TRANE

Product Catalog

Packaged Rooftop Air Conditioners
IntelliPak™ II — S*HJ

90 to 150 Tons — Air-Cooled Condensers
100 to 162 Tons — Evaporative Condensers

October 2014

RT-PRC027T-EN

Ingersoll Rand

Introduction

IntelliPak™ II Rooftops Designed For Today, Tomorrow and Beyond

Built on the legacy of Trane's industry leading IntelliPak, the IntelliPak II 90 to 162 ton platform is designed for the future. Expanded features and benefits, controls enhancements and world class energy efficiencies make the IntelliPak II the right choice for demanding applications today, and tomorrow.

Trane's rooftop unit control module (UCM), an innovative, modular microprocessor control design, coordinates the actions of the IntelliPak II rooftop for reliable and efficient operation and allows for standalone operation of the unit.

Access to the unit controls, via a human interface panel, provides a high degree of control, superior monitoring capability, and unmatched diagnostic information.

Optionally, for centralized building control on-site, or from a remote location, IntelliPak II can be configured for direct communication with a Trane Tracer™ or a 3rd party building management system using LonTalk® or BACnet®. With any of these systems, the IntelliPak II operating status data and control adjustment features can be conveniently monitored from a central location.

The Trane IntelliPak II has the technology and flexibility to bring total comfort to every building space.

Note: *AHRI certifies up to 63 Ton units*

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Revision History

This version includes the addition of the Fault Detection and Diagnostics (FDD) and the AMCA 1A Ultra Low Leak economizer.

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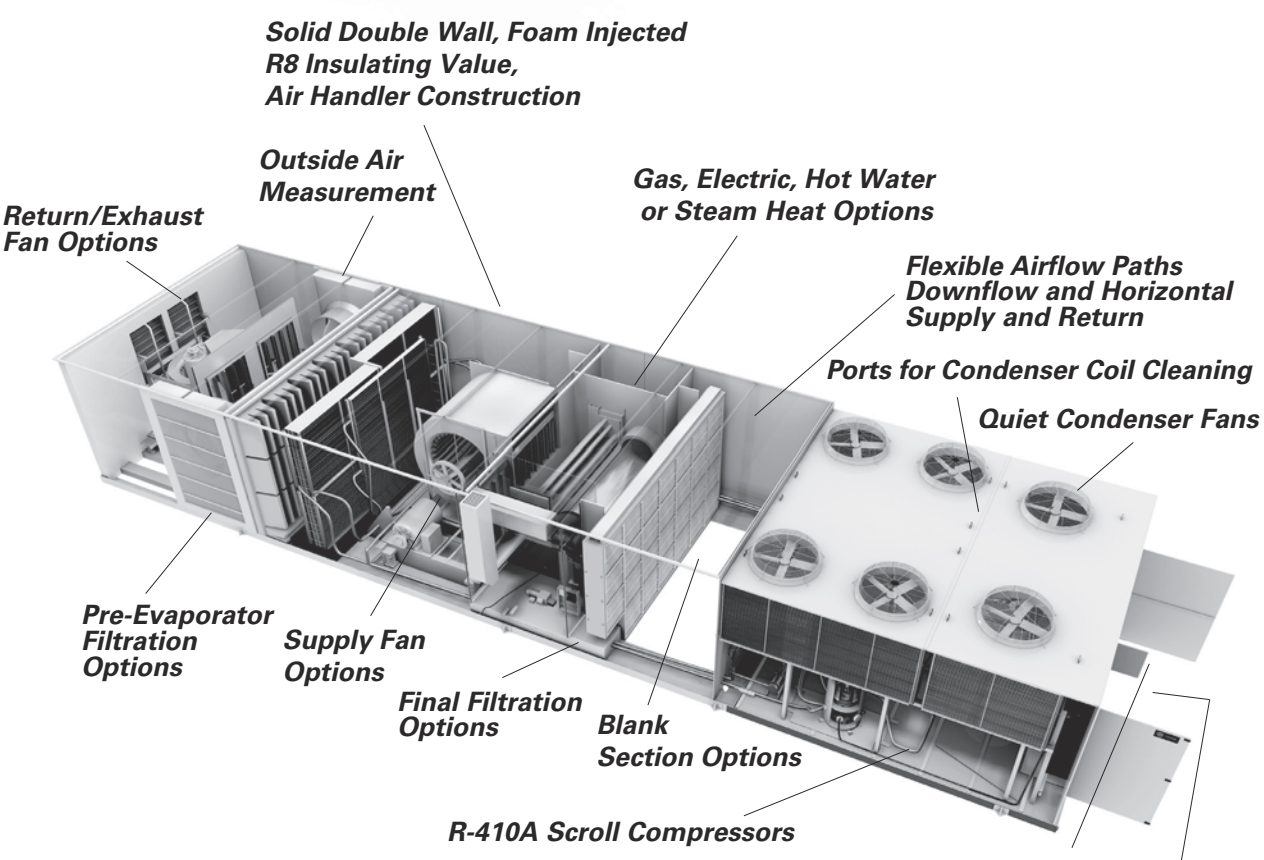
Features & Benefits



