	—	—	—	—	—	—

a. Compressor kW

Table 19: RPS 070C, R-22–Low Airflow

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW[a]	TH	SH	kW[a]	TH	SH	kW[a]
18000 cfm 5 row 12 fpi	75	63	745	526	55.2	716	512	61.8	685	499	69.2
		67	799	442	56.1	768	430	62.8	735	416	70.3
		71	857	358	57.0	823	345	63.8	788	332	71.4
	80	63	747	624	55.2	718	611	61.8	687	597	69.2
		67	798	540	56.1	768	528	62.8	735	514	70.2
		71	856	456	57.0	823	443	63.8	787	430	71.3
	85	63	750	721	55.3	722	707	61.9	693	690	69.4
		67	800	639	56.1	768	626	62.8	735	612	70.2
		71	855	554	57.0	823	542	63.8	787	528	71.3
22000 cfm 5 row 12 fpi	75	63	772	579	55.6	741	565	62.3	708	551	69.7
		67	827	478	56.5	794	465	63.2	758	451	70.8
		71	886	377	57.5	850	364	64.3	812	350	71.9
	80	63	775	697	55.7	744	683	62.3	712	668	69.7
		67	827	598	56.5	794	584	63.2	759	570	70.7
		71	885	496	57.5	849	483	64.3	811	469	71.9
	85	63	791	791	55.9	765	765	62.7	738	738	70.3
		67	828	715	56.5	795	702	63.3	760	688	70.8
		71	886	615	57.5	850	602	64.3	812	588	71.9
26000 cfm 5 row 12 fpi	75	63	792	630	56.0	759	616	62.6	725	601	70.1
		67	847	513	56.9	812	499	63.6	775	485	71.1
		71	906	395	57.9	869	382	64.7	829	368	72.2
	80	63	797	764	56.0	765	747	62.7	733	729	70.2
		67	848	652	56.9	813	638	63.6	776	624	71.1
		71	906	534	57.9	868	521	64.6	829	507	72.2
	85	63	832	832	56.6	804	804	63.4	775	775	71.1
		67	852	788	56.9	817	773	63.7	782	757	71.2
		71	907	673	57.8	869	660	64.6	830	646	72.2

a. Compressor kW

Table 20: RPS 070C, R-22–High Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW[a]	TH	SH	kW[a]	TH	SH	kW[a]
20000 cfm 5 row 12 fpi	75	63	782	565	55.8	750	552	62.5	717	537	69.9
		67	838	472	56.7	804	459	63.4	768	444	71.0
		71	898	378	57.7	862	364	64.5	823	350	72.1
	80	63	785	676	55.8	752	662	62.5	719	647	69.9
		67	838	583	56.7	805	569	63.4	769	555	70.9
		71	897	488	57.7	861	474	64.5	823	460	72.1
	85	63	790	784	55.9	763	763	62.7	736	736	70.3
		67	840	693	56.7	806	679	63.5	771	665	71.0
		71	898	599	57.7	862	585	64.5	822	570	72.1
24000 cfm 5 row 12 fpi	75	63	806	620	56.2	773	606	62.9	738	591	70.3
		67	863	509	57.1	827	495	63.9	789	480	71.4
		71	923	397	58.2	885	383	65.0	844	369	72.6
	80	63	811	751	56.2	778	736	62.9	743	720	70.4
		67	864	641	57.1	828	627	63.9	791	612	71.4
		71	923	528	58.1	884	515	64.9	844	500	72.6
	85	63	837	837	56.7	810	810	63.5	780	780	71.2
		67	866	772	57.2	831	758	63.9	793	742	71.5
		71	922	660	58.1	884	646	64.9	845	632	72.6
28000 cfm 5 row 12 fpi	75	63	825	672	56.5	790	658	63.2	753	642	70.6
		67	881	544	57.4	843	530	64.2	805	515	71.7
		71	941	415	58.5	901	401	65.3	—	207	—
	80	63	833	819	56.6	800	800	63.3	769	769	71.0
		67	883	697	57.4	844	682	64.2	805	667	71.7
		71	941	567	58.5	902	554	65.3	—	207	—
	85	63	877	877	57.4	847	847	64.2	814	814	71.9
		67	889	846	57.5	853	830	64.3	816	812	71.9
		71	942	720	58.5	902	706	65.3	—	207	—

a. Compressor kW

Table 21: RPS 075C, R-22–Low Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
18000 cfm 5 row 10 fpi	75	63	848	573	68.5	816	558	76.4	780	542	85.4
		67	910	490	69.6	876	475	77.6	839	459.	86.8
		71	977	405	70.8	941	391	78.9	900	375	88.1
	80	63	848	672	68.5	817	657	76.4	782	641	85.4
		67	909	588	69.6	876	574	77.6	839	557	86.7
		71	976	503	70.8	939	489	78.9	899	473	88.1
	85	63	850	770	68.5	819	755	76.4	784	738	85.5
		67	910	687	69.6	876	672	77.6	839	656	86.7
		71	976	602	70.8	939	587	78.9	899	571	88.1
22000 cfm 5 row 10 fpi	75	63	884	628	69.1	849	613	77.1	812	596	86.2
		67	948	528	70.3	911	512	78.3	871	496	87.5
		71	1016	425	71.5	976	411	79.6	933	394	88.9
	80	63	885	747	69.1	851	732	77.1	813	715	86.2
		67	948	647	70.3	911	631	78.3	871	615	87.5
		71	1015	544	71.5	975	529	79.6	932	513	88.9
	85	63	890	863	69.2	857	845	77.2	823	823	86.4
		67	948	766	70.3	912	750	78.3	872	734	87.5
		71	1015	663	71.5	975	648	79.6	932	632	88.9
26000 cfm [b] 5 row 10 fpi	75	63	911	681	69.6	874	665	77.6	835	648	86.7
		67	975	563	70.8	936	547	78.8	894	531	88.0
		71	1044	444	72.0	1002	429	80.2	956	412	89.4
	80	63	913	818	69.6	877	802	77.6	837	784	86.7
		67	975	702	70.8	937	687	78.8	895	670.	88.0
		71	1043	583	72.0	1001	568	80.1	956	551	89.4
	85	63	930	930	69.9	900	900	78.1	867	867	87.4
		67	977	840	70.8	938	825	78.8	896	807	88.0
		71	1042	722	72.0	1002.	707	80.1	957	691	89.4

a. Compressor kW
b. Maximum airflow is 25,675 cfm

Table 22: RPS 075C, R-22–High Airflow Coil

Unit Data	Entering Air		Ambient Air Temperature (°F)								
			85			95			105		
	DB	WB	TH	SH	kW [a]	TH	SH	kW [a]	TH	SH	kW [a]
22000 cfm 5 row 10 fpi	75	63	905	640	69.5	870	624	77.5	831	607	86.6
		67	97	538	70.7	933	523	78.8	892	506	88.0
		71	1040	435	72.0	1000	420	80.1	955	403	89.4
	80	63	907	760	69.5	872	744	77.5	833	727	86.6
		67	970	658	70.7	933	642	78.7	891	625	87.9
		71	1039	555	72.0	999	539	80.1	954	523	89.4
	85	63	912	878	69.6	878	861	77.6	842	840	86.8
		67	972	779	70.7	933	762	78.7	892	745	87.9
		71	1038	674	72.0	999	659	80.1	954	643	89.4
26000 cfm 5 row 10 fpi	75	63	933	693	70.0	896	677	78.0	855	659	87.1
		67	999	574	71.2	959	558	79.3	915	541	88.5
		71	1070	454	72.5	1026	438	80.7	980	421	90.0
	80	63	936	833	70.0	899	817	78.0	859	798	87.2
		67	999	715	71.2	959	699	79.3	916	682	88.5
		71	1069	594	72.5	1026	579	80.6	979	562	89.9
	85	63	952	952	70.3	921	921	78.5	887	887	87.8
		67	1000	855	71.2	961	838	79.3	917	821	88.5
		71	1069	735	72.5	1026	720	80.6	979	703	89.9
30000 cfm 5 row 10 fpi	75	63	954	744	70.4	915	728	78.4	873	710	87.6
		67	1021	609	71.6	979	593	79.7	934	575	88.9
		71	1091	472	72.9	1047	456	81.1	998	439	90.4
	80	63	959	901	70.5	920	883	78.5	880	863	87.7
		67	1021	770	71.6	979	753	79.7	934	736	88.9
		71	1091	632	72.9	1046	617	81.0	998	600	90.4
	85	63	994	994	71.1	962	962	79.3	925	925	88.7
		67	1025	928	71.7	984	911	79.8	939	891	89.0
		71	1091	794	72.9	1047	778	81.0	998	761	90.3

a. Compressor kW

Gas Heat

Figure 13: Gas Heat Capacity

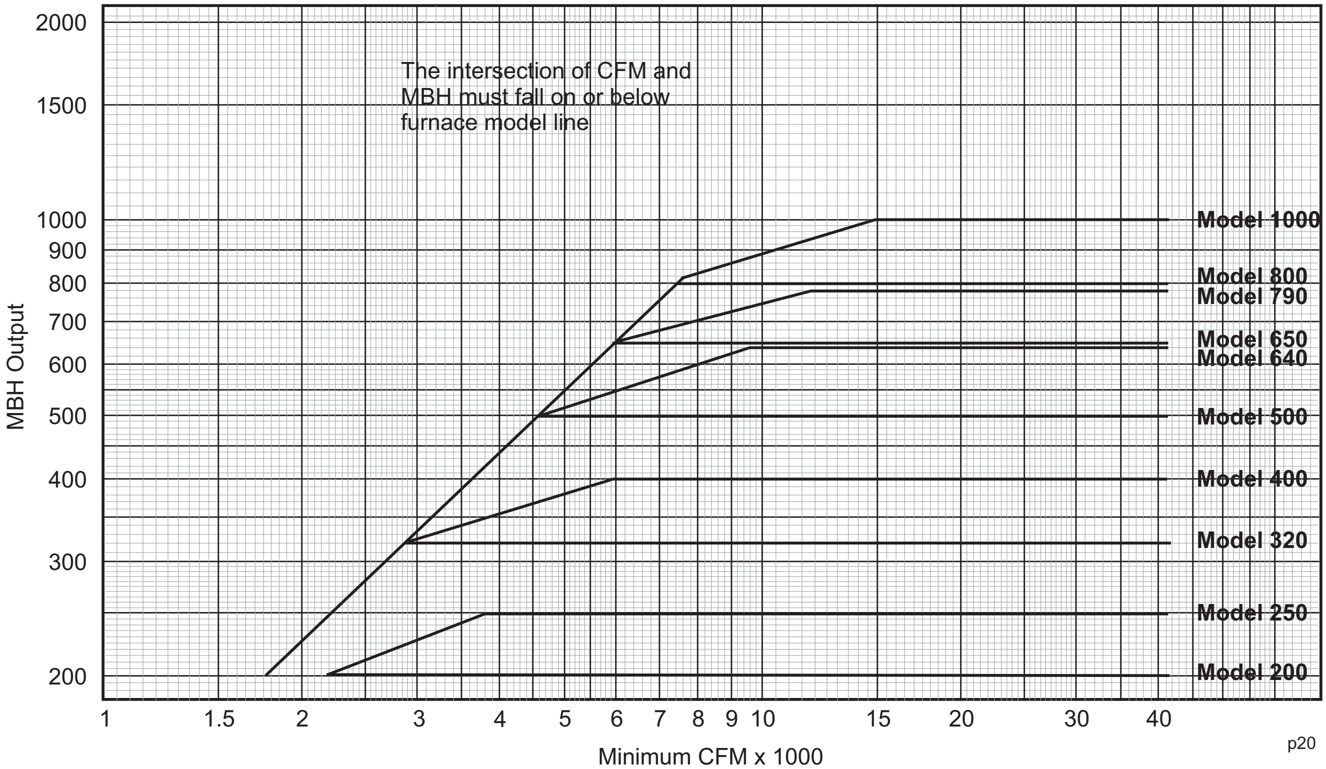


Table 23: RPS 015C to 135C–Gas Furnace Air Temperature Rise (°F)

Unit Size	Nominal Airflow (cfm)	Furnace Size (MBh Output)[a]									
		200	250	320	400	500	640	650	790	800	1000
015C	7000	26.3	32.9	42.1	52.7	65.8	—	85.6	—	—	—
020C	8000	23.0	28.8	36.9	46.1	57.6	—	74.9	—	92.2	—
025C	10000	18.4	23.0	29.5	36.9	46.1	59.0	59.9	—	73.7	—
030C	12000	15.4	19.2	24.6	30.7	38.4	49.2	49.9	60.7	61.4	—
036C	14000	13.2	16.5	21.1	26.3	32.9	42.1	42.8	52.0	52.7	—
040C	16000	11.5	14.4	18.4	23.0	28.8	36.9	37.4	45.5	46.1	57.6
045C	16000	11.5	14.4	18.4	23.0	28.8	36.9	37.4	45.5	46.1	57.6
050C	20000	9.2	11.5	14.7	18.4	23.0	29.5	30.0	36.4	36.9	46.1
060C	24000	7.7	9.6	12.3	15.4	19.2	24.6	25.0	30.3	30.7	38.4
070C	28000	6.6	8.2	10.5	13.2	16.5	21.1	21.4	26.0	26.3	32.9
075C	30000	6.1	7.7	9.8	12.3	15.4	19.7	20.0	24.3	24.6	30.7
080C	32000	—	—	—	—	14.4	18.4	18.7	22.8	23.0	28.8
090C	36000	—	—	—	—	12.8	16.4	16.6	20.2	20.5	25.6
105C	40000	—	—	—	—	11.5	14.7	15.0	18.2	18.4	23.0
115C	46000	—	—	—	—	10.0	12.8	13.0	15.8	16.0	20.0
125C	48000	—	—	—	—	9.6	12.3	12.5	15.2	15.4	19.2
135C	50000	—	—	—	—	9.2	11.8	12.0	14.6	14.7	18.4

a. Output is 80% of input.

Table 24: Gas Furnace Design Maximum Air Temperature Rise (°F) and Minimum Airflow

Baffle Position	Maximum Temperature Rise (°F) / Minimum Airflow (cfm) / Column Number for Pressure Drop (See Table 37: Furnace pressure drop (in. W.C.), RPS 015C to 135C on page 34) / Furnace Size (MBh)									
	200	250	320	400	500	640	650	790	800	1000
A	80	61	100	61	100	61	100	61	100	61
	2300	3800	2950	6000	4600	9600	5970	12000	7340	15000
	1	1	1	1	2	2	3	3	3	3
B	62	42	78	35	63	42	73	52	76	50
	3000	5500	3800	10500	7400	14000	8200	14000	9800	18500
	4	4	4	4	5	5	4	4	4	4
C	46	15	59	31	55	37	65	46	71	40
	4000	15000	5000	12000	8400	16000	9200	16000	10400	23000
	9	9	9	9	10	10	10	10	10	10

NOTES: Temperature rise and airflow limit applicable to all burner types.
VAV application, consider the minimum turndown airflow when selecting baffle position.

Table 25: Gas Burner Connection Size (inches)

Description		Furnace Size (MBh output)									
		200	250	320	400	500	640	650	790	800	1000
Natural gas (CFH)		250	312	400	500	625	800	812	1000	1000	1250
Minimum Gas Inlet Pressure (in. W.C.)	Standard burner	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.50	7.50	9.00
	20:1 burner	4.50	5.50	6.00	5.00	5.50	7.00	7.00	6.50	6.50	6.50
Gas Pipe Connection Size (N.P.T.)	Through 0.5 psi	0.75	0.75	0.75	1.00	1.00	1.25	1.25	1.25	1.25	1.25
	2–3 psi	0.75	0.75	0.75	1.00	1.00	1.25	1.25	1.25	1.25	1.25
	5–10 psi	0.75	0.75	0.75	1.00	1.00	1.25	1.25	1.25	1.25	1.25

Electric Heat

208 Volts

Table 26: RPS 015C to 040C or 800 to 802–208V Electric Heat Air Temperature Rise (°F)

Airflow (cfm)	Electric Heater Model Number					
	20	40	60	80	100	120
	Electric Heater Capacity (MBh)					
	51	102	154	204	255	306
6000	7.8	15.7	23.7	31.3	39.2	47.0
7000	6.7	13.4	20.3	26.9	33.6	40.3
8000	5.9	11.8	17.7	23.5	29.4	35.3
9000	5.2	10.4	15.8	20.9	26.1	31.3
10000	4.7	9.4	14.2	18.8	23.5	28.2
11000	4.3	8.5	12.9	17.1	21.4	25.6
12000	3.9	7.8	11.8	15.7	19.6	23.5
13000	3.6	7.2	10.9	14.5	18.1	21.7
14000	3.4	6.7	10.1	13.4	16.8	20.1
15000	3.1	6.3	9.5	12.5	15.7	18.8
16000	2.9	5.9	8.9	11.8	14.7	17.6

The maximum temperature rise allowed for electric heat is 60°F with leaving air temperature not to exceed 140°F.

The minimum airflow required for unit sizes 015C to 040C with electric heat is 6,000 cfm.

Table 27: RPS 045C to 075C (or RAH 047C)–208V Electric Heat Air Temperature Rise (°F)

Airflow (cfm)	Electric Heater Model Number					
	40	60	80	100	120	160
	Electric Heater Capacity (MBh)					
	102	154	204	255	306	408
14000	6.7	10.1	13.4	16.8	20.1	26.9
15000	6.3	9.5	12.5	15.7	18.8	25.1
16000	5.9	8.9	11.8	14.7	17.6	23.5
17000	5.5	8.3	11.1	13.8	16.6	22.1
18000	5.2	7.9	10.4	13.1	15.7	20.9
19000	4.9	7.5	9.9	12.4	14.8	19.8
20000	4.7	7.1	9.4	11.8	14.1	18.8
21000	4.5	6.8	9.0	11.2	13.4	17.9
22000	4.3	6.5	8.5	10.7	12.8	17.1
23000	4.1	6.2	8.2	10.2	12.3	16.3
24000	3.9	5.9	7.8	9.8	11.8	15.7
25000	3.8	5.7	7.5	9.4	11.3	15.0
26000	3.6	5.5	7.2	9.0	10.8	14.5
27000	3.5	5.3	7.0	8.7	10.4	13.9
28000	3.4	5.1	6.7	8.4	10.1	13.4
29000	3.2	4.9	6.5	8.1	9.7	13.0
30000	3.1	4.7	6.3	7.8	9.4	12.5

The maximum temperature rise allowed for electric heat is 60°F with leaving air temperature not to exceed 140°F.

The minimum airflow required for unit sizes 045C to 075C with electric heat is 14,000 cfm.

230 and 575 Volts

Table 28: RPS 015C to 040C or 800 to 802–230V, 460V, 575V; Electric Heat Air Temperature Rise (°F)

Airflow (cfm)	Electric Heater Model Number											
	20	40	60	80	100	120	140	160	180*	200*	220*	240*
	Electric Heater Capacity (MBh)											
	63	125	188	249	312	374	439	499	564	624	689	748
6000	9.7	19.2	28.9	38.2	47.9	57.5	n/a	n/a	n/a	n/a	n/a	n/a
7000	8.3	16.5	24.8	32.8	41.1	49.2	57.8	n/a	n/a	n/a	n/a	n/a
8000	7.3	14.4	21.7	28.7	35.9	43.1	50.6	57.5	n/a	n/a	n/a	n/a
9000	6.5	12.8	19.3	25.5	32.0	38.3	45.0	51.1	57.8	n/a	n/a	n/a
10000	5.8	11.5	17.3	22.9	28.8	34.5	40.5	46.0	52.0	57.5	n/a	n/a
11000	5.3	10.5	15.8	20.9	26.1	31.3	36.8	41.8	47.3	52.3	57.7	n/a
12000	4.8	9.6	14.4	19.1	24.0	28.7	33.7	38.3	43.3	47.9	52.9	57.5
13000	4.5	8.9	13.3	17.7	22.1	26.5	31.1	35.4	40.0	44.2	48.8	53.0
14000	4.1	8.2	12.4	16.4	20.5	24.6	28.9	32.9	37.1	41.1	45.4	49.2
15000	3.9	7.7	11.6	15.3	19.2	23.0	27.0	30.7	34.7	38.3	42.3	46.0
16000	3.6	7.2	10.8	14.3	18.0	21.5	25.3	28.7	32.5	35.9	39.7	43.1

The maximum temperature rise allowed for electric heat is 60°F with leaving air temperature not to exceed 140°F.

The minimum airflow required for units 015C to 040C with electric heat is 6,000 cfm. 180, 200, 220, and 240 electric heaters available at 460 or 575 Volts only.

Table 29: RPS 045C to 075C (or RAH 047C)–230V, 460V, 575V; Electric Heat Air Temperature Rise (°F)

Airflow (cfm)	Electric Heater Model Number								
	40	60	80	100	120	160	180	200	240
	Electric Heater Capacity (MBh)								
	125	188	249	312	374	499	564	624	748
14000	8.2	12.4	16.4	20.5	24.6	32.9	37.1	41.1	49.2
15000	7.7	11.6	15.3	19.2	23.0	30.7	34.7	38.3	46.0
16000	7.2	10.8	14.3	18.0	21.5	28.7	32.5	35.9	43.1
17000	6.8	10.2	13.5	16.9	20.3	27.1	30.6	33.8	40.6
18000	6.4	9.6	12.7	16.0	19.2	25.6	28.9	32.0	38.3
19000	6.1	9.1	12.1	15.1	18.1	24.2	27.4	30.3	36.3
20000	5.8	8.7	11.5	14.4	17.2	23.0	26.0	28.8	34.5
21000	5.5	8.3	10.9	13.7	16.4	21.9	24.8	27.4	32.8
22000	5.2	7.9	10.4	13.1	15.7	20.9	23.6	26.1	31.3
23000	5.0	7.5	10.0	12.5	15.0	20.0	22.6	25.0	30.0
24000	4.8	7.2	9.6	12.0	14.4	19.2	21.7	24.0	28.7
25000	4.6	6.9	9.2	11.5	13.8	18.4	20.8	23.0	27.6
26000	4.4	6.7	8.8	11.1	13.3	17.7	20.0	22.1	26.5
27000	4.3	6.4	8.5	10.7	12.8	17.0	19.3	21.3	25.5
28000	4.1	6.2	8.2	10.3	12.3	16.4	18.6	20.5	24.6
29000	4.0	6.0	7.9	9.9	11.9	15.9	17.9	19.8	23.8
30000	3.8	5.8	7.6	9.6	11.5	15.3	17.3	19.2	23.0

Steam and Hot Water Heat

RPS 015C to 040C

For performance data, refer to the selection program, in catalogs CAT 214, CAT 217, or CAT 218.

Energy Recovery Module Air Pressure Drop Fan Loss

The fan loss includes air pressure drop for the wheel, prefilter, damper, and hood.

Table 30: RDT/RFS/RPS 045C to 075C (or RAH 047C)

Unit Airflow (cfm)	Supply Fan APD	
	ISP 6" Wheel	ISP 12" Wheel
5,000	0.45	—
6,000	0.57	—
7,000	0.71	0.53
8,000	0.87	0.59
9,000	1.05	0.67
10,000	—	0.76
11,000	—	0.88
12,000	—	0.99
13,000	—	1.13
14,000	—	1.32
15,000	—	1.56

Based on design OA cfm through the wheel.

Table 31: RDT/RFS/RPS 045C to 075C (or RAH 047C)

Unit Airflow (cfm)	Return/Exhaust Fan APD	
	ISP 6" Wheel	ISP 12" Wheel
14,000	0.45	—
16,000	0.57	—
18,000	0.71	0.53
20,000	0.87	0.59
22,000	1.05	0.67
24,000	—	0.76
26,000	—	0.88
28,000	—	0.99
30,000	—	1.13

Based on maximum exhaust cfm during economizer operation.

If design OA cfm through the wheel is > 70% of design cfm, then check APD with your local representative.

Table 32: RFS/RPS 015C to 040C, RDS 800-802

Unit Airflow (cfm)	Supply Fan APD	
	ISP 1-Wheel	ISP 2-Wheel
4,000	0.66	—
5,000	0.88	—
6,000	1.09	—
7,000	1.32	0.81
8,000	1.05	0.94
9,000	—	1.08
10,000	—	1.23
11,000	—	1.39
12,000	—	1.56
13,000	—	1.73
14,000	—	1.92
15,000	—	2.12

Based on design OA cfm through the wheel.

Table 33: RFS/RPS 015C to 040C, RDS 800-802

Unit Airflow (cfm)	Economizer Return/Exhaust Fan APD	No Economizer Return/Exhaust Fan APD	
	ISP	ISP 1-Wheel	ISP 2-Wheel
4,000	0.21	0.73	—
5,000	0.32	0.92	—
6,000	0.44	1.16	—
7,000	0.57	1.45	0.99
8,000	0.71	—	1.17
9,000	0.86	—	1.39
10,000	1.01	—	1.59
11,000	1.16	—	1.83
12,000	1.34	—	2.09
13,000	1.54	—	2.38
14,000	1.74	—	2.60
15,000	1.98	—	—

Economizer - Based on maximum exhaust cfm during economizer operation.

If design OA cfm through the wheel is > 70% of design cfm, then check APD with your local representative.

No Economizer - Based on design OA cfm through the wheel.

Table 34: RFS/RPS 015C to 040C or RDS 800 to 802 (in. w.g.)

Unit Airflow (cfm)	Filter				Evaporator Coils [a]					
	Angular Rack	Flat Rack			018C–020C			025C–040C		
	30% pleated	Prefilters	65% cartr.	95% cartr.	5-row 8 fpi	5-row 10 fpi	5-row 12 fpi	5-row 8 fpi	5-row 10 fpi	5-row 12 fpi
4,000	0.02	0.06	0.08	0.12	0.16	0.19	0.23	—	—	—
5,000	0.03	0.08	0.12	0.17	0.22	0.27	0.33	—	—	—
6,000	0.04	0.10	0.16	0.23	0.30	0.35	0.42	0.17	0.20	0.24
7,000	0.05	0.13	0.20	0.29	0.37	0.44	0.53	0.21	0.25	0.30
8,000	0.07	0.16	0.25	0.35	0.45	0.54	0.64	0.26	0.31	0.37
9,000	0.08	0.19	0.31	0.42	0.54	0.64	0.75	0.31	0.36	0.43
10,000	0.09	0.22	0.36	0.49	0.63	0.74	0.87	0.36	0.42	0.50
11,000	0.10	0.25	0.43	0.56	0.72	0.84	0.99	0.41	0.49	0.58
12,000	0.12	0.28	0.49	0.64	0.81	0.95	—	0.46	0.55	0.65
13,000	0.13	0.32	0.56	0.72	—	—	—	0.54	0.64	0.75
14,000	0.14	0.35	0.63	0.81	—	—	—	0.60	0.71	0.84
15,000	0.16	0.39	0.71	0.89	—	—	—	0.67	0.79	0.92
16,000	0.18	0.43	0.79	0.98	—	—	—	0.73	0.86	1.01
17,000	0.19	0.47	0.87	1.07	—	—	—	0.80	0.94	—
18,000	0.21	0.50	0.95	1.17	—	—	—	—	—	—

a. Pressure drop is for wet coil.

Table 35: RFS/RPS 015C to 040C or RDS 800 to 802 (in. w.g.)

Unit Airflow (cfm)	Coils			
	Hot Water		Steam	
	Low Capacity	High Capacity	Low Capacity	High Capacity
4,000	0.03	0.05	0.02	0.04
5,000	0.04	0.08	0.03	0.06
6,000	0.06	0.11	0.04	0.07
7,000	0.08	0.14	0.05	0.09
8,000	0.09	0.18	0.06	0.11
9,000	0.12	0.22	0.07	0.13
10,000	0.14	0.27	0.08	0.14
11,000	0.17	0.31	0.09	0.16
12,000	0.20	0.36	0.10	0.18
13,000	0.22	0.41	0.11	0.20
14,000	0.26	0.46	0.12	0.23
15,000	0.29	0.53	0.13	0.25
16,000	0.32	0.60	0.15	0.27
17,000	0.36	0.66	0.16	0.30
18,000	0.40	0.74	0.17	0.32

Table 36: RFS/RPS/RPT 045C to 075C or RAH 047C

Component		Airflow (cfm)								
		14,000	16,000	18,000	20,000	22,000	24,000	26,000	28,000	30,000
Filter Options	30% pleated	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.25	0.27
	Prefilter, standard flow	0.17	0.20	0.24	0.28	0.32	0.37	0.41	—	—
	Prefilter, medium flow	0.13	0.15	0.18	0.21	0.25	0.28	0.32	0.35	0.39
	65% cartridge, standard flow	0.27	0.34	0.41	0.49	0.57	0.66	0.76	—	—
	65% cartridge, medium flow	0.20	0.25	0.31	0.36	0.43	0.49	0.56	0.63	0.71
	95% cartridge, standard flow	0.38	0.46	0.55	0.64	0.74	0.84	0.95	—	—
	95% cartridge, medium flow	0.29	0.35	0.42	0.49	0.56	0.64	0.72	0.81	0.89
Plenum Options	Return, isolation damper	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	Discharge, isolation damper	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cooling Options [a b c]	DX, low airflow, 5-row, 10 fpi	0.41	0.50	0.59	0.69	0.79	0.89	—	—	—
	DX, low airflow, 5-row, 12 fpi	0.49	0.59	0.70	0.81	0.93	—	—	—	—
	DX, high airflow, 5-row, 10 fpi	—	0.38	0.45	0.52	0.60	0.68	0.79	0.88	0.98
	DX, high airflow, 5-row, 12 fpi	—	0.45	0.54	0.62	0.71	0.80	0.93	1.04	—
	Cooling diffuser	0.04	0.05	0.06	0.08	0.10	0.11	0.13	0.15	0.18
Heating options [b]	Hot water, 1-row	0.12	0.15	0.19	0.22	0.26	0.30	0.35	0.39	0.44
	Hot water, 2-row	0.24	0.30	0.37	0.44	0.52	0.61	0.69	0.78	0.88
	Steam, 1-row, 6 fpi	0.10	0.12	0.15	0.18	0.21	0.24	0.27	0.31	0.35
	Steam, 1-row, 12 fpi	0.16	0.20	0.24	0.28	0.33	0.38	0.43	0.48	0.54
	Steam, 2-row, 6 fpi	0.19	0.24	0.30	0.35	0.41	0.48	0.55	0.62	0.70
	Electric heat	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34
	Gas heat	See Table 37: Furnace pressure drop (in. W.C.), RPS 015C to 135C on page 34.								

a. Pressure drop of cooling coils not shown can be found in the Daikin Selection Program output.

b. DX coil pressure drops are based on wet coils.

c. A cooling diffuser is provided on units with blow-through cooling only.

Table 37: Furnace pressure drop (in. W.C.), RPS 015C to 135C

Airflow (cfm)	Column Number, see Table 25 on page 29									
	1	2	3	4	5	6	7	8	9	10
4000	0.06	0.05	—	—	—	—	—	—	—	—
6000	0.13	0.1	—	—	—	—	—	—	—	—
8000	0.24	0.17	0.14	0.08	0.07	—	—	—	—	—
10000	0.37	0.27	0.22	0.12	0.11	0.09	0.08	—	—	—
12000	0.53	0.39	0.32	0.17	0.16	0.13	0.12	0.09	0.08	—
14000	0.72	0.54	0.44	0.24	0.21	0.18	0.16	0.12	0.1	0.1
16000	0.94	0.7	0.57	0.31	0.28	0.24	0.2	0.15	0.13	0.12
18000	1.19	0.89	0.72	0.39	0.35	0.3	0.26	0.19	0.17	0.16
20000	—	1.09	0.89	0.48	0.43	0.37	0.32	0.24	0.21	0.2
22000	—	—	1.08	0.58	0.52	0.44	0.39	0.29	0.25	0.24
24000	—	—	—	0.69	0.62	0.53	0.46	0.34	0.3	0.28
26000	—	—	—	0.81	0.73	0.62	0.54	0.4	0.35	0.33
28000	—	—	—	0.94	0.85	0.72	0.63	0.47	0.41	0.38
30000	—	—	—	1.08	0.97	0.83	0.72	0.54	0.47	0.44

Table 38: Gravity relief damper air pressure drop, 0 to 100% economizer

Exhaust cfm	5000	10000	15000	20000	25000	30000	35000	40000
Size 015C-040C	—	0.25	0.54	—	—	—	—	—
Size 045C-075C	—	—	0.36	0.61	1.00	—	—	—

NOTE: If all exhaust must occur through the economizer gravity relief damper, and no return or exhaust fan is provided, then the building may be pressurized by the sum of the return duct pressure drop plus the gravity relief pressure.

Supply Fans

Figure 14: RFS/RPS 015C to 030C or RDS 800; (2) 15 in. × 6 in. Forward Curved Supply Fan

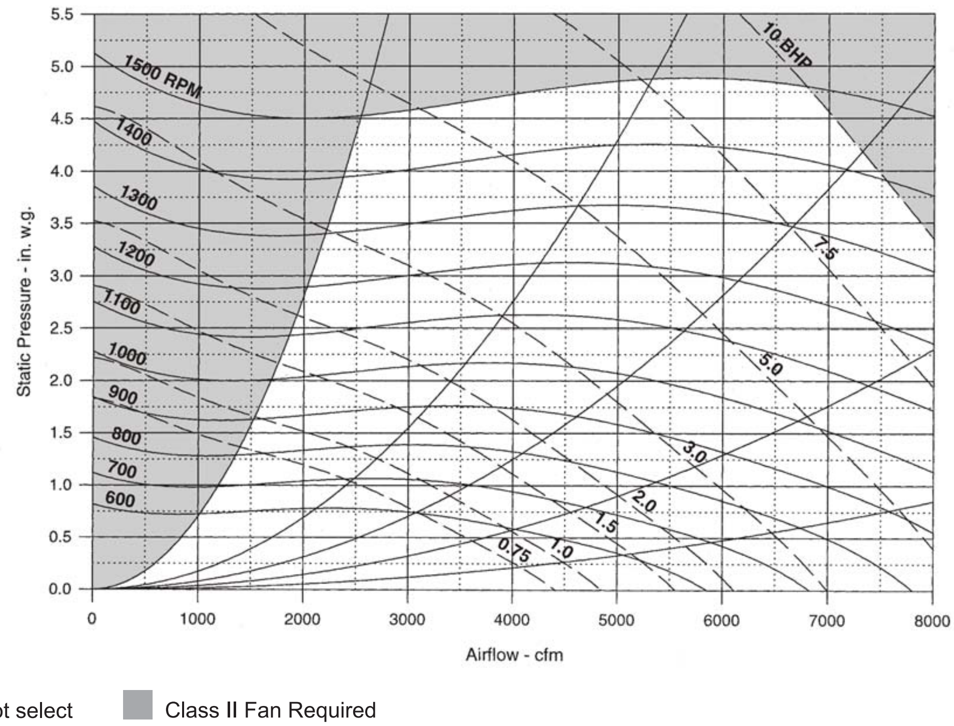


Figure 15: 015C to 030C or RDS 800; (2) 15 in. × 15 in. Forward Curved Supply Fan

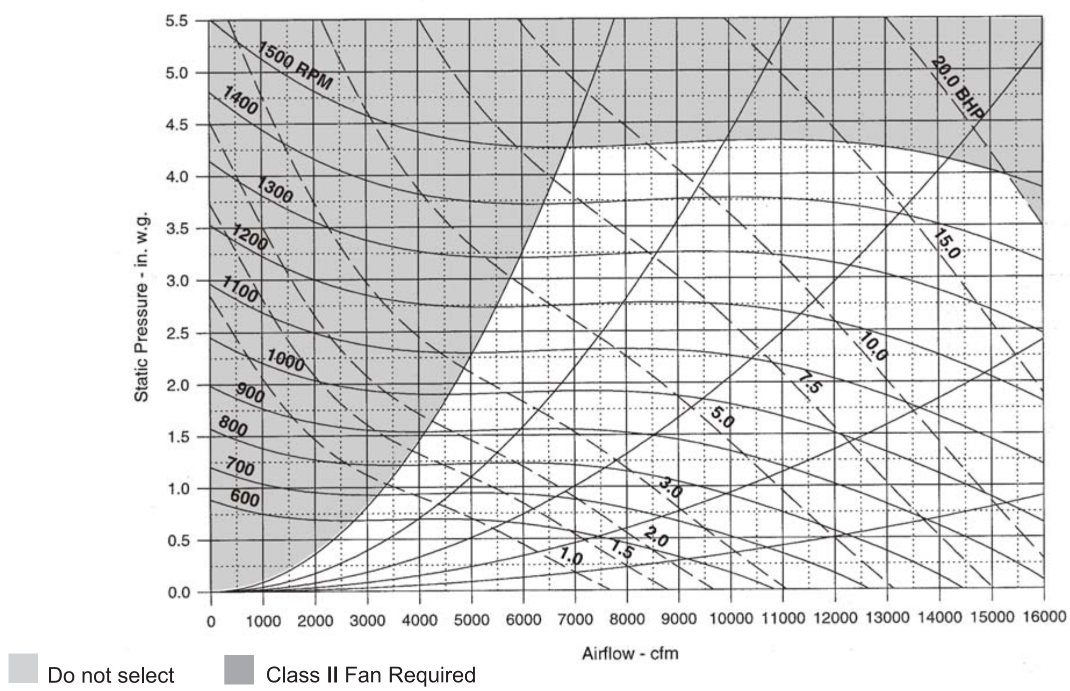
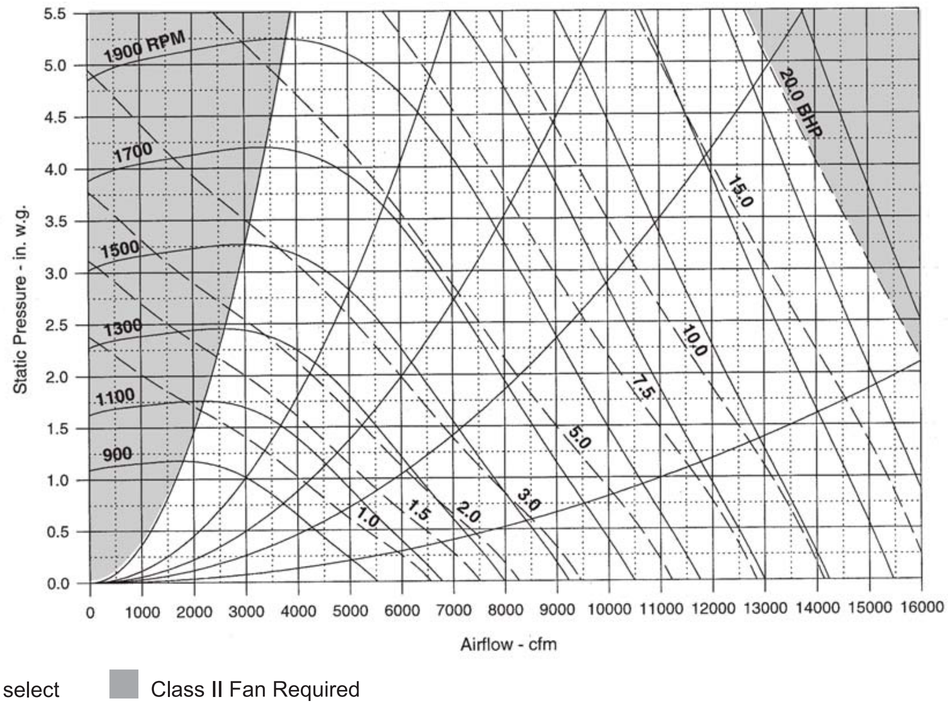
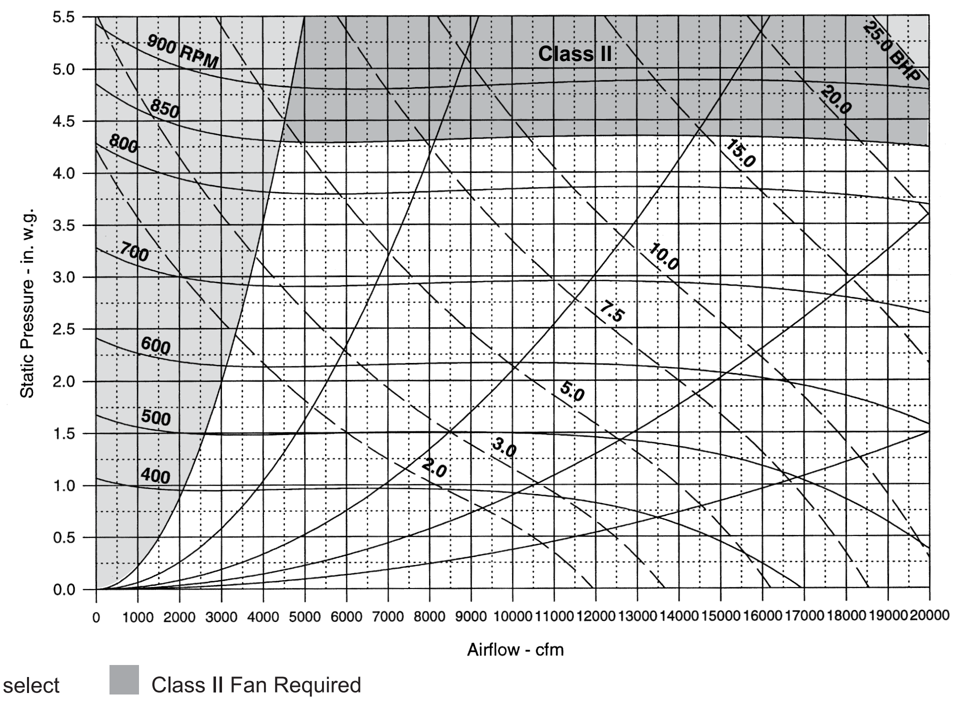


Figure 16: 015C to 030C or RDS 800; 20 in. Airfoil Supply Fan



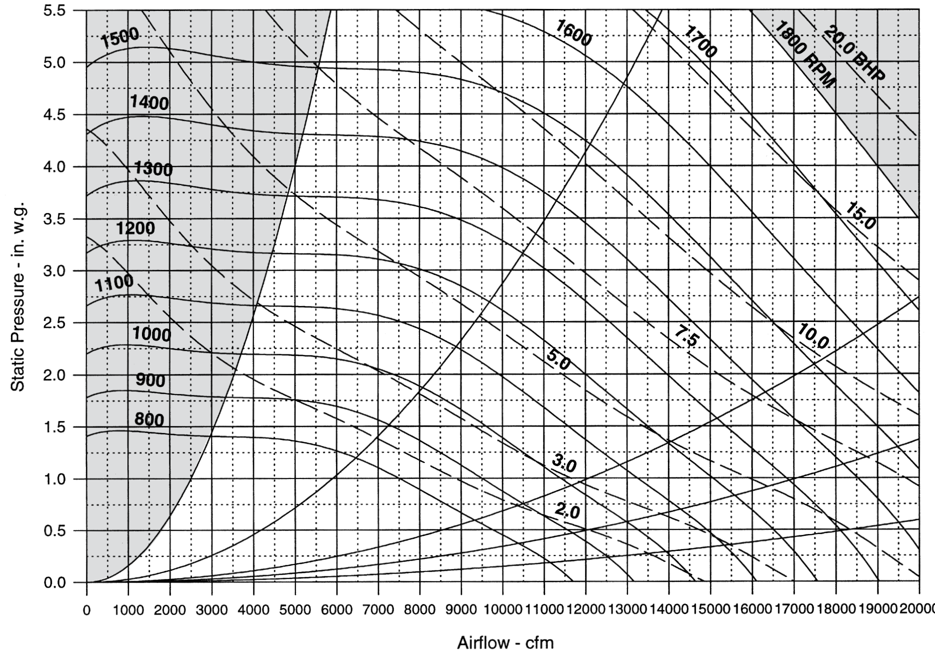
NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

Figure 17: 036C to 040C or RDS 802; 24 in. Forward Curve Supply Fan



NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

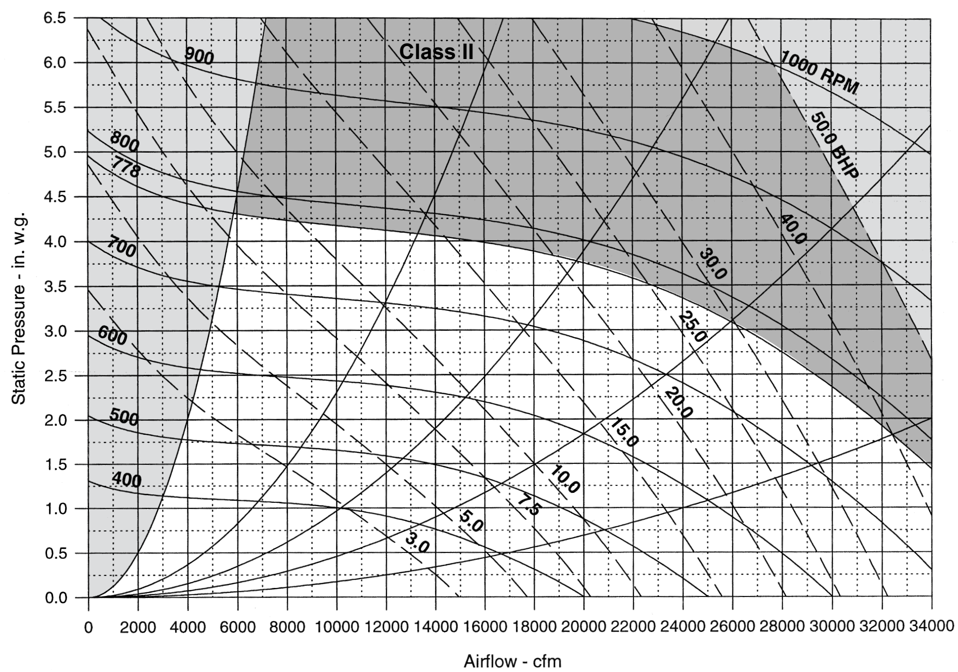
Figure 18: 036C to 040C or RDS 802; 24 in. Airfoil Supply Fan



Do not select Class II Fan Required

NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

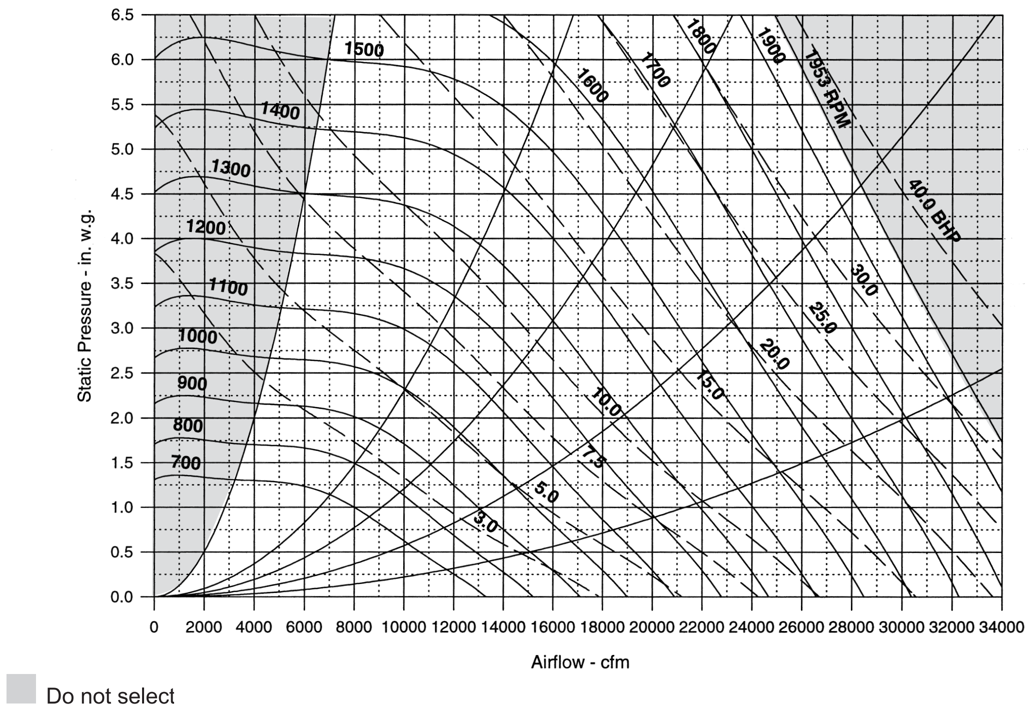
Figure 19: RFS/RPS 045C to 050C or RAH 047C; 27 in. Forward Curved Supply Fan



Do not select Class II Fan Required

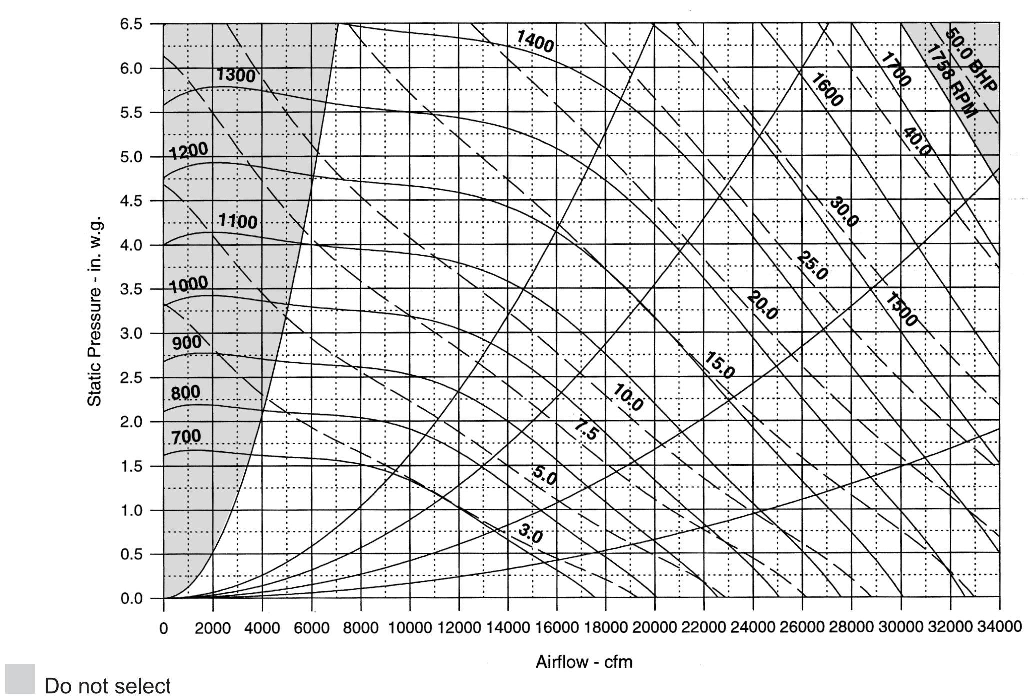
NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in. (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

Figure 20: RFS/RPS 045C to 050C or RAH 047C; 27 in. Airfoil Supply Fan



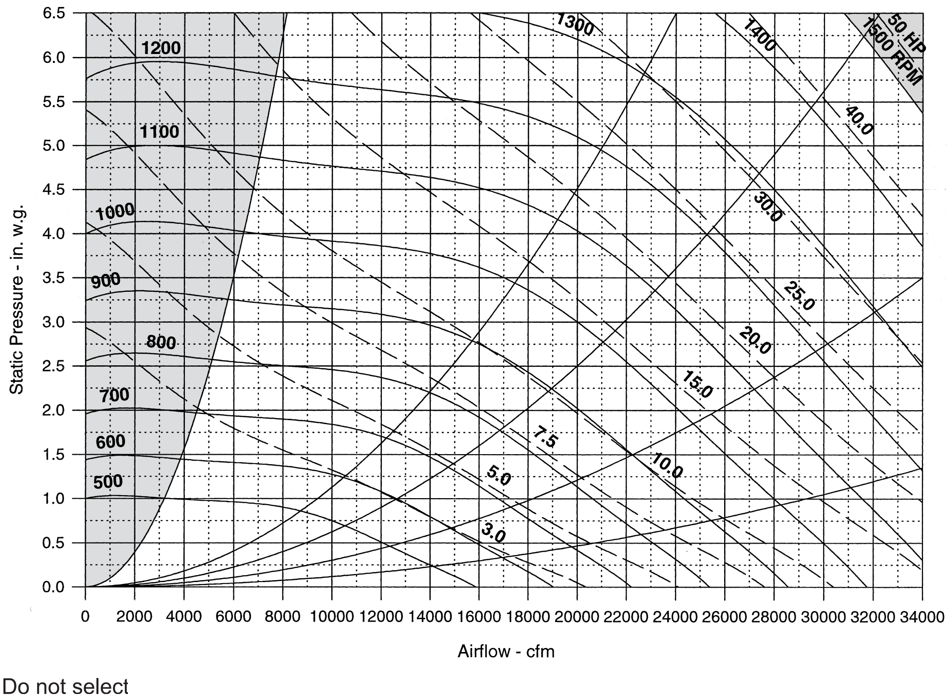
NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in. (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

Figure 21: RFS/RPS 045C to 075C or RAH 047C; 30 in. Airfoil Supply Fan



NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in. (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

Figure 22: RFS/RPS 060C to 075C or RAH 047C; 33 in. Airfoil Supply Fan



NOTE: Maximum allowable static pressure at fan bulkhead is 5.0 in. (i.e., ESP plus blow-through component pressure drops cannot exceed 5.0 in).

Airfoil Return Fans

Figure 23: RFS/RPS 015C to 040C, RDS 800C to 802C; 24 in. Airfoil Return Fan

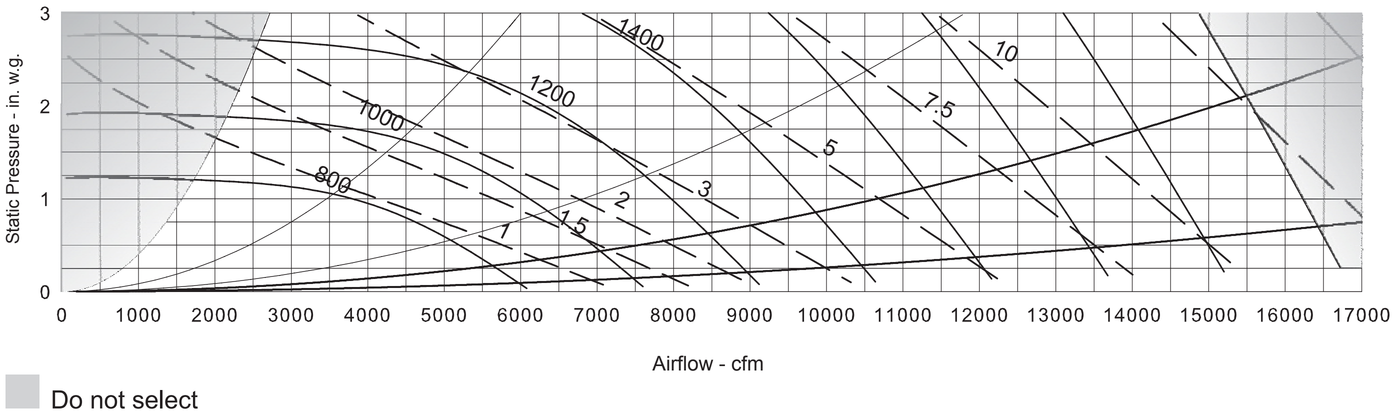
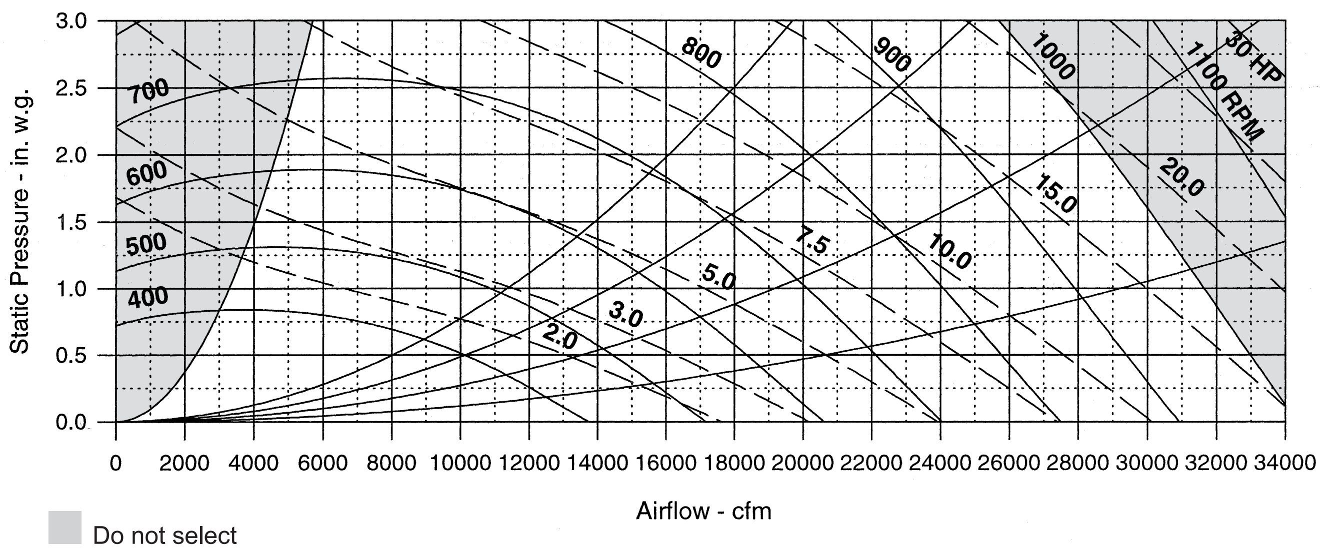


Figure 24: RDT/RFS/RPS 045C to 075C or RAH 047C; 40 in. Airfoil Return Fan



Section Options and Locations

Figure 25 through Figure 29 show section options, curb lengths, and relative positions. Curb lengths (in inches) are shown below each icon.

Figure 25: RFS/RPS 015C to 030C, Draw-Through Coil Section (RDS 800 varies slightly)

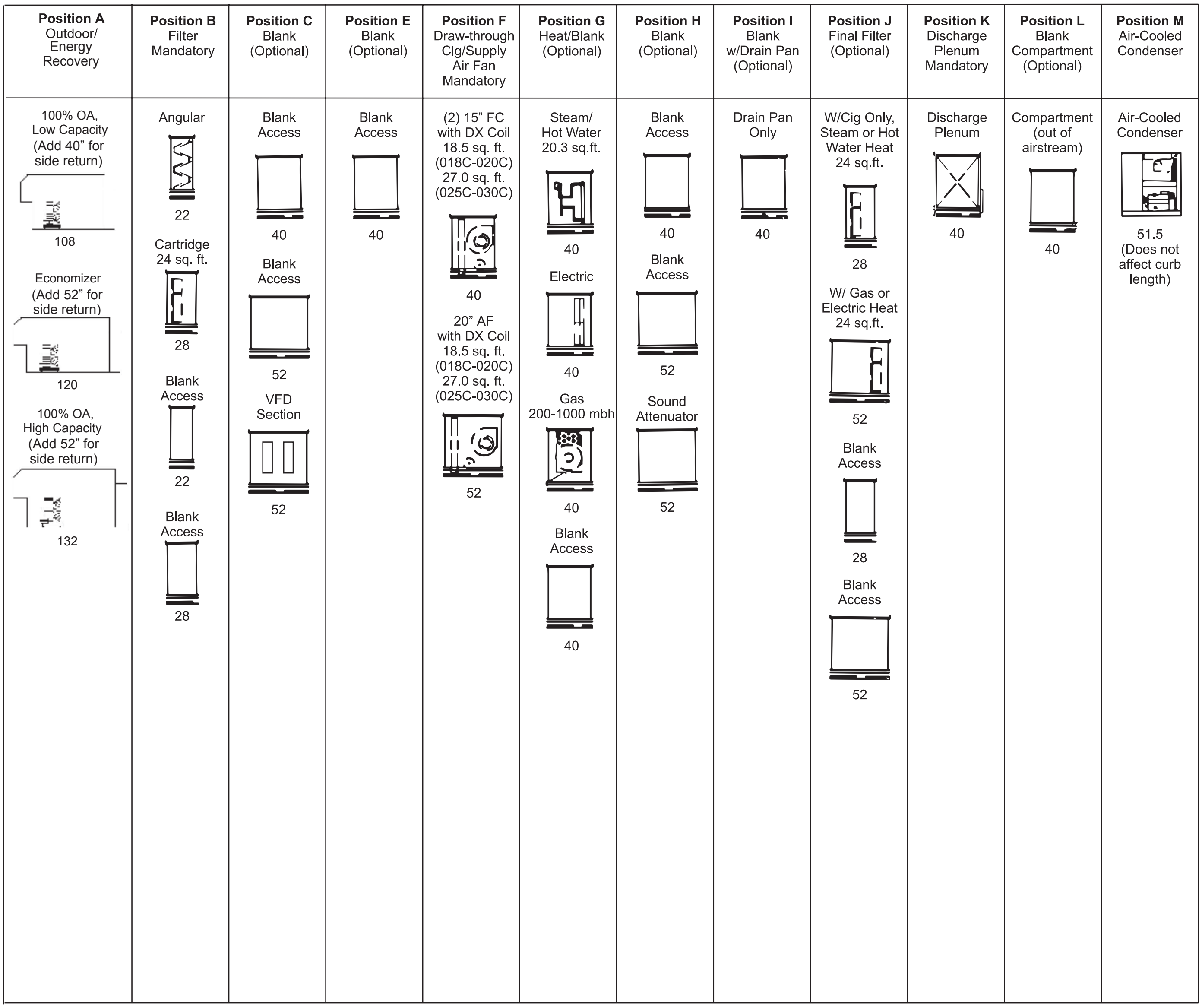


Figure 26: RCS/RFS/RPS 036C and 040C, Blow-Through Coil Section (n/a final filters, RDS 802 varies slightly)

Position A Outdoor/ Energy Recovery	**Position B** Filter Mandatory	**Position C** Blank Optional	**Position D** Blank w/Drain Pan Optional	**Position E** Blank Optional	**Position F** Supply Air Fan Mandatory	**Position G** Heat/Blank Mandatory	**Position H** Blank Optional	**Position I** DX Coil Mandatory	**Position J** Blank Optional	**Position K** Discharge Plenum Mandatory	**Position L** Blank Compartment Optional	**Position M** Air-cooled Condenser
100% OA, Low Capacity (Add 40" for side return) 108 Economizer (Add 52" for side return) 120 100% OA, High Capacity (Add 52" for side return) 132	Angular 22 Cartridge 24 sq. Ft 28 Blank Access 22 Blank Access 28	Blank Access 40 Blank Access 52 VFD Section 52	Drain Pan Only 40	Blank Access 40	24" Dia 62	Steam/ Hot Water 40 Electric 40 Gas 40 Blank Access 40	Blank Access 40 Blank Access 52 Sound Attenuator 52	DX Coil 27.0 sq. Ft. 22	Blank Access 28 Blank Access 52	Discharge Plenum 40	Compartment (out of airstream) 40	Air-cooled Condenser 100 (Does Not Affect Curb Length)

Figure 27: RCS/RFS/RPS 036C and 040C, Draw-Through Coil Section (RDS 802 varies slightly)

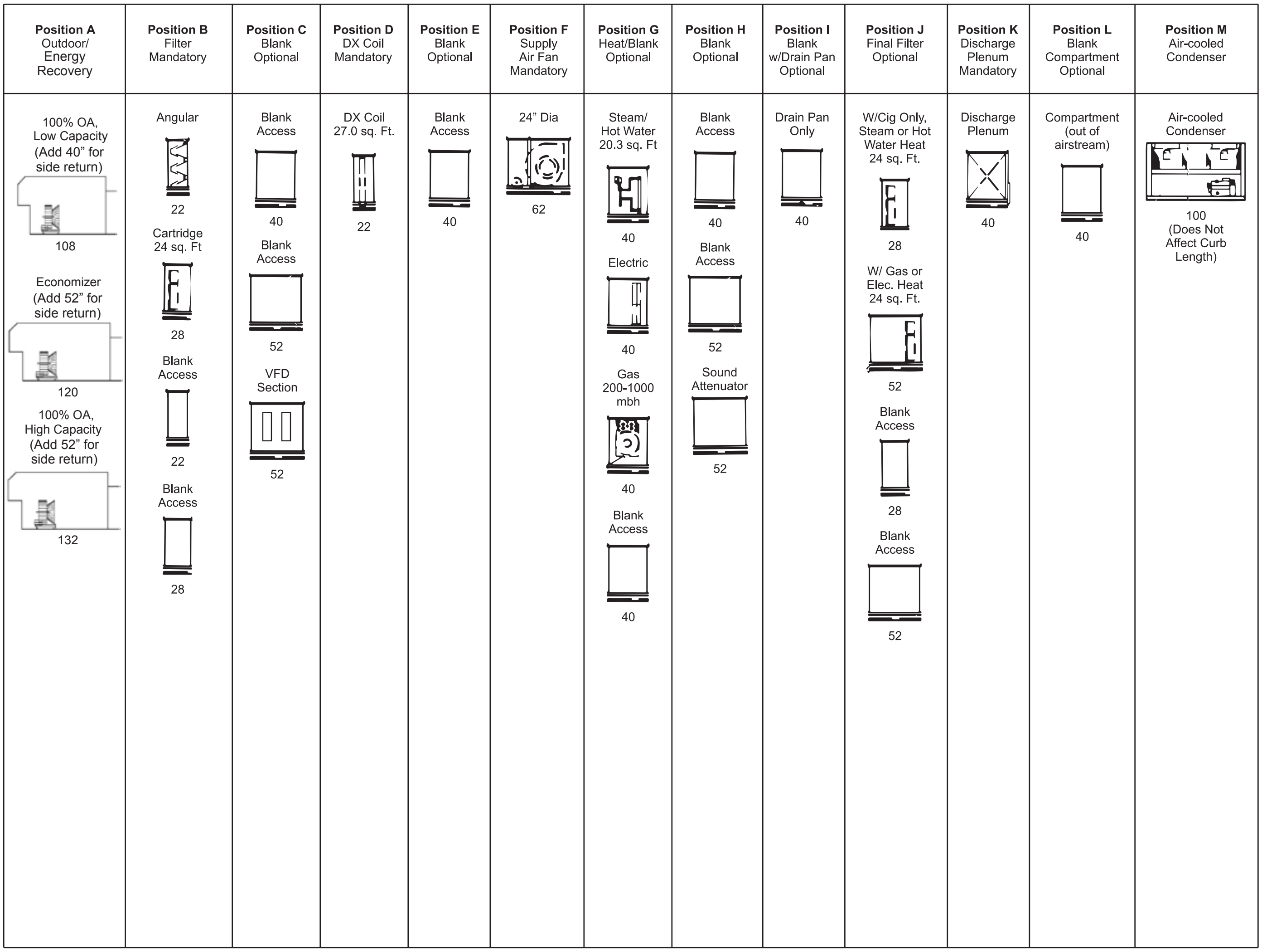
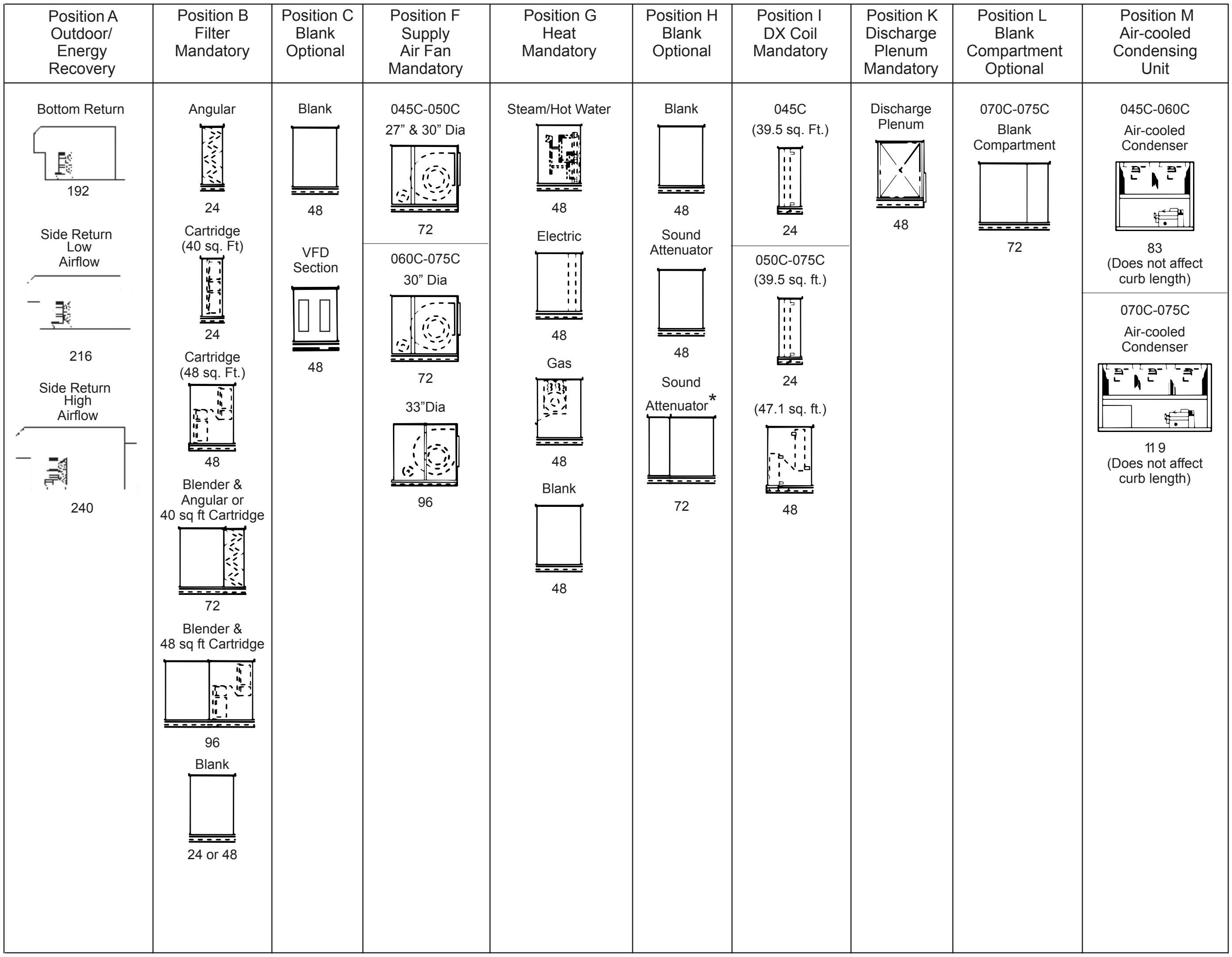
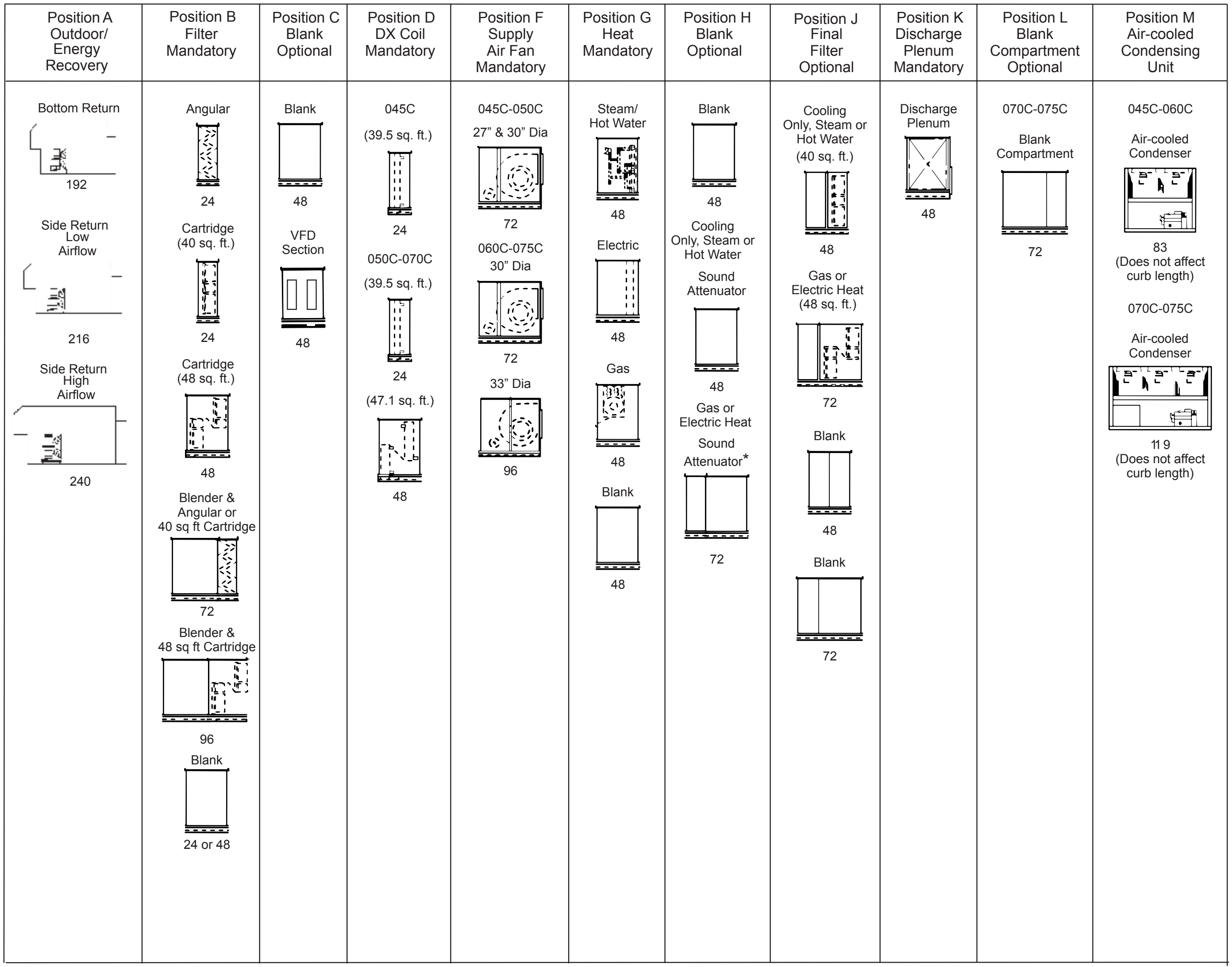


Figure 28: RCS/RFS/RPS 045C to 075C, Blow-Through Coil Section (n/a final filters)



NOTE: Exhaust fan section dimensions do not include the hood. See page 38.

Figure 29: RCS/RFS/RPS 045C to 075C, Draw-Through Coil Section (RAH 047C varies slightly)



NOTE: Exhaust fan section dimensions do not include the hood. See page 38.

Use Figure 25 through Figure 29 to determine the total air handler length and total unit length. The total air handler length, which is needed to determine roof curb knockouts, incudes all unit sections except the air cooled condensing section.

Example:

RPS 045C with Draw-Through Coil Section (from Figure 29)

For a custom certified drawing of your specific requirements, consult your local Daikin sales representative.

Section Description	Length (in.)
Energy Recovery with bottom return	192
Angular filters	24
Cooling coil	24
Supply fan	72
Gas heat	48
Final filter, standard flow	48
Discharge plenum	48
Air cooled condensing unit	83
Total air handler length	**456**
Total unit length (including condensing unit)	**539**

Electrical Knockout Locations

Figure 30: Main Control Panel/Discharge Plenum, 015C to 040C or 800 to 802C

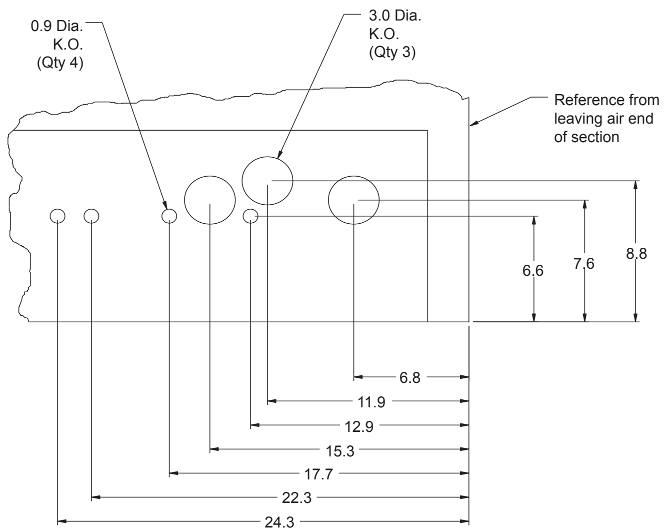


Figure 31: Main Control Panel/Discharge Plenum, RFS/RPS 045C to 075C or RAH 047C

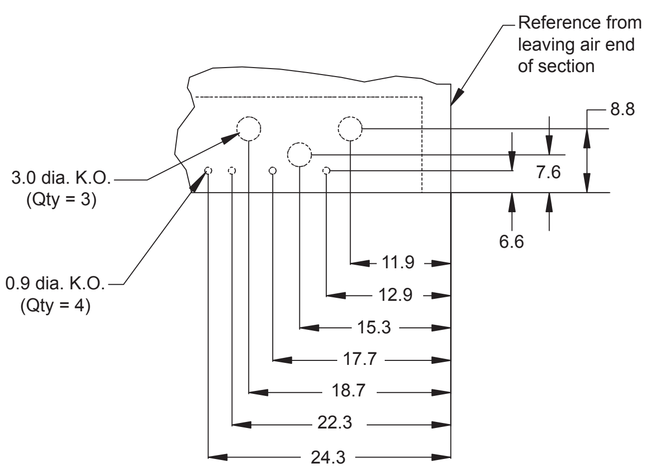
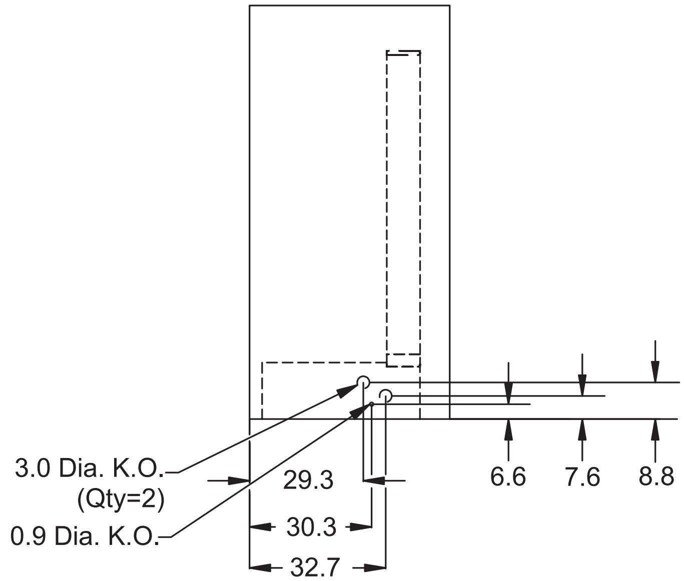


Figure 32: Electric Heat/Heat Section



Drain and Air Connection Locations

Figure 33: RPS 030C Dimensions

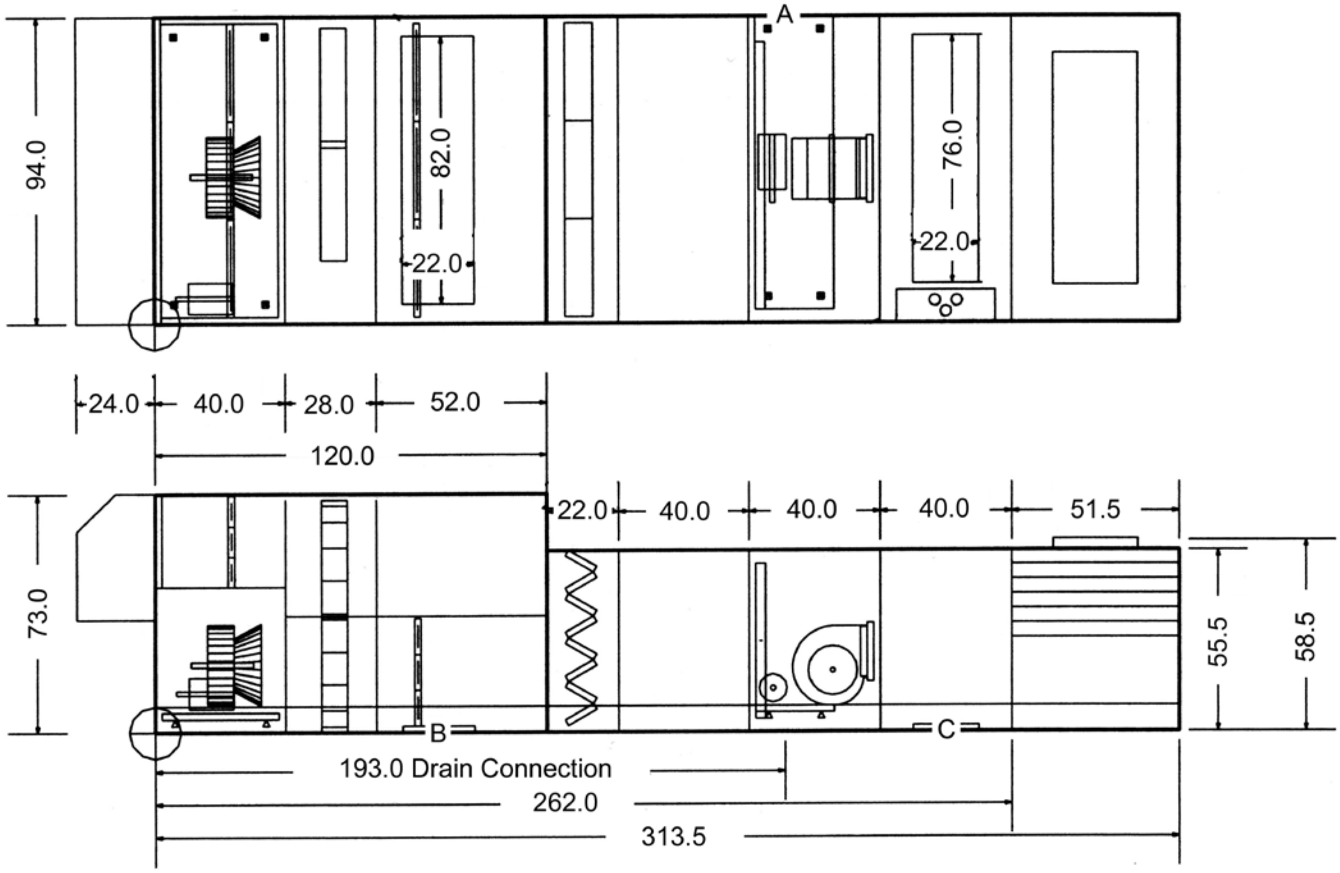


Table 39: RPS 030C drain and air connection locations

Model	Opening	X (in.)	Y (in.)	Z (in.)	Width (in.)	Height (in.)
RPS 030C	(A) Condensate drain connection (1.5 MPT)	193	95.5	2.7	—	—
	(B) Return air inlet	76	6	2	82	22
	(C) Discharge air outlet	232	12	0	76	20

Figure 34: RPS 050C Dimensions

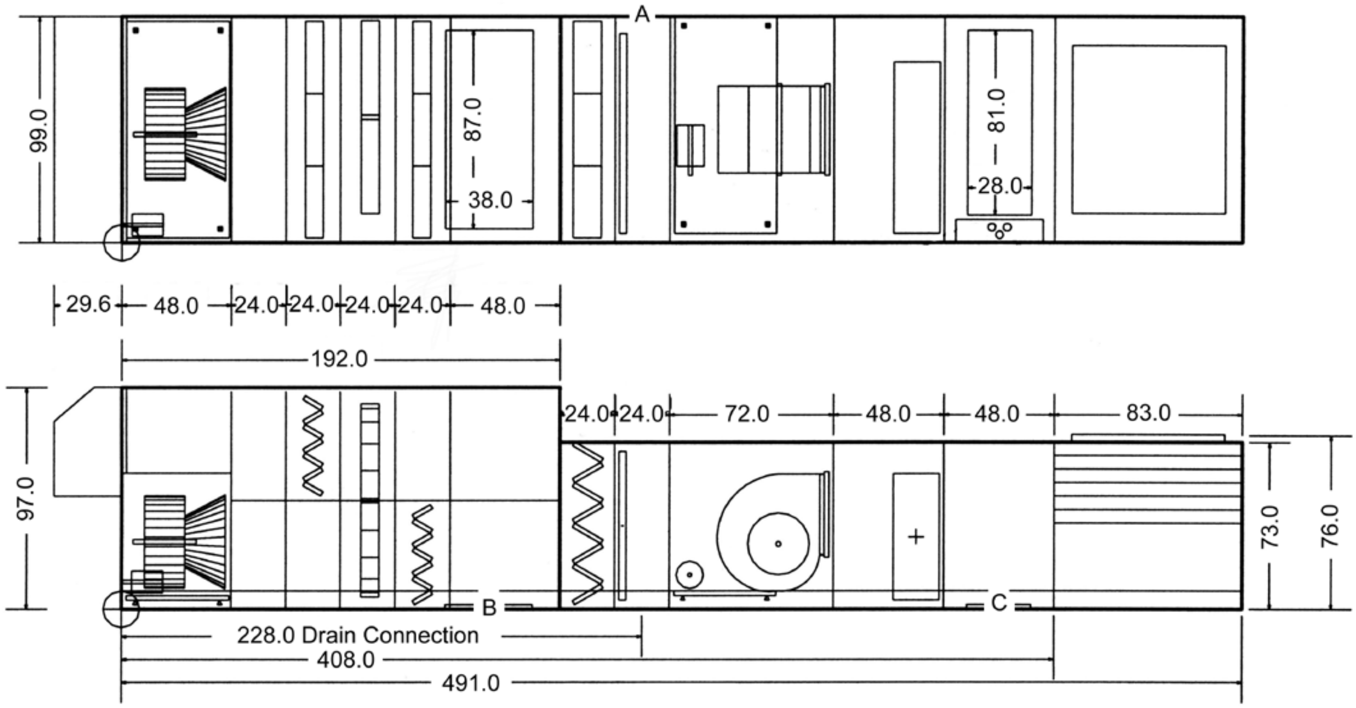
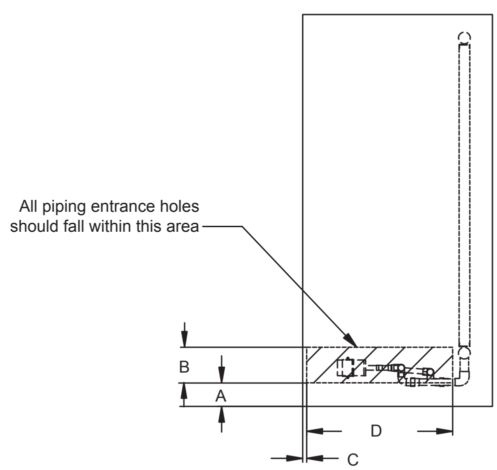


Table 40: RPS 050C Drain and Air Connection Locations

Model	Opening	X (in.)	Y (in.)	Z (in.)	Width (in.)	Height (in.)
RPS 050C	(A) Condensate drain connection (1.5 MPT)	193	95.5	2.70	—	—
	(B) Return air inlet	76	6	2	82	22
	(C) Discharge air outlet	232	12	0	76	20

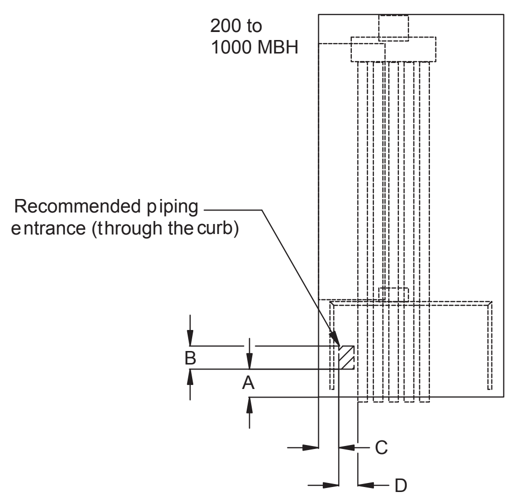
Piping Entrance Locations

Figure 35: Steam and Hot Water Heat/Heat Section



Unit Size	A	B	C	D
015C–040C or 800-802C	6.0	6.5	1.0	29.0
045C–075C or 47C	6.0	9.0	1.0	37.0

Figure 36: 200 to 1400 MBh Gas Heat/Heat Section



Unit Size	A	B	C	D
015C-040C or 800-802C	6.0	12.0	5.0	2.7
045C-075C or 47C	8.6	6.0	4.2	4.0

Figure 37: RFS/RPS 015C to 040C Roof Curb, (without blank compartment)

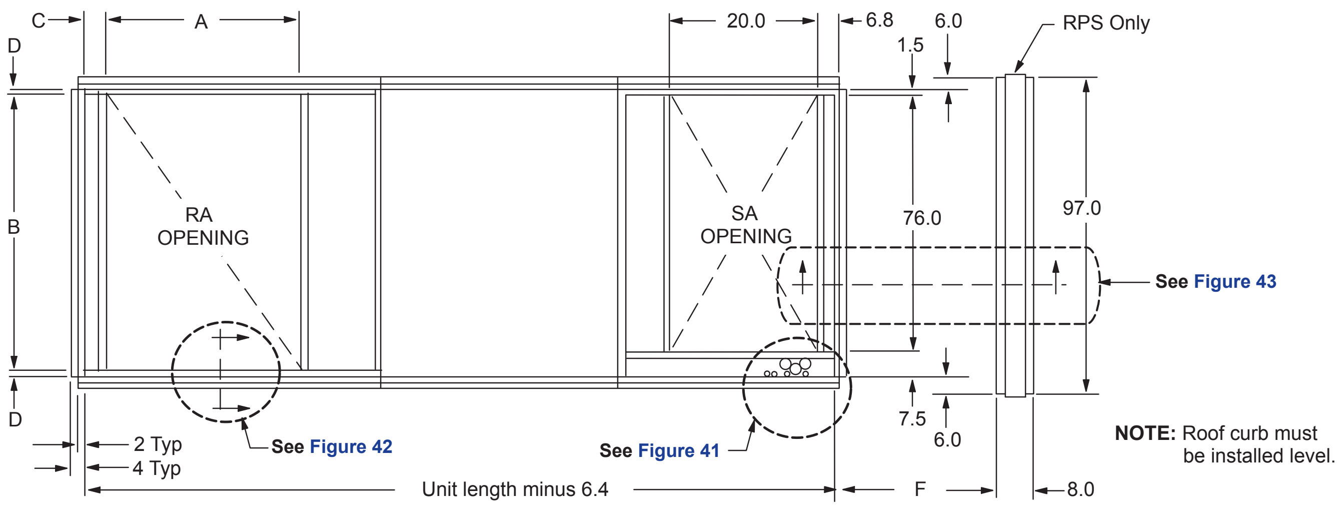


Figure 38: RFS/RPS 015C to 040C Roof Curb, (with blank compartment)

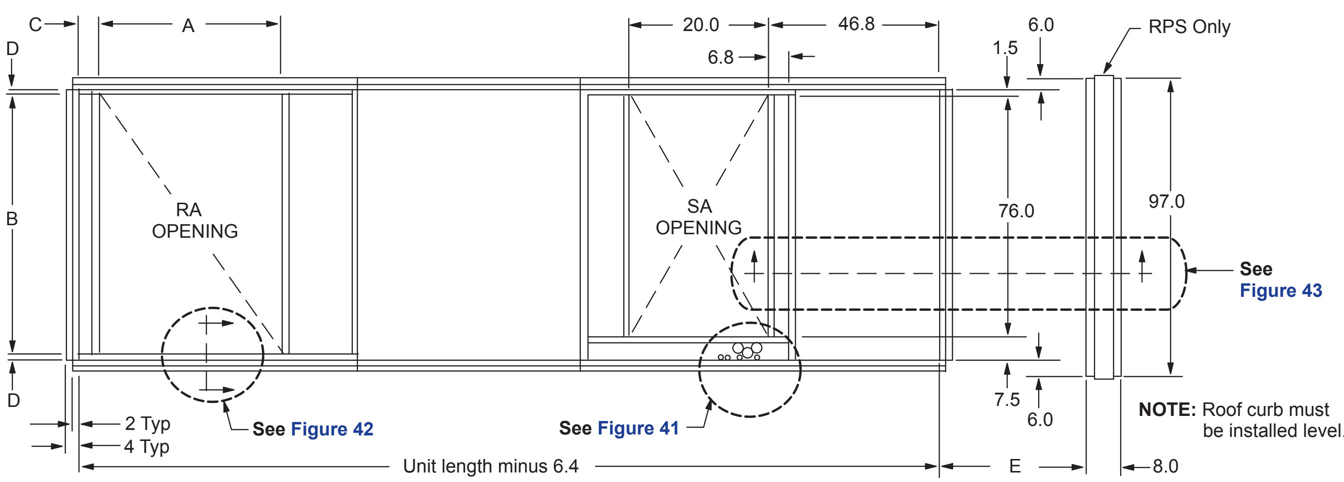


Table 41: 015C to 040C Roof Curb Dimensions

Model	Return fan	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)
015C to 030C	100% OA low air flow	224	82	76.8	1.5	42
	100% OA high air flow	22	82	100.8	1.5	42
	Economizer	22	82	72.8	1.5	42
036C to 040C	100% OA low air flow	22	82	76.8	1.5	90
	100% OA high air flow	22	82	100.8	1.5	90
	Economizer	22	82	72.8	1.5	90

Figure 39: Roof curb, RPS/RFS 045C to 075C (without blank compartment)

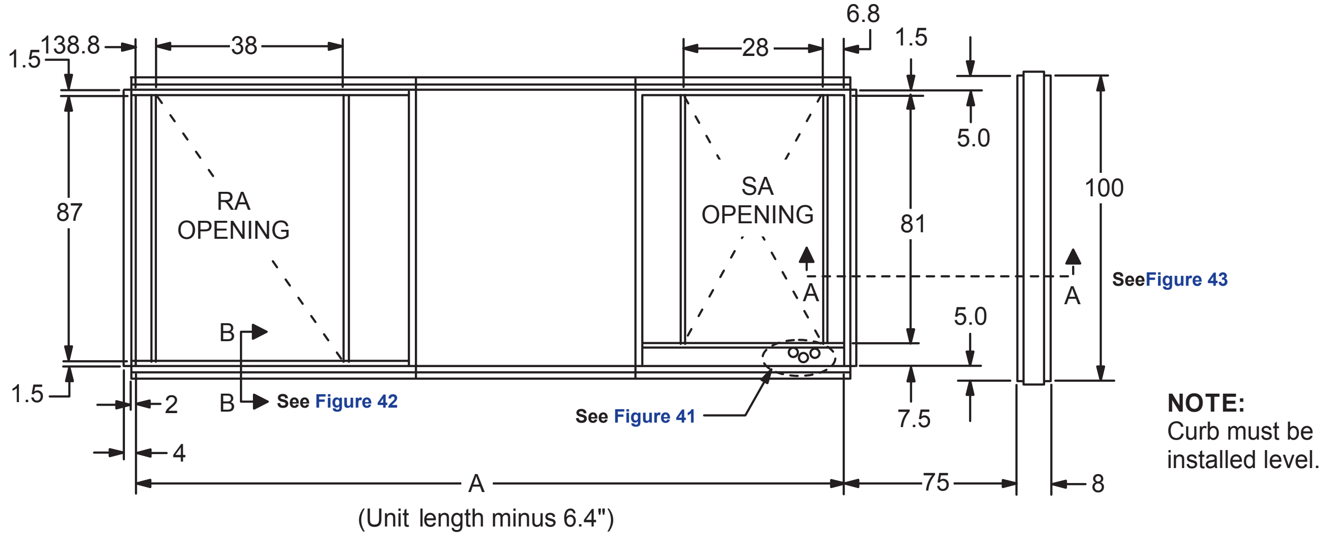


Figure 40: Roof curb, RPS/RFS 045C to 075C (with blank compartment)

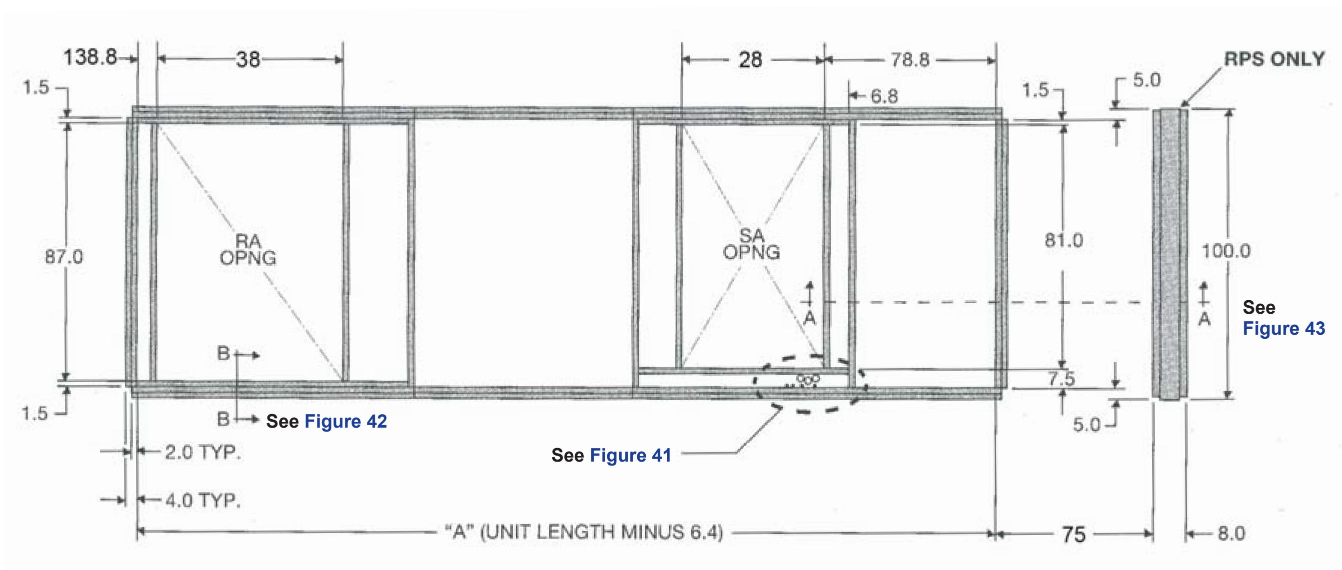


Figure 41: Knockout Detail

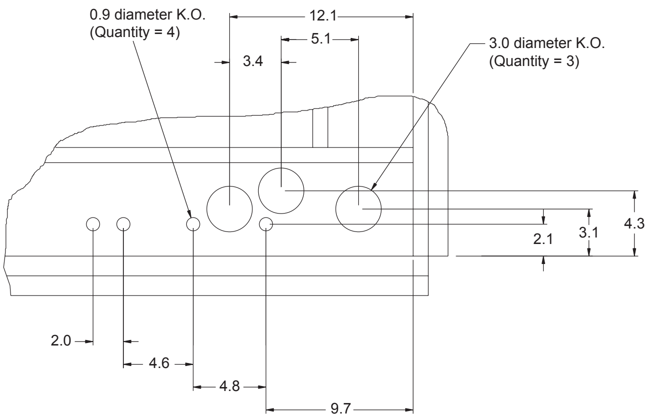


Figure 42: RAH/RDS/RFS/RPS Curb Section A-A

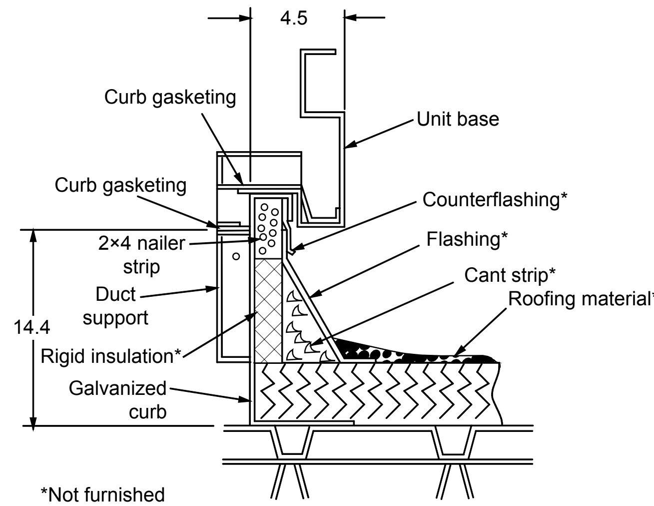
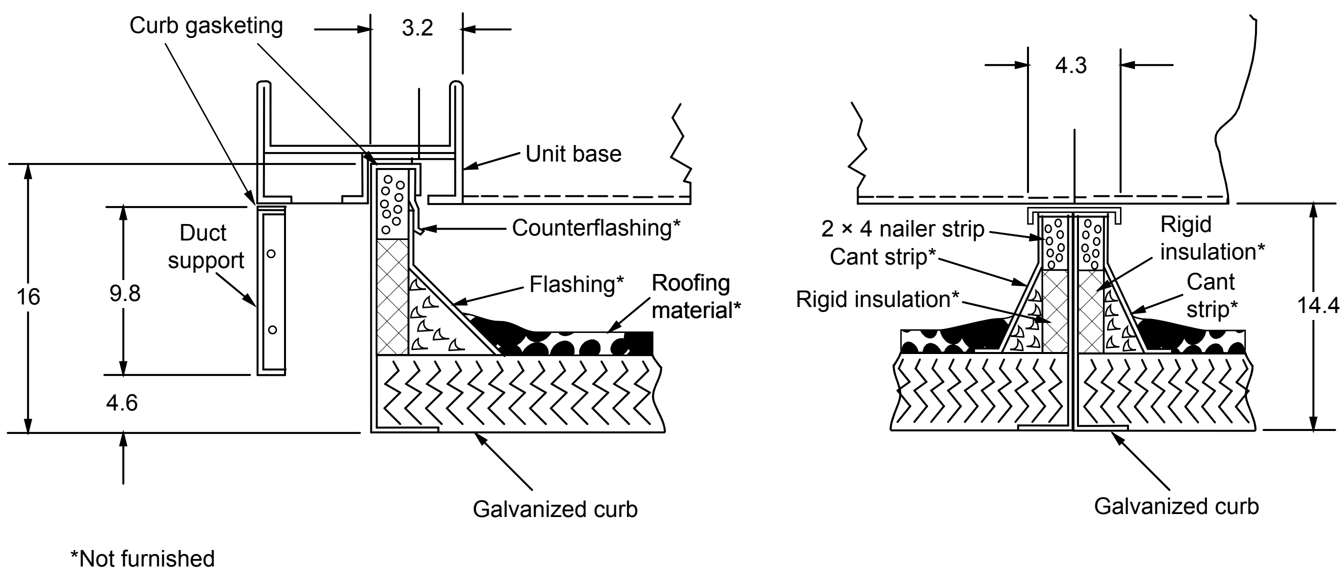


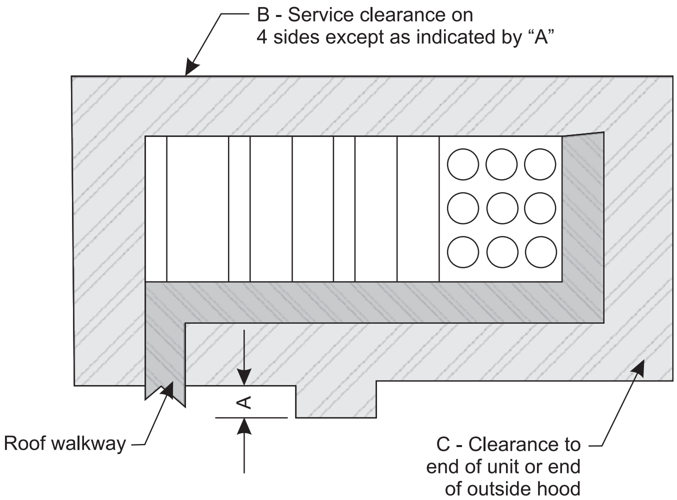
Figure 43: RFS/RPS Curb Section B-B



Service Clearance

Allow recommended service clearances shown in Figure 44. Provide a roof walkway along two sides of the unit for service and access to most controls.

Figure 44: Service Clearances



Cooling Coil, Heat and Supply Fan Service Clearance

Additional clearance, "A" is recommended adjacent to the cooling coil, heat, and supply fan sections. See Figure 25 on page 41 through Figure 29 on page 45 to identify these sections.

Table 42: Service Clearance

Unit Size	A	B	C
015C to 040C or 800 to 802C	30	60	60
045C to 075C or 047C	24	72	72

Overhead Clearance

1. Unit(s) surrounded by screens or solid walls must have no overhead obstructions over any part of the unit.
2. Area above condenser must be unobstructed in all installations to allow vertical air discharge.
3. For overhead obstructions above the air handler section, observe the following restrictions:
    a. No overhead obstructions above the furnace flue, or within 9 in. of the flue box.
    b. Any overhead obstruction not within 2 in. of the top of

Ventilation Clearance

Unit(s) Surrounded by a Screen or a Fence:

1. The bottom of the screen should be a minimum of 1 ft. above the roof surface.
2. Minimum distance, unit to screen—same as service clearance (Table 42).
3. Minimum distance, unit to unit—120 in.

Unit(s) Surrounded by Solid Walls:

1. Minimum distance, unit to wall—96 in., all sizes
2. Minimum distance, unit to unit—120 in.
3. Wall height restrictions:
    a. Wall on one side only or on two adjacent side—no restrictions.
    b. Walls on more than two adjacent sides—wall height not to exceed unit height.

Do not locate outside air intakes near exhaust vents or other sources of contaminated air.

If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified above. This is particularly important to prevent blowing snow from entering outside air intakes and to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures. SpeedTrol, required for compressor operation below 45°F, maintains proper head pressure in calm wind conditions.

Figure 45: Ventilation Clearances

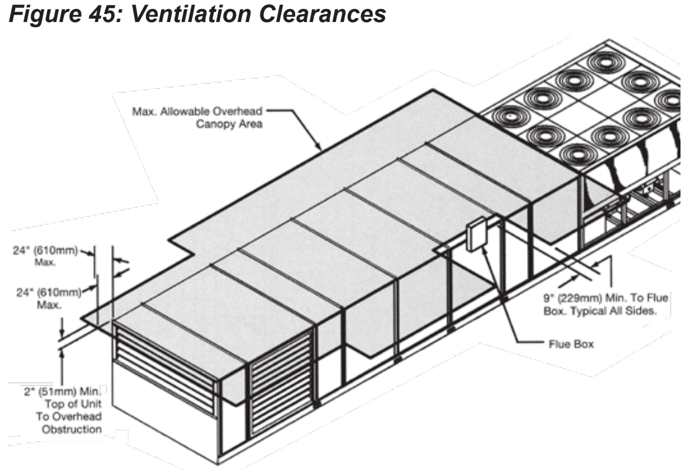


Table 43: RDT/RFS/RPS 015C to 075C, Compressor Amps

Model	Voltage	R-22												R-407C											
		Circuit 1						Circuit 2						Circuit 1						Circuit 2					
		Comp 1		Comp 3		Comp 5		Comp 2		Comp 4		Comp 6		Comp 1		Comp 3		Comp 5		Comp 2		Comp 4		Comp 6	
		RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
015C	208/60/3	14.7	124	—	—	—	—	30.1	225	—	—	—	—	14.7	124	—	—	—	—	30.1	225	—	—	—	—
	230/60/3	14.7	124	—	—	—	—	30.1	225	—	—	—	—	14.7	124	—	—	—	—	30.1	225	—	—	—	—
	460/60/3	7.4	60	—	—	—	—	15.5	114	—	—	—	—	7.4	60	—	—	—	—	15.5	114	—	—	—	—
	575/60/3	5.9	49	—	—	—	—	12.1	80	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
018C	208/60/3	22.4	164	—	—	—	—	37.2	239	—	—	—	—	22.4	164	—	—	—	—	37.2	239	—	—	—	—
	230/60/3	22.4	164	—	—	—	—	37.2	239	—	—	—	—	22.4	164	—	—	—	—	37.2	239	—	—	—	—
	460/60/3	10.9	100	—	—	—	—	17.2	125	—	—	—	—	10.9	100	—	—	—	—	17.2	125	—	—	—	—
	575/60/3	7.4	54	—	—	—	—	12.4	80	—	—	—	—	7.4	54	—	—	—	—	12.4	80	—	—	—	—
020C	208/60/3	22.4	164	—	—	—	—	48.1	425	—	—	—	—	22.4	164	—	—	—	—	49.4	425	—	—	—	—
	230/60/3	22.4	164	—	—	—	—	48.1	425	—	—	—	—	22.4	164	—	—	—	—	49.4	425	—	—	—	—
	460/60/3	10.9	100	—	—	—	—	23.7	187	—	—	—	—	10.9	100	—	—	—	—	28.8	187	—	—	—	—
	575/60/3	7.4	54	—	—	—	—	21.2	148	—	—	—	—	7.4	54	—	—	—	—	23.1	148	—	—	—	—
025C	208/60/3	22.4	164	22.4	164	—	—	41.0	350	—	—	—	—	22.4	164	22.4	164	—	—	43.9	350	—	—		
	230/60/3	22.4	164	22.4	164	—	—	41.0	350	—	—	—	—	22.4	164	22.4	164	—	—	43.9	350	—	—		
	460/60/3	10.9	100	10.9	100	—	—	21.8	158	—	—	—	—	10.9	100	10.9	100	—	—	24.5	158	—	—		
	575/60/3	7.4	54	7.4	54	—	—	17.3	125	—	—	—	—	7.4	54	7.4	54	—	—	17.3	125	—	—		
030C	208/60/3	22.4	164	22.4	164	—	—	48.1	425	—	—	—	—	22.4	164	22.4	164	—	—	49.4	425	—	—	—	—
	230/60/3	22.4	164	22.4	164	—	—	48.1	425	—	—	—	—	22.4	164	22.4	164	—	—	49.4	425	—	—	—	—
	460/60/3	10.9	100	10.9	100	—	—	23.7	187	—	—	—	—	10.9	100	10.9	100	—	—	28.8	187	—	—	—	—
	575/60/3	7.4	54	7.4	54	—	—	21.2	148	—	—	—	—	7.4	54	7.4	54	—	—	23.1	148	—	—	—	—
036C	208/60/3	22.4	164	22.4	164	—	—	33.6	278	33.6	278	—	—	22.4	164	22.4	164	—	—	36.9	278	36.9	278	—	—
	230/60/3	22.4	164	22.4	164	—	—	33.6	278	33.6	278	—	—	22.4	164	22.4	164	—	—	36.9	278	36.9	278	—	—
	460/60/3	10.9	100	10.9	100	—	—	16.5	127	16.5	127	—	—	10.9	100	10.9	100	—	—	19.9	127	19.9	127	—	—
	575/60/3	7.4	54	7.4	54	—	—	13.7	100	13.7	100	—	—	7.4	54	7.4	54	—	—	16.4	100	16.4	100	—	—
040C	208/60/3	33.6	278	33.6	278	—	—	33.6	278	33.6	278	—	—	36.9	278	36.9	278	—	—	36.9	278	36.9	278	—	—
	230/60/3	33.6	278	33.6	278	—	—	33.6	278	33.6	278	—	—	36.9	278	36.9	278	—	—	36.9	278	36.9	278	—	—
	460/60/3	16.5	127	16.5	127	—	—	16.5	127	16.5	127	—	—	19.9	127	19.9	127	—	—	19.9	127	19.9	127	—	—
	575/60/3	13.7	100	13.7	100	—	—	13.7	100	13.7	100	—	—	16.4	100	16.4	100	—	—	16.4	100	16.4	100	—	—
045C	208/60/3	33.6	278	33.6	278	—	—	33.6	278	33.6	278	—	—	36.9	278	36.9	278	—	—	36.9	278	36.9	278	—	—
	230/60/3	33.6	278	33.6	278	—	—	33.6	278	33.6	278	—	—	36.9	278	36.9	278	—	—	36.9	278	36.9	278	—	—
	460/60/3	16.5	127	16.5	127	—	—	16.5	127	16.5	127	—	—	19.9	127	19.9	127	—	—	19.9	127	19.9	127	—	—
	575/60/3	13.7	100	13.7	100	—	—	13.7	100	13.7	100	—	—	16.4	100	16.4	100	—	—	16.4	100	16.4	100	—	—
050C	208/60/3	41.0	350	41.0	350	—	—	41.0	350	41.0	350	—	—	43.9	350	43.9	350	—	—	43.9	350	43.9	350	—	—
	230/60/3	41.0	350	41.0	350	—	—	41.0	350	41.0	350	—	—	43.9	350	43.9	350	—	—	43.9	350	43.9	350	—	—
	460/60/3	21.8	158	21.8	158	—	—	21.8	158	21.8	158	—	—	24.4	158	24.4	158	—	—	24.4	158	24.4	158	—	—
	575/60/3	17.3	125	17.3	125	—	—	17.3	125	17.3	125	—	—	17.3	125	17.3	125	—	—	17.3	125	17.3	125	—	—
060C	208/60/3	48.1	425	48.1	425	—	—	48.1	425	48.1	425	—	—	49.4	350	49.4	350	—	—	49.4	350	49.4	350	—	—
	230/60/3	48.1	425	48.1	425	—	—	48.1	425	48.1	425	—	—	49.4	350	49.4	350	—	—	49.4	350	49.4	350	—	—
	460/60/3	23.7	187	23.7	187	—	—	23.7	187	23.7	187	—	—	28.8	187	28.8	187	—	—	28.8	187	28.8	187	—	—
	575/60/3	21.2	148	21.2	148	—	—	21.2	148	21.2	148	—	—	23.1	148	23.1	148	—	—	23.1	148	23.1	148	—	—
070C	208/60/3	33.6	278	33.6	278	33.6	278	33.6	278	33.6	278	33.6	278	36.9	278	36.9	278	36.9	278	36.9	278	36.9	278	36.9	278
	230/60/3	33.6	278	33.6	278	33.6	278	33.6	278	33.6	278	33.6	278	36.9	278	36.9	278	36.9	278	36.9	278	36.9	278	36.9	278
	460/60/3	16.5	127	16.5	127	16.5	127	16.5	127	16.5	127	16.5	127	19.9	127	19.9	127	19.9	127	19.9	127	19.9	127	19.9	127
	575/60/3	13.7	100	13.7	100	13.7	100	13.7	100	13.7	100	13.7	100	16.4	100	16.4	100	16.4	100	16.4	100	16.4	100	16.4	100
075C	208/60/3	41.0	350	41.0	350	41.0	350	41.0	350	41.0	350	41.0	350	43.9	350	43.9	350	43.9	350	43.9	350	43.9	350	43.9	350
	230/60/3	41.0	350	41.0	350	41.0	350	41.0	350	41.0	350	41.0	350	43.9	350	43.9	350	43.9	350	43.9	350	43.9	350	43.9	350
	460/60/3	21.8	158	21.8	158	21.8	158	21.8	158	21.8	158	21.8	158	24.4	158	24.4	158	24.8	158	24.4	158	24.4	158	24.8	158
	575/60/3	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125	17.3	125

NOTE:
1. Data given is for individual compressors and condenser fan motors.
2. Locked Rotor Amps for part winding start are for the first winding for 1 second.
3. 115-volt receptacle or marine light options require separate power.

Table 44: Condenser Fan Quantity

RCS/RPS Model	Quantity Fans
015C to 020C	2
025C to 030C	3
036C to 050C	4
060C to 070C	6
075C to 090C	8

* Units ordered with SpeedTrol low ambient control have two SpeedTrol fan motors (one per circuit) in lieu of two of the standard condenser fan motors.

Table 45: Condenser Fan Amps (each)

Voltage	Standard Fan, rpm = 1140		Quiet Fan, rpm = 850		SpeedTrol Fan	
	FLA	LRA	FLA	LRA	FLA	LRA
208/230	4	19.8	3.6	16.4	5.6	16.4
460	2	9.9	1.8	7.6	2.8	7.6
575	1.7	9.6	1.7	6.0	2.3	6.0

Table 46: Supply, Exhaust and Return Fan Motors

Fan motor			208/60/3		230/60/3 [a]		460/60/3		575/60/3	
HP	Efficiency		FLA	LRA	FLA	LRA	FLA	LRA	FLA	LRA
1	High	ODP	3.9	26	2.8	20	1.4	10.5	1.15	9
	High	TEFC	4	27	2.8	21	1.4	10.5	1.2	9
	Premium	ODP	—	—	3	19.2	1.5	15	1.1	7.7
	Premium	TEFC	3.3	27	3	28	1.5	14	1.3	10
1.5	High	ODP	4.5	39	4.2	32	2.1	16	1.7	12.8
	High	TEFC	6.2	39	4.2	32	2.1	16	1.7	12.8
	Premium	ODP	4.8	40.3	4.2	25	2.1	14	1.7	14
	Premium	TEFC	—	—	4.2	40	2.1	20	1.7	16
2	High	ODP	7.1	47	5.6	42	2.8	21	2.2	16.8
	High	TEFC	7	50.6	5.6	48	2.8	24	2.2	17
	Premium	ODP	6.1	43.2	5.8	37.6	2.9	26.5	2.1	15
	Premium	TEFC	—	—	5.6	44	2.8	22	2.2	17
3	High	ODP	9.9	79	9	64.6	4.5	32.3	3.4	26.1
	High	TEFC	9.6	81	8.2	77.2	4.1	38.6	3.4	30.9
	Premium	ODP	9.3	74	8.2	64	4.1	32	3.1	25.6
	Premium	TEFC	9.4	80	8.2	71	4.1	35.5	3.3	29
5	High	ODP	16.1	106	14	94	7	47	5.3	38
	High	TEFC	15.2	126	13.4	102.4	6.7	51.2	5.4	39
	Premium	ODP	15.7	110	13.6	96	6.8	48	5.2	38.4
	Premium	TEFC	15	124	13	96	6.5	48	5.2	38
7.5	High	ODP	25	137	21.6	148.4	10.8	74.2	8.2	49
	High	TEFC	24.8	175.3	20.4	145.2	10.2	72.6	8.2	58
	Premium	ODP	22.3	185	20	122	10	80	7.4	52
	Premium	TEFC	22	177	20	141	10	70.5	8	56
10	High	ODP	33	290	28	180	14	94	11	72
	High	TEFC	29.5	228	28.4	200	14.2	100	11.4	80
	Premium	ODP	29	247	25.8	192	12.9	106	10.3	76.6
	Premium	TEFC	28.5	209	25	182	12.5	91	10	67
15	High	ODP	44.8	368	40.6	301	20.3	150.5	16.2	120
	High	TEFC	43.7	310	38.8	272	19.4	136	15.5	109
	Premium	ODP	43.4	271	37.8	233.6	18.9	117	14.1	94
	Premium	TEFC	42.4	282	37	246	18.5	123	14	89
20	High	ODP	61	342	50	350	25	175	20	135
	High	TEFC	60	465	48	320	24	160	19.1	123
	Premium	ODP	57	373	49	322	24.5	160.8	18.9	130
	Premium	TEFC	56	403	48	350	24	175	18.8	138
25	High	ODP	74	427	62	382	31	191	24.3	151
	High	TEFC	73	416	60	380	30	190	24.2	152
	Premium	ODP	70	438	61	380	30.5	190	24.2	125
	Premium	TEFC	68.4	431	61	376	30.5	188	22.8	148
30	High	ODP	86.5	560	75	460	37.5	230	30	177
	High	TEFC	87	448	72	460	36	230	28.6	184
	Premium	ODP	83.3	514	72.4	448	36.2	224	29.8	179
	Premium	TEFC	84	566	69	428	34.5	214	27.6	178
40	High	ODP	117	660	102	630	51	315	40	251
	High	TEFC	114	590	95	544	47.5	272	38	214
	Premium	ODP	110	730	96	630	48	315	38	245
	Premium	TEFC	106	734	94	650	47	325	37	213
50	High	ODP	140	832	124	770	62	385	49.2	303
	High	TEFC	136	840	118	744	59	372	48	266
	Premium	ODP	137	877	120	752	60	376	47.5	332
	Premium	TEFC	131	897	118	778	59	389	46	237

a. For 380/50/3 applications, 460/60/3 motors are used. Derate nameplate by 0.85 to obtain actual horsepower.

Table 47: 015C to 040C or 800 to 802C, Electric Heat

Model	208/60/3				240/60/3				480/60/3				600/60/3			
	kW	FLA	Steps[a]	Stages[b]	kW	FLA	Steps[a]	Stages[b]	kW	FLA	Steps[a]	Stages[b]	kW	FLA	Steps[a]	Stages[b]
20	14.4	41.4	2	2	19.8	47.6	2	2	19.8	23.8	2	2	19.8	19.0	2	2
40	29.9	83.0	2	2	39.8	95.7	2	2	39.8	47.8	2	2	39.8	38.3	2	2
60	45.1	124.9	4	3	60.0	144.3	4	3	60.0	72.2	2	2	60.0	57.7	2	2
80	59.8	166.0	4	3	79.6	191.5	4	3	79.6	94.7	2	2	79.6	76.6	2	2
100	74.7	207.4	6	3	99.5	239.3	6	3	99.5	119.7	4	3	99.5	95.7	4	3
120	89.7	249.3	6	3	119.4	287.2	6	3	119.4	143.6	4	3	119.4	114.9	4	3
140	—	—	—	—	—	—	—	—	139.1	167.3	4	3	139.1	133.8	4	3
160	—	—	—	—	—	—	—	—	159.2	191.5	4	3	159.2	153.2	4	3
180	—	—	—	—	—	—	—	—	179.1	215.4	6	3	179.1	172.3	6	3
200	—	—	—	—	—	—	—	—	199.0	239.4	6	3	199.0	191.5	6	3
220	—	—	—	—	—	—	—	—	218.7	263.0	6	3	218.7	210.4	6	3
240	—	—	—	—	—	—	—	—	238.8	287.2	6	3	238.8	229.8	6	3

a. Number of fused circuits
b. Number of controlled heat stages from MicroTech II solid-state control system; additional fused circuits controlled by time delay relays.
See Table 5 on page 18 for electric heat availability by unit size.

Table 48: RFS/RPS 045C to 075C or RAH 047C, Electric Heat

Model	208/60/3			240/60/3			480/60/3			600/60/3		
	kW	FLA	Stages	kW	FLA	Stages	kW	FLA	Stages	kW	FLA	Stages
40	29.9	83.0	2	39.8	95.7	2	39.8	47.9	2	39.8	38.3	2
60	45.1	124.9	2	60.0	144.3	2	60.0	72.2	2	60.0	57.7	2
80	59.8	166.0	4	79.6	191.5	4	79.6	95.7	4	79.6	76.6	4
100	74.7	207.4	4	99.5	239.4	4	99.5	119.7	4	99.5	95.7	4
120	89.7	249.3	4	119.4	287.2	4	119.4	143.6	4	119.4	114.9	4
160	119.7	332.0	4	159.2	383.0	4	159.2	191.5	4	159.2	153.2	4
—	—	—	—	—	—	—	199.0	239.4	4	199.0	191.5	4
—	—	—	—	—	—	—	238.8	287.2	6	238.8	229.8	6
—	—	—	—	—	—	—	278.6	335.1	4	278.6	268.1	4
—	—	—	—	—	—	—	318.4	383.0	4	318.4	306.4	4

*Not available on RPS/RFS 808C–135C on 208/240 volt applications.
See Table 5 on page 18 and Table 6 on page 19 for electric heat availability by unit size.

Supply Power Wiring

Table 49: Recommended Power Wiring

Ampacity	No. of power wires per phase	No. of conduits	Wire gauge	Insulation rating (0°C)
30	1	1	10	60
40	1	1	8	60
55	1	1	6	60
70	1	1	4	60
85	1	1	3	60
95	1	1	2	60
130	1	1	1	75
150	1	1	1/0	75
175	1	1	2/0	75
200	1	1	3/0	75
230	1	1	4/0	75
255	1	1	250	75
285	1	1	300	75
310	1	1	350	75
335	1	1	400	75
380	1	1	500	75
400	2	2	3/0	75
460	2	2	4/0	75
510	2	2	250	75
570	2	2	300	75
620	2	2	350	75
670	2	2	400	75
760	2	2	500	75
765	3	3	250	75
855	3	3	300	75
930	3	3	350	75

1. Units require three-phase power supply.
2. Allowable voltage tolerances:
   a. 60 Hertz
      – Nameplate 208V: Min. 187V, Max. 229V
      – Nameplate 230V: Min. 207V, Max. 253V
      – Nameplate 460V: Min. 414V, Max. 506V
      – Nameplate 575V: Min. 518V, Max. 633V
   b. 50 Hertz
      – Nameplate 380V: Min. 360V, Max. 418V
3. Minimum Circuit Ampacity (MCA) Calculation:

NOTE: If a unit is provided with multiple power connections, each must be considered alone in selecting power wiring components.

The MCA is calculated based on the following formulas:

1. Units with cooling and all heating except electric heat MCA = 1.25 × largest load + sum of all other loads
2. On units with electric heat, the MCA is computed both in the cooling mode and the heating mode and the greater of the two values is used.
   a. Heating Mode
      – Electric heat less than or equal to 50 kW MCA = 1.25 (heater FLA + largest motor FLA) + remaining SAF (or RAF/EAF FLA).
      – Electric heat greater than or equal to 50 kW MCA = 1.25 (largest motor FLA) + heater FLA + remaining SAF (or RAF/EAF FLA).

NOTE: The compressor and condenser are not included in this calculation.

   b. Cooling Mode
      – MCA = 1.25 × largest FLA or RLA load + sum of all the other loads

NOTE: Control circuit ampacity does not need to be considered in the calculation for wire sizing ampacity. If the unit is provided with one or more fan section lights, they are powered from the separate 15 amp (minimum), 120V supply required by the NEC for the unit convenience outlet.

3. Size wires in accordance with Table 310-16 or 310-19 of the National Electrical Code.
4. Wires should be sized for a maximum of 3% voltage drop.

Unit Weights

Table 50: RFS/RPS 015C to 040C and RDS 800C to 802C (lbs)

Components	Unit Size					
	RDS 800C				RDS 802C	
	015C and 018C	020C	025C	030C	036C	040C
Unit Configuration [d]						
RPS basic unit [a], standard cond. fan	6737	6774	8030	8051	9353	9800
RPS basic unit [a], quiet cond. fan.	7977	8054	8450	8471	9913	10,360
RDS and RFS basic unit [a]	6205	6205	6213	6213	7041	7041
Economizer	370	370	370	370	370	370
Filter Options — Draw-Through Section						
30% pleated	9	9	9	9	9	9
65% cartridge with prefilter	146	146	146	146	146	146
95% cartridge with prefilter	154	154	154	154	154	154
Filter Options — Blow-Through Section (Final Filters, 95% Cartridge) — Including Liners in the Filter and Discharge Section						
With cooling only, steam, or hot water heat	625	625	625	625	625	625
With gas or electric heat	794	794	794	794	794	794
Supply Air Fan Assembly						
(2) 15" × 6" diameter forward curved	345	345	345	345	—	—
(2) 15" × 15" diameter forward curved	375	375	375	375	—	—
20" diameter airfoil	556	556	556	556	—	—
24" diameter forward curved—LP	—	—	—	—	539	539
24" diameter forward curved—MP	—	—	—	—	569	569
24" diameter airfoil	—	—	—	—	574	574
Evaporator Coils						
3-row, 8 fpi	140	140	224	224	224	233
3-row, 10 fpi	150	150	238	238	238	247
3-row, 12 fpi	160	160	253	253	253	261
4-row, 8 fpi	184	184	273	273	273	281
4-row, 10 fpi	198	198	292	292	292	300
4-row, 12 fpi	211	211	311	311	311	320
5-row, 8 fpi	219	219	324	324	324	332
5-row, 10 fpi	235	235	348	348	348	356
5-row, 12 fpi	252	252	372	372	372	380
Hot Water Heat [b]						
Low capacity	580	580	580	580	580	580
High capacity	630	630	630	630	630	630
Steam Heat [b]						
Low capacity	575	575	575	575	575	575
High capacity	605	605	605	605	605	605
Electric Heat [b]						
20 kW	656	656	656	656	656	656
40 kW	664	664	664	664	664	664
60 kW	668	668	668	668	668	668
80 kW	696	696	696	696	696	696
100 kW	769	769	769	769	769	769
120 kW	777	777	777	777	777	777
140 kW	811	811	811	811	811	811
160 kW	819	819	819	819	819	819
180 kW	841	841	841	841	841	841
200 kW	849	849	849	849	849	849
Gas Furnace [b]						
200, 250, 320, 400 MBh	964	964	964	964	964	964
500, 640 MBh	1041	1041	1041	1041	1041	1041
650, 790 MBh	1155	1155	1155	1155	1155	1155
800, 1000 MBh	1237	1237	1237	1237	1237	1237
Blank or Heating Section						
40", unlined	405	405	405	405	405	405
52", unlined	512	512	512	512	512	512
Accessory Items						
Variable frequency drive—SAF [b]	150	150	150	150	150	150
Variable frequency drive RAF [b]	100	100	100	100	100	100
Insulation and Liners [c]						
Weight per foot of unit length	24	24	24	24	24	24

a. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, discharge plenum, and condensing unit (RPS only).

b. Does not include weight of blank or heating section.

c. Nominal 2", 1.5 lbs. density solid liners, excluding condensing unit section and blank compartment. Weights shown are sufficient for both reciprocating and scroll compressor units.

d. Add 880 lbs for units with (2) energy recovery wheels.

Fan Motor Weights

Table 51: RDT/RFS/RPS 045C to 075C or RAH 047C (lbs)

Components	Unit Size				
	RAH 047C				
	045C	050C	060C	070C	075C
Unit Configuration [c]					
RPS basic unit[a], standard condenser fan	12,440	12,590	12,885	13,450	13,450
RPS basic unit[a], quiet condenser fan	13,001	13,153	13,725	14,304	15,930
RAH and RFS basic unit[a]	9749	9749	9749	9819	9819
RDT basic unit, standard condenser fan[b]	8644	8775	9067	9548	9848
RDT basic unit, quiet condenser fan[b]	9204	9335	9907	10,388	10,968
Filter Options—Draw-Thru Section					
30% pleated	4	4	4	4	4
65% cartridge—std. flow	57	57	57	57	57
– Med. flow	538	538	538	538	538
– High flow	—	—	—	—	—
95% cartridge—std. flow	67	67	67	67	67
– Med. flow	550	550	550	550	550
– High flow	—	—	—	—	—
Filter Options—Blow-Thru Section (Final Filters)[a] — including Liners in Filter and Discharge Plenum					
95% cartridge—std. flow	1083	1083	1083	1083	1083
– Med. flow	1509	1509	1509	1509	1509
– High flow	—	—	—	—	—
Supply Air Fan Assembly					
27" diameter forward curved—LP	919	919	—	—	—
27" diameter forward curved—MP	942	942	—	—	—
27" diameter airfoil	868	868	—	—	—
30" diameter airfoil	965	965	965	965	965
33" diameter airfoil	—	—	1452	1452	1452
Condenser Coil Options					
Copper fins	267	435	435	649	649
Coil guards	—	15	15	23	23
Evaporator Coils—Aluminum Fins, Standard Airflow Face Area					
3-row, 8 fpi	370	370	370	370	370
3-row, 10 fpi	395	395	395	395	395
3-row, 12 fpi	419	419	419	419	419
4-row, 8 fpi	445	445	445	445	445
4-row, 10 fpi	478	478	478	478	478
4-row, 12 fpi	510	510	510	510	510
5-row, 8 fpi	518	518	518	518	518
5-row, 10 fpi	559	559	559	559	559
5-row, 12 fpi	600	600	600	600	600

a. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, discharge plenum, and condensing unit (RPS only). For RPS 015C to 030C and RPS 018C to 030C, cooling section is incorporated in the supply fan section.

b. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, and condensing unit (RPS only). For RPS 015C to 030C and RPS 018C to 030C, cooling section is incorporated in the supply fan section.

c. Add 200 lbs for the 12" wheel option.

d. Does not include weight of heating section.

e. Excluding condensing unit section and blank compartment.

Components	Unit Size				
	RAH 047C				
	045C	050C	060C	070C	075C
Evaporator Coils—Aluminum Fins, High Airflow Face Area					
3-row, 8 fpi	—	1001	1001	1001	1001
3-row, 10 fpi	—	1030	1030	1030	1030
3-row, 12 fpi	—	1059	1059	1059	1059
4-row, 8 fpi	—	1135	1135	1135	1135
4-row, 10 fpi	—	1151	1151	1151	1151
4-row, 12 fpi	—	1166	1166	1166	1166
5-row, 8 fpi	—	1176	1176	1176	1176
5-row, 10 fpi	—	1224	1224	1224	1224
5-row, 12 fpi	—	1272	1272	1272	1272
Evaporator Coil—Copper Fins, Standard Airflow Face Area					
3-row, 8 fpi	591	591	591	591	591
3-row, 10 fpi	671	671	671	671	671
3-row, 12 fpi	750	750	750	750	750
4-row, 8 fpi	739	739	739	739	739
4-row, 10 fpi	845	845	845	845	845
4-row, 12 fpi	951	951	951	951	951
5-row, 8 fpi	886	886	886	886	886
5-row, 10 fpi	1019	1019	1019	1019	1019
5-row, 12 fpi	1151	1151	1151	1151	1151
Evaporator Coil—Copper Fins, High Airflow Face Area					
3-row, 8 fpi	—	1262	1262	1262	1262
3-row, 10 fpi	—	1356	1356	1356	1356
3-row, 12 fpi	—	1450	1450	1450	1450
4-row, 8 fpi	—	1437	1437	1437	1437
4-row, 10 fpi	—	1562	1562	1562	1562
4-row, 12 fpi	—	1687	1687	1687	1687
5-row, 8 fpi	—	1611	1611	1611	1611
5-row, 10 fpi	—	1768	1768	1768	1768
5-row, 12 fpi	—	1924	1924	1924	1924
Hot Water Coil [d]					
1-row	373	373	373	373	373
2-row	449	449	449	449	449
Steam Coil [d]					
1-row, 6 fpi	331	331	331	331	331
1-row, 12 fpi	354	354	354	354	354
2-row, 6 fpi	405	405	405	405	405
Electric Heat [d]					
40 kW	278	278	278	278	278
60 kW	286	286	286	286	286
80 kW	289	289	289	289	289
100 kW	295	295	295	295	295
120 kW	301	301	301	301	301
160 kW	312	312	312	312	312
200 kW	336	336	336	336	336
240 kW	348	348	348	348	348

a. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, discharge plenum, and condensing unit (RPS only). For RPS 015C to 030C and RPS 018C to 030C, cooling section is incorporated in the supply fan section.

b. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, and condensing unit (RPS only). For RPS 015C to 030C and RPS 018C to 030C, cooling section is incorporated in the supply fan section.

c. Add 200 lbs for the 12" wheel option.

d. Does not include weight of heating section.

e. Excluding condensing unit section and blank compartment.

Components	Unit Size				
	RAH 047C				
	045C	050C	060C	070C	075C
Gas Furnace [d]					
200, 250 MBh	319	319	319	319	319
320, 400 MBh	372	372	372	372	372
500, 640 MBh	428	428	428	428	428
650, 790 MBh	512	512	512	512	512
800, 1000 MBh	577	577	577	577	577
Accessory Items					
Variable frequency drive—SAF	150	150	150	150	150
Variable frequency drive—RAF	100	100	100	100	100
Sound attenuator	Consult Factory				
Plenum Options					
Burglar bars—discharge	53	53	53	53	53
Burglar bars—return	73	73	73	73	73
Isolation dampers—discharge	85	85	85	85	85
Isolation dampers—return	112	112	112	112	112
Blank or Heating Section					
4-foot, unlined	574	574	574	574	574
6-foot, unlined	915	915	915	915	915
Insulation Liners [e]					
2", 1.5 lbs., with solid liners: Weight per foot of unit length	25	25	25	25	25

a. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, discharge plenum, and condensing unit (RPS only). For RPS 015C to 030C and RPS 018C to 030C, cooling section is incorporated in the supply fan section.
b. Basic unit consists of energy recovery section, angular filter section with 2" throwaway filters, supply fan section without fan or motor, cooling section without coil, and condensing unit (RPS only). For RPS 015C to 030C and RPS 018C to 030C, cooling section is incorporated in the supply fan section.
c. Add 200 lbs for the 12" wheel option.
d. Does not include weight of heating section.
e. Excluding condensing unit section and blank compartment.

Table 52: Fan Motor Weights

Motor hp	Supply, Exhaust and Return Fan Motor Weight (lbs)	
	Open drip-proof	Totally enclosed
1	39	40
1.5	48	49
2	48	49
3	71	72
5	82	85
7.5	124	140
10	144	170
15	185	235
20	214	300
25	266	330
30	310	390
40	404	510
50	452	570
60	620	850
75	680	910

Roof Curb Weights

Calculate the weight of the unit curb using the following equation and adding additional weights accordingly.

Unit Size	Weight Formula
015C–075C	Base curb wt. (lb.) = 0.74 [170 + 2 × curb length (in.)]

NOTE: Curb length does not include condenser length.

Additional Weights

1. For return plenum with bottom opening, add 91 lbs. (sizes 015–030 or 800 to 802 only)
2. For discharge plenum with bottom opening, add 78 lbs. (sizes 015–030 or 800 to 802 only)
3. For blank compartment out of airstream, add 30 lbs.
4. Cross supports:
   – For curb length greater than 144 in., add 30 lbs.
   – For curb length greater than 288 in., add 60 lbs.
   – For curb length greater than 432 in., add 90 lbs.
   – For curb length greater than 576 in., add 120 lbs.
5. For condenser section support rail (RPS/RDT only), add 139 lbs.

Example of Additional Weights for RPS 030C Unit

Component	Lbs.
Basic unit w/economizer	8,051
Economizer	370
30% efficiency filters	9
20" airfoil supply fan	556
DX coil—5-row 12 fpi, aluminum fins	372
Gas heat—1000 MBh	1237
SAF motor—20 hp	214
RAF motor —15 hp	185
Liners—24 lbs/foot × 23 feet	552
	11,546

Liner Calculations		Feet
Section Length	Energy Recovery	10
	Filter	2
	Supply fan + DX	4.3
	Heat	3.3
	Discharge plenum	3.3
		23

NOTE: For structural purposes, consider roof curb weight.

GENERAL DESCRIPTION

A. Furnish as shown on plans, Daikin RoofPak® Singlezone Heating and Cooling Unit(s) model [RPS] [RFS] [RDT]. Unit performance and electrical characteristics shall be per the job schedule.

B. The complete unit shall be [ETL/MEA] [ETL-Canada] listed. The burner and gas train for the unit furnace shall be [UL] [IRI/FIA] [FM] approved.

C. All components included herein are designed, manufactured and independently tested, rated and certified to meet the seismic compliance standards of the International Building Code. Components designated for use in systems that are life safety, toxic, high hazard, combustible or flammable shall meet the on line, anchorage and load path requirements for life safety as defined in IBC sections 1621.1.6, 1621.3.3,1707.7.2. and IBC Commentary, Volume II, section 1621.1.6, IBC notes pertaining to the release of hazardous material. All components used as part of a system other than the above shall meet as a minimum, all load path and anchorage standards for components as outlined in IBC section 1621.3.3 & 1707.7.2.

   All completed component assemblies shall be clearly labeled for field inspection. Seismic Compliance Labels shall include the manufacturer's identification, designation of certified models, definitive information describing the product's compliance characteristics, and the Independent Certifying Agency's name and report identification.

   In addition to all seismic requirements for IBC Certification listed elsewhere in the project specification, manufacturer's submittals shall include:

   1. Certificate of Compliance from the Independent Certifying Agency clearly indicating that components supplied on this project are included in the component manufacturer's Certificate of Compliance.
   2. Clear installation instructions including all accessory components that are part of the overall component installation.

D. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Units shall be of a modular design with factory installed access sections available to provide maximum design flexibility. Each unit shall be [completely factory assembled and shipped in one piece] [split at the condensing section] and/ or [split (size 36-75C) between the supply fan section and the heat section]. RPS and RDT packaged units shall be shipped fully charged with Refrigerant [22] [407C]. RFR/ RCS split systems and all units split between the evaporator and the condensing section are shipped with a nitrogen holding charge only.

E. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include final balancing of the supply and exhaust fan assemblies, a refrigeration circuit run test, a unit control system operations checkout, [test and adjustment of the gas furnace], a unit refrigerant leak test and a final unit inspection.

F. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

G. Performance: All scheduled capacities and face areas are minimum accepted values. All scheduled amps, kW, and hp are maximum accepted values that allow scheduled capacity to be met.

H. Warranty: The manufacturer shall provide 12-month parts only warranty. [The manufacturer will provided extended 48-month, parts only, warranty on the compressor.] Defective parts will be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

CABINET, CASING AND FRAME

A. Standard double-wall construction for all side wall access doors and floor areas shall be provided with 22 gauge solid galvanized steel inner liners to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick, 3/4-lb. density neoprene coated glass fiber. Unit cabinet shall be designed to operate at total static pressures up to 5.5 inches w.g. Insulation on ceiling and end panels shall be secured with adhesive and mechanical fasteners. [Heavy gauge solid galvanized steel liners shall be provided throughout, allowing no exposed insulation within the air stream. All cabinet insulation, except floor panels, shall be a nominal 2" thick, 1½-lb. density, R6.5, glass fiber.] [A combination of solid and perforated galvanized steel liners shall be provided throughout. Perforated liners to be used in the supply and return air plenums to provide improved sound attenuation. All cabinet insulation, except floor panels, shall be a nominal 2" thick, 1½-lb. density, R6.5, glass fiber.] All floor panels shall include [double wall construction and include a nominal 2" thick, 1½-lb. density, R6.5 glass fiber insulation.] [a minimum 1" thick, 3-lb. density, R4.2 glass fiber glass insulation.]

B. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished surface to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance. Service doors shall be provided on both sides of each section in order to provide user access to all unit components. Service doors shall be constructed of heavy gauge galvanized steel with a gauge, galvanized steel interior liner. All service doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system that is operated by a single, flush-mounted handle. The latch system shall feature a staggered engagement for ease of operation. Removable panels, or doors secured by multiple, mechanical fasteners are not acceptable.

C. The unit base frame shall be constructed of heavy-gauge pre-painted galvanized steel. The unit base shall overhang the roof curb for positive water runoff and shall have a formed recess that seats on the roof curb gasket to provide a positive, weather tight seal. Lifting brackets shall be provided on the unit base with lifting holes to accept cable or chain hooks.

SUPPLY AND RETURN EXHAUST FANS

A. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment. All fan assemblies shall employ solid steel fan shafts. Heavy-duty pillow block type, self-aligning, grease lubricated ball bearings shall be used. Bearings shall be sized to provide an L-50 life at 200,000 hours. The entire fan assembly shall be isolated from the fan bulkhead and mounted on [rubber-in-shear isolators] [spring isolators] [spring isolators with seismic restraints]. [Fixed] [Adjustable] pitch V-belt drives with matching belts shall be provided. V-belt drives shall be selected at [the manufacturer's standard service factor] [1.5 times fan brake horsepower].

B. Fan motors shall be heavy-duty 1800 rpm [open drip-proof (ODP)] [totally enclosed TEFC] type with grease lubricated ball bearings. [Motors shall be high efficiency and meet applicable EPACT requirements.] [Motors shall be premium efficiency.] Motors shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment.

C. **Airfoil supply fans**
Supply fan shall be double width, double inlet (DWDI) airfoil centrifugal fan. All fans shall be mounted using shafts and hubs with mating keyways. Fans shall be Class II type and fabricated from heavy-gauge aluminum. Fan blades shall be continuously welded to the back plate and end rim.

D. **Forward curved supply fans**
Supply fan shall be double width, double inlet forward curved centrifugal fan. All fans shall be mounted using shafts and hubs with mating keyways. The forward curved fan wheel and housing shall be fabricated form galvanized steel and shall be [Class I] [Class II] construction to satisfy the specified application.

E. **Airfoil return/exhaust fans**
A single width, single inlet (SWSI) airfoil centrifugal return air fan shall be provided. The fan shall be Class II construction. The fan wheel shall be Class II construction and fabricated from heavy-gauge aluminum with fan blades continuously welded to the back plate and end rim. The fan shall be mounted using shafts and hubs with mating keyways. Exhaust fans are not acceptable.

F. [The supply air fan and return air fan sections shall be provided with an expanded metal belt guard.]

VARIABLE AIR VOLUME CONTROL

A. An electronic variable frequency drive shall be provided for the supply [and return] air fan. [Two independent drives, one per fan, shall be provided.] Each drive shall be factory installed downstream of the filters in a manner that the drive(s) are directly cooled by the filtered, mixed air stream. Drives shall meet UL Standard 95-5V and the variable frequency drive manufacturer shall have specifically approved them for plenum duty application. The completed unit assembly shall be listed by a recognized safety agency, such as ETL. Drives are to be accessible through a hinged door assembly complete with a single handle latch mechanism. Mounting arrangements that expose drives to high temperature, unfiltered ambient air is not acceptable.

B. The unit manufacturer shall install all power and control wiring. [A manual bypass contactor arrangement shall be provided. The bypass arrangement will allow fan operation at full design cfm, even if the drive has been removed for service]. [Line reactors shall be factory installed for each drive].

C. The supply air fan drive output shall be controlled by the factory installed main unit control system and drive status and operating speed shall be monitored and displayed at the main unit control panel. [The supply and return/exhaust fan drive outputs shall be independently controlled in order to provide the control needed to maintain building pressure control. Supply and return/exhaust air fan drives that are slaved off of a common control output are not acceptable.]

D. All drives shall be factory run tested prior to unit shipment.

ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a [single] [dual] point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, high temperature sensor, and a 115volt receptacle with a separate electrical connection shall also be provided with unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply and return fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance. All 115–600 voltage wire shall be protected from damage by raceways or conduit.

B. [A factory installed and wired marine service light, with switch and receptacle, shall be provided in the supply air and return/exhaust fan section. The separate, main unit service receptacle electrical circuit shall also power the light circuit.]

C. [Part winding start shall be provided for the unit compressors to reduce inrush current at start-up.]

D. [Power factor capacitors shall be factory mounted and wired to the unit compressors. Power factor capacitors shall be selected to provide correction to a minimum of 0.90.]

E. [Phase failure and under voltage protection on three-phase motors shall be provided to prevent damage from single phasing, phase reversal, and low voltage conditions.]

F. [Ground fault protection shall be provided to protect against arcing ground faults.]

G. Further options

1. Factory-mounted smoke detectors shall be factory installed in the [supply air opening] [supply and return air openings]. Smoke detectors to be ionization type, which responds to invisible products of combustion without requiring the sensing of heat, flame or visible smoke. Upon sensing smoke, the unit shall provide a control output for use by building management system.

2. Unit to have factory-mounted UV lights located on the leaving air side of the cooling coil. Unit to have view port to allow for visual indication of operation through UV resistant glass. Unit to have door interlocks on each door accessing UV light. Interlock to kill power to UV light when door is opened.

   Lamp and fixture to consist of a housing, power source, lamp sockets, and lamp. All components are to be constructed to withstand typical HVAC environments and are UL/C-UL listed. Housings are to be constructed of type 304 stainless steel and are to be equipped with both male and female power plugs with one type at each end to facilitate simple fixture-to-fixture plug-in for AC power.

   Power source shall be an electric, rapid-type with overload protections and is to be designed to maximize radiance and reliability at UL/C-UL listed temperatures of 55°F–135°F. Power source will include RF and EMI suppression.

   Sockets shall be medium bi-pin, single click safety, twist lock type and are to constructed of a UVC-resistant poly carbonate.

   Lamp shall be a high output, hot cathode, T8 diameter, medium bi-pin that produces UVGI of 254 nm. Each tube produces the specified output at 500 fpm and air temperatures of 55°F–135°F.

3. A [single] [dual] non-fused disconnect switch[es] shall be provided for disconnecting electrical power at the unit. [The second switch will service the condensing section.] Disconnect switches shall be mounted internally to the control panel and operated by an externally-mounted handle. Externally-mounted handle is designed to prohibit opening of the control panel door without the use of a service tool.

HEATING AND COOLING SECTIONS

Cooling

A. [The cooling coil section shall be installed in a blow-through configuration, downstream of the supply air fan. A factory-tested diffuser shall be used in order to provide air distribution across the cooling coil. A blow-through coil is specified to minimize the impact of fan motor heat.] [The cooling coil section shall be installed in a draw through configuration, upstream of the supply air fan.] The coil section shall be complete with factory piped cooling coil and sloped drain pan. Hinged access doors on both sides of the section shall provide convenient access to the cooling coil and drain pan for inspection and cleaning.

   Submittals must demonstrate that scheduled unit leaving air temperature (LAT) is met, that fan and motor heat temperature rise (TR) have been considered, and scheduled entering air temperature (EAT) equals mixed air temperature (MAT).

   Draw-through cooling—Scheduled EAT equals cooling coil EAT and scheduled unit LAT equals cooling coil LAT plus TR.

   Blow-through cooling—Cooling coil EAT equals scheduled EAT plus TR and scheduled unit LAT equals cooling coil LAT.

Direct expansion (DX) cooling coils shall be fabricated of seamless 1/2" diameter high efficiency copper tubing that is mechanically expanded into high efficiency [aluminum] [copper] plate fins. Coils shall be a multi-row, staggered tube design with a minimum of [3] [4] [5] rows and a maximum of [8] [10] [12] fins per inch. All units shall have two independent refrigerant circuits and shall use an interlaced coil circuiting that keeps the full coil face active at all load conditions.

All coils shall be factory leak tested with high pressure air under water.

B. A [painted galvanized steel,] [stainless steel,] positively sloped drain pan shall be provided with the cooling coil. The drain pan shall extend beyond the leaving side of the coil and underneath the cooling coil connections. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall be connected to a threaded drain connection extending through the unit base. Units with stacked cooling coils shall be provided with a secondary drain pan piped to the primary drain pan.

Hot Water Heating Option

C. A [1] [2] row hot water heating coil shall be factory installed in the unit heat section. Coils shall be fabricated of seamless 5/8" diameter copper tubing that is mechanically expanded into high efficiency HI-F rippled and corrugated aluminum plate fins. All coil vents and drains shall be factory installed. The hot water heat section shall be installed downstream of the supply air fan. A factory-tested diffuser shall be used in order to provide air distribution across the coil. Hinged access doors shall provide convenient access to the coil and valve for inspection and cleaning.

[A factory installed three-way modulating control valve and spring return valve actuator shall provide control of the hot water coil. The valve actuator shall be controlled by the factory installed main unit control system]

[[Ethylene glycol] [propylene glycol] shall be added to the hot water circuit to protect against coil freeze-up.]

[A factory installed, non-averaging type freezestat shall be factory installed to provide some protection against coil freeze-up.]

Coils shall be factory leak tested with high pressure air under water.

Steam Heating Option

D. A [1 row, 6 fin per inch] [1 row, 12 fin per inch] [2 row, 6 fin per inch] fin per inch team heating coil shall be factory installed in the unit heat section. Coils shall be fabricated of seamless 5/8" diameter copper tubing that is mechanically expanded into high efficiency HI-F rippled and corrugated aluminum plate fins. Steam coils shall be of the jet distributing type. The steam heat section shall be installed downstream (RFS/RPS) of the supply air fan. A factory-tested diffuser shall be used in order to provide air distribution across the coil. Hinged access doors shall provide convenient access to the coil and valve for inspection and cleaning.

[A factory installed two-way modulating control valve and spring return valve actuator shall provide control of the steam coil. The valve actuator shall be controlled by the factory installed main unit control system]

[A factory installed, non-averaging type freezestat shall be factory installed to provide some protection against coil freeze-up.]

Coils shall be factory leak tested with high pressure air under water.

Gas Heating Option

E. A natural gas fired furnace shall be installed in the unit heat section. The heat exchanger shall include a type 321 stainless steel cylindrical primary combustion chamber, a type 321 stainless steel header, type 321 stainless steel] secondary tubes and type 321stainless steel turbulators. Carbon and aluminized steel heat exchanger surfaces are not acceptable. The heat exchanger shall have a condensate drain. Clean out of the primary heat exchanger and secondary tubes shall be accomplished without removing casing panels or passing soot through the supply air passages. The furnace section shall be positioned downstream of the supply air fan.

[The furnace will be supplied with a modulating forced draft burner. The burner shall be controlled for low fire start. The burner shall be capable of continuous modulation between 33% and100% of rated capacity and shall operate efficiently at all firing rates.]

[The furnace shall be supplied with a Daikin SuperMod™ forced draft burner capable of continuous modulation between 5% and 100% of rated capacity, without steps. The burner shall operate efficiently at all firing rates. The burner shall have proven open damper low-high-low pre-purge cycle, and proven low fire start. The combustion air control damper shall be in the closed position during the off cycle to reduce losses.]

The burner shall be specifically designed to burn natural gas and shall include a microprocessor based flame safeguard control, combustion air proving switch, prepurge timer and spark ignition. The gas train shall include redundant gas valves, [maximum 0.5psi pressure regulator] [2–3psi high pressure regulator] [5–10psi high pressure regulator], shutoff cock, pilot gas valve, pilot pressure regulator, and pilot cock. The burner shall be rated for operation and full modulation capability at inlet gas pressures down to [7.0. W.C. (models 200–650)] [8.0 in. W.C. (models 790, 800] [9.0 in. W.C. (model 100)].

The gas burner shall be controlled by the factory installed main unit control system.

The burner shall be fired, tested and adjusted at the factory. Final adjustments shall be made in the field at initial startup by a qualified service technician to verify that installation and operation of the burner is according to specifications.

Electric Heating Option

F. Staged electric heating coils shall be factory installed in the unit heat section. Heating coils shall be constructed of a low watt density, high nickel-chromium alloy resistance wire, mechanically stacked and heli-arc welded to corrosion resistant terminals. A corrosion resistant heavy gauge rack shall support the elements. Safety controls shall include automatic reset high limit control for each heater element with manual reset backup line break protection in each heater element branch circuit (Note: Manual reset not provided when ETL-Canada label is provided). Heating element branch circuits shall be individually fused to maximum of 48 Amps per NEC requirements. The electric heat section shall be positioned downstream of the supply air fan.

The electric heat elements shall be controlled by the factory installed main unit control system.

FILTERS

Draw-through Filters

A. Unit shall be provided with a draw-through filter section. The filter section shall be supplied complete with the filter rack as an integral part of the unit. The draw-through filter section shall be provided with [panel] [cartridge] filters.

B. 2" thick AmericanAirFilter 30% efficient pleated panel filters shall be provided. Filters shall be frame mounted and shall slide into galvanized steel racks contained within the unit. Filters shall be installed in an angular arrangement to maximize filter area and minimize filter face velocity. Filters shall be accessible from both sides of the filter section.

C. [12" deep [60-65%] [90-95%] efficient, UL Std. 900, Class 1, AmericanAirFilter cartridge filters shall be provided. 2" panel, 30% efficient pre-filters shall be included. Cartridge filters shall consist of filter media permanently attached to a metal frame and shall slide into a gasketed, extruded aluminum rack contained within the unit. The filter rack shall have secondary gasketed, hinged end panels to insure proper sealing. Filters shall be accessible from both sides of the filter section.]

D. [[30% efficient pleated] [60-65% efficient cartridge] [90– 95% efficient cartridge] filters shall be provided with INTERSEPT® antimicrobial treatment.]

Final Filters Option

E. Final Filters—Unit shall be provided with a final filter section downstream of the supply fan. Unit to have 40" of unit length between the fan discharge and the final filters to allow for proper air distribution. The final filter section shall be supplied complete with the filter rack as an integral part of the unit. The final filter section shall be provided with cartridge filters.

F. [12" deep [60-65%] [90-95%] efficient, UL Std. 900, Class 1, AmericanAirFilter cartridge filters shall be provided. 2" panel, 30% efficient pre-filters shall be included. Cartridge filters shall consist of filter media permanently attached to a metal frame and shall slide into a gasketed, extruded aluminum rack contained within the unit. The filter rack shall have secondary gasketed, hinged end panels to insure proper sealing. Filters shall be accessible from both sides of the filter section.]

G. [Filters shall be provided with INTERSEPT® antimicrobial treatment.]

OUTDOOR / RETURN AIR SECTION

Return Air Plenum

A. Daikin UltraSeal™ low leak dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged horizontally in the hood. Damper leakage shall be less than 0.2% at 1.5 inches static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. [Control of the dampers shall be from a factory installed, two-position actuator.]

B. Unit shall be provided with [a modulating outdoor air economizer section with] an ARI Certified energy recovery wheel. [The economizer section shall include outdoor, return and return exhaust air control and bypass dampers and damper actuators shall be included that automatically bypass outdoor air around the wheel during economizer operation.] Outdoor air shall enter at the back of the section through a factory installed hood capable of handling 100% outdoor air. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same prepainted finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream. Return air shall enter through the bottom of the unit. The entire section shall be double wall construction.

C. 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. Rotors with desiccants coated, bonded, or synthesized onto the media are not acceptable due to delamination or erosion of the desiccant material. Media shall be synthetic to provide corrosion resistance and resistance against attack from laboratory chemicals present in pharmaceutical, hospital, etc. environments as well as attack from external outdoor air conditions. Coated aluminum is not acceptable. Face flatness of the wheel shall be maximized (+/- 0.032 in) in order to minimize wear on inner seal surfaces and to minimize cross leakage. Rotor shall be constructed of alternating layers of flat and corrugated media. Wheel layers should be uniform in construction forming uniform aperture sizes for airflow. Wheel construction shall be fluted or formed honeycomb geometry so as to eliminate internal wheel bypass. Wheel layers that can be separated or spread apart by airflow are unacceptable due to the possibility of channeling, internal bypass or leakage, and performance degradation. The media shall be in accordance with NFPA or UL guidelines. The desiccant material shall be a molecular sieve, and specifically a 4A or smaller molecular sieve to minimize cross contamination. The wheel frames shall consist of evenly spaced steel spokes, galvanized steel outer band and rigid center hub. The wheel construction should allow for post fabrication wheel alignment. The wheel seals shall be brush seals, neoprene bulb seals or equivalent. Seals should be easily adjustable. Cassettes shall be fabricated of heavy duty reinforced galvanized steel. Cassettes shall have a built in adjustable purge section minimizing cross contamination of supply air. Bearings shall be inboard, zero maintenance, permanently sealed roller bearings, or alternatively, external flanged bearings. Drive systems shall consist of fractional horsepower A.C. drive motors with multilink drive belts.

The wheel capacity, air pressure drop, and efficiency shall be tested in accordance with NFPA or UL guidelines and shall be UL recognized or equivalent. The wheel capacity, air pressure drop and effectiveness shall be ARI certified by ARI and its testing agencies. Alternative independent performance testing must be pre-approved to be accepted.

[Wheel shall be provided with variable speed control for frost protection].

D. The wheel recovers energy from the factory-supplied return/exhaust section and includes an SWSI airfoil fan and motor in accordance with construction already specified. Gravity relief dampers and fold out exhaust hood shall be provided. All necessary exhaust fan motor starters, branch short circuit protection, and wiring and controls shall be provided. Two inch, 30% pleated filters shall be provided in both air inlets to protect the wheel from dust and dirt in both the outdoor and return/exhaust air paths. Dampers to be Daikin UltraSeal low leak type, and shall be provided on outdoor or return dampers. Damper blades shall be fully gasketed and side sealed and arranged horizontally in the hood. Damper leakage shall be less than 0.2% at 1.5 inches static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers.

ACCESS SECTION OPTION

A. Unit shall be provided with factory installed access sections located [upstream] [downstream] [upstream and downstream] of the supply air fan, as shown on the unit drawing. Access sections shall have hinged access doors on both sides of the section and shall have the same construction features as the rest of the unit.

Blank Compartment

B. An insulated, blank compartment shall be provided. The section shall be located after the discharge plenum and will be out of the air stream. The section shall be complete with insulation, double wall construction [and a service light].

SOUND ATTENUATOR OPTION

A. A section shall be provided by the air handling unit manufacturer as an integral part of the unit to attenuate fan noise at the source. Variable range of splitter thickness and air passages provided to optimize acoustic performance and energy conservation. The attenuators shall have perforated double-wall construction and be located downstream of the supply fan. Hinged access doors shall be provided on both sides of the section and shall have the same construction as the rest of the unit. [Sound attenuator shall have Tedlar coating for moisture protection]. Combustion rating for the silencer acoustic fill shall not be greater than the following UL fire hazard classification:

Flame Spread 15

Fuel Contributed 0

Smoke Developed 0

Tested in accordance with UL Test Procedure 723.

B. The attenuator rating shall be determined using the duct-toreverberant room test method which provides for airflow in both directions through the attenuator in accordance with latest version of ASTM specification E-477. Insertion Loss Ratings (ILR) shall be:

	Octave Band at Center Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
ILR (no Tedlar)	7	9	22	28	29	29	18	12
ILR (Tedlar coating)	6	10	20	16	14	18	13	12

C. Manufacturer shall provide certified test data on dynamic insertion loss, self-generated sound power levels, and aerodynamic performance for reverse and forward flow test conditions to the design professional in writing as least 10 days prior to the bid.

DISCHARGE AND RETURN PLENUM ACCESSORIES

A. A supply air discharge plenum shall be provided. [The plenum section shall be lined with a perforated acoustic liner to enhance sound attenuation.] The plenum section shall have a [bottom] [side] [front (RFR only)] discharge opening.

B. A combination burglar bar/safety grate shall be provided in the [bottom return air opening] [bottom supply air opening] [bottom return and supply air openings]. Burglar bar/safety grate shall be made of 3/4" diameter ground and polished steel shaft welded to a galvanized steel frame.

C. Isolation dampers shall be provided in the [bottom return air opening] [bottom supply air opening] [bottom return and supply air openings]. [A two-position actuator shall be provided to close the dampers when the fans are not running.]

CONDENSING UNIT SECTION

A. The condensing section shall be open on the sides and bottom to provide access and to allow airflow through the coils. Condenser coils shall be multi-row and fabricated from 3/8" high efficiency rifled copper tubing mechanically bonded to high efficiency aluminum fins. Each condenser coil shall be factory leak tested with high-pressure air under water. [Condenser coil guards shall provide protection from incidental contact to coil fins. Coil guards to be constructed of cross wire welded steel with PVC coating.]

B. Condenser fans shall be direct drive, propeller type designed for low tip speed and vertical air discharge. [Condenser fan rpm shall be 1140 rpm maximum.] [Condenser fans shall have airfoil blades, discharge shrouds for quiet operation, and shall run at 850 maximum rpm.] Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.

C. Each circuit shall have fan cycling of at least one condenser fan to maintain positive head pressure. An ambient thermostat shall prevent the refrigeration system from operating below 45ºF. [SpeedTrol™ condenser fan speed control shall be added to the last fan off on each refrigeration circuit to provide cooling operation to ambient temperatures down to 0°F. Fan speed control shall be field adjustable (size 36-75C only).]

D. Each unit shall have multiple, heavy-duty Copeland scroll compressors. Each compressor shall be complete with gauge ports, crankcase heater, sight-glass, anti-slug protection, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.

E. Each unit shall have two independent refrigeration circuits. Each circuit shall be complete with a liquid line solenoid valve, low pressure control, filter-drier, liquid moisture indicator/sight-glass, thermal expansion valve, liquid line shutoff valve with charging port, discharge line shutoff valve, a manual reset high pressure safety switch, high pressure relief device and pump down switch. The thermal expansion valve shall be capable of modulation from 100% to 25% of its rated capacity. Sight-glasses shall be accessible for viewing without disrupting unit operation.

Each refrigerant circuit shall include a subcooling circuit to provide 15 degrees of liquid subcooling. Each circuit shall be dehydrated and factory charged with Refrigerant [22] [407C] and oil.

F. Refrigeration capacity control shall be accomplished by staging of the unit's multiple compressors. To maintain desired temperature control, the unit shall have a minimum of [three] [four] [six] steps of capacity control.

G. All compressor capacity control staging shall be controlled by the factory installed main unit control system.

H. All compressor capacity control staging shall be controlled by the factory installed main unit control system.

Hot Gas Bypass

I. Hot gas bypass control shall be factory installed on one [both] refrigerant circuits. Hot gas bypass control shall include a modulating hot gas bypass control valve, solenoid valve, all associated piping and be automatically operated by the units microprocessor control.

ROOF CURB

A. A prefabricated 12-gauge galvanized steel, mounting curb, designed and manufactured by the unit manufacturer, shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and rail support of the condensing section. Supply and return opening duct frames shall be provided as part of the curb structure allowing duct connections to be made directly to the curb prior to unit arrival. The curb shall be a minimum of 16" high and include a nominal 2" × 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

CONTROLS

A. Each unit shall be equipped with a complete MicroTech® II microprocessor based control system. The unit control system shall include all required temperature and pressure sensors, input/output boards, main microprocessor and operator interface. The unit control system shall perform all unit control functions including scheduling,], unit diagnostics and safeties. Control sequences shall include [constant air volume, zone temperature control (CAV-ZTC)] [constant air volume, discharge temperature control (CAV-DTC)] [variable air volume, cooling only discharge temperature control (VAV-DTC)] [variable air volume, cooling/modulating heating discharge temperature control (VAV-DTC)] [duct static pressure control], [supply/ return air fan tracking control] and [building static pressure control. All boards shall be individually replaceable for ease of service. All microprocessors, boards, and sensors shall be factory mounted, wired and tested.

B. The microprocessor shall be a stand-alone DDC controller not dependent on communications with any on-site or remote PC or master control panel. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The main microprocessor shall support an RS-232 direct connection to a product service tool or a modem. A [BACnet ethernet] [BACnet MSTP] [LonTalk] communications port shall be provided for direct communication into the BAS network.

D. All digital inputs and outputs shall be protected against damage from transients or wrong voltages. Each digital input and digital output shall be equipped with an LED for ease of service. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The microprocessor memory shall be protected from all voltage fluctuations as well as any extended power failures. The microprocessor shall support an RS-232 direct connect from an IBM PC or 100% true compatible using MicroTech software. The microprocessor shall maintain existing set points and operate stand alone if the rooftop loses either direct connect or network communications.

F. The microprocessor shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications. G

If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

1. Zone sensor with tenant override switch.
2. #1 above plus a heating and cooling set point adjustment. (CAV-ZTC only)

H. The keypad/display character format shall be 20 characters × 4 lines. The character font shall be a 5 × 8 dot matrix. The display shall be a supertwist liquid crystal display (LCD) with black characters on yellow background providing high visibility. The display form shall be in plain English coded formats. Lookup tables are not acceptable.

I. The keypad shall be equipped with 8 individual touch-sensitive membrane key switches. All control settings shall be password protected from changes by unauthorized personnel.

J. [Both a unit-mounted and remote-mounted UI shall be provided. A unit-mounted switch brings either the unit-mounted or remote-mounted UI into control. The control contractor is responsible for wiring between the unit and the remote UI. The maximum wiring distance to the remote UI is 1200 feet. Optical isolation shall protect the main unit controller from remote UI wiring problems. The remote UI shall be provided with the same keypad/display and have identical functionality to the unit-mounted UI.]

K. The display shall provide the following information as required by selected unit options:

1. Supply, outdoor and space air temperature
2. Supply, return, outdoor, and space air temperature
3. Duct and building static pressure; the control contractor is responsible for providing and installing sensing tubes
4. Supply fan and return fan status and airflow verification
5. Supply and return VFD speed
6. Outside air damper position and economizer mode
7. Cooling and heating changeover status
8. Occupied, unoccupied, and dirty filter status
9. Date and time schedules
10. Up to four current alarms and eight previous alarms with time and date

L. The keypad shall provide the following set points as a minimum as required by selected unit options:

1. Supply, outdoor and space air temperature
2. Six control modes including off manual, auto, heat/cool, cool only, heat only, and fan only
3. Four occupancy modes including auto, occupied, unoccupied and bypass (tenant override with adjustable duration)
4. Control changeover based on return air temperature, outdoor air temperature, or space temperature
5. Primary cooling and heating set point temperature based on supply or space temperature
6. Night setback and setup space temperature
7. Cooling and heating control differential (or dead band)
8. Cooling and heating supply temperature reset options based on one of the following: Return air temperature, outdoor air temperature, space temperature, airflow, or external (1-5 VDC) signal
9. Reset schedule temperature
10. High supply, low supply, and high return air temperature alarm limits
11. Ambient compressor and heat lockout temperatures
12. Auto or manual lead lag method on compressors
13. Compressor interstage timers duration
14. Duct and building static pressure
15. Return fan tracking (VaneTrol) settings that include minimum/maximum VFD speed with and without remote exhaust operation
16. Minimum outdoor airflow reset based on external reset (1-5 VFD) percent of cfm capacity, and fixed outdoor damper position
17. Minimum outdoor airflow reset based on DesignFlow direct OA volume measurement, percent of cfm capacity, and fixed outdoor damper position
18. Economizer changeover based on enthalpy, dry bulb or network signal
19. Current time and date
20. Occupied/unoccupied time schedules with allowances for holiday/event dates and duration
21. Three types of service modes including timers normal (all time delays), timers fast (all time delays 20 seconds), and normal

M. Open Communications Protocol-The unit control system shall have the ability to communicate to an independent Building Management System (BMS) through a direct [BACnet ethernet] [BACnet MSTP] [LonTalk] communication connection. The independent BMS system shall have access to [quantity from specification] "read only' variables and [quantity from specification] "read and write" variables. Communications shall not require field mounting of any additional sensors or devices at the unit. [The communications protocol shall be LONMARK 3.3 certified under the [Discharge Air] [Space Comfort] functional profiles.]

The BMS system shall be capable of interacting with the individual rooftop controllers in the following ways:

1. Monitor controller inputs, outputs, set points, parameters and alarms
2. Set controller set points and parameters
3. Clear alarms
4. Reset the cooling and heating discharge air temperature set point (VAV and CAV-DTC units)
5. Reset the duct static pressure set point (VAV units)
6. Set the heat/cool changeover temperature (VAV and CAV-DTC units)
7. Set the representative zone temperature (CAV-ZTC units)

N. It will be the responsibility of the Systems Integrating Contractor to integrate the rooftop data into the BMS control logic and interface stations.

1. Minimum outdoor airflow reset based on DesignFlow direct OA volume measurement, percent of cfm capacity, and fixed outdoor damper position
2. Economizer changeover based on enthalpy, dry bulb or network signal
3. Current time and date
4. Occupied/unoccupied time schedules with allowances for holiday/event dates and duration
5. Three types of service modes including timers normal (all time delays), timers fast (all time delays 20 seconds), and normal

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5. Reset the duct static pressure set point (VAV units)
6. Set the heat/cool changeover temperature (VAV and CAV-DTC units)
7. Set the representative zone temperature (CAV-ZTC units)

P. It will be the responsibility of the Systems Integrating Contractor to integrate the rooftop data into the BMS control logic and interface stations.

EXECUTION

Installation

Install in accordance with manufacturer’s instructions.

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied Representative for warranty details. To find your local Daikin Applied Representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.