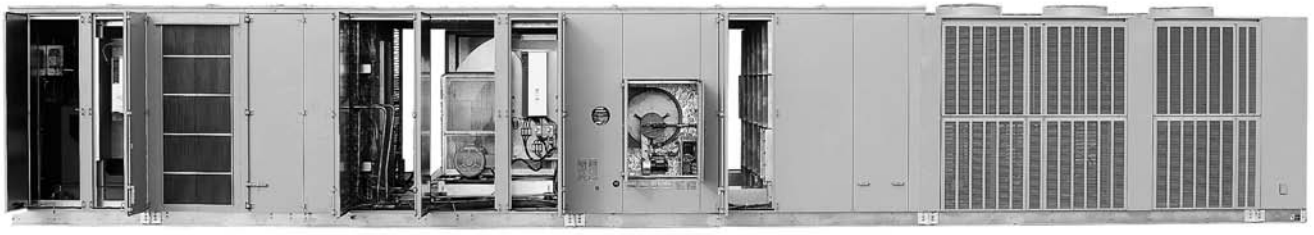
Tried and True Controls Platform—
LonTalk® Communication Flexibility
BACnet® Communication Flexibility
Wireless Comm Interface Option

Single Point Latching, Adjustable Handle Height, Hinged Access Doors on Serviceable Compartments

Single and Multi-Piece Construction for Installation Flexibility

Evaporative Condensing Option Available

Figure 1. Standard unit with 8 ft blank space—panels removed



Standard Features

- 90 to 162 ton industrial/ commercial packaged rooftops
- R-410A HFC Refrigerant
- ASHRAE 90.1 - 2010 Efficiency Compliant
- IBC (International Building Code) Seismic compliance in select configurations
- cULus approval on standard options

Controls

- Fully integrated, factory installed/commissioned microelectronic controls
- Unit mounted human interface panel with a 2 line x 40 character English display and a 16 function keypad that includes custom, diagnostics, and service test mode menu keys
- Low charge indication and lockout
- Superheat monitoring and indication on each circuit
- CV, VAV, or SZVAV control
- Daytime warm-up (Occupied mode) on VAV models and morning warm-up operation on all units with heating options
- Low ambient compressor lockout control on units with economizers
- Frostat coil frost protection on all units
- Supply air static over-pressurization protection on units with VFD's
- Supply airflow proving
- Exhaust/return airflow proving on units with exhaust or return fan options
- Supply air tempering control
- Supply air heating control on SZVAV and VAV units with heat: modulating gas, electric, steam and hot water
- Emergency stop input
- Mappable sensors and setpoint sources
- Occupied/unoccupied switching
- Timed override activation

Figure 2. Human Interface Panel

Refrigeration

- Scroll compressors
- Compressor lead/lag for run- time equalization
- Intertwined evaporator coil circuiting for full face area operation at part load conditions
- Liquid and discharge service valves

Cabinet

- Solid double wall construction with foam injected R8 insulation throughout air handler section
- Single point latching, hinged access doors on control panel, filter, supply and exhaust/return fan section as well as gas heat section
- Flexible downflow and horizontal discharge/return paths
- Double sloped galvanized drain pans
- Extended casing, cooling only models
- Pitched roof over air handler section
- Heavy-gauge, continuous construction base rails
- Meets salt spray testing in accordance to ASTM B117 Standard

Mechanical

- Airfoil supply fan—standard and low CFM
- Totally enclosed condenser fan motors (TEFC)
- Stainless steel flue stack on gas heat units
- Two-inch spring fan isolation standard
- Two-inch MERV 8 high efficiency throwaway filters

Figure 3. Solid double wall

Figure 4. Latching access door

Figure 5. Spring isolation

Optional Features

Controls

- Demand control ventilation (energy saving CO_2 economizer control)
- Twinning of up to four units for applications on common supply and return ducts
- Variable frequency drive (VFD) control of supply/ exhaust/return fan motor
- High duct temperature thermostats
- Low ambient control to 0°F
- LonTalk Communication Interface module
- BACnet Communication Interface module
- Wireless Comm Interface, field installed
- Single Zone VAV
- Rapid Restart
- Five ventilation override sequences

Figure 6. Variable frequency drive

- Generic BAS interfaces—0-5 VDC and 0-10 VDC
- Remote human interface panel (controls up to 4 units)
- SZ VAV - Modulated Supply Fan for more efficient operation
- Rapid Restart - 100% cooling mode after power loss
- Fault Detection and Diagnostics (FDD)

Refrigeration

- High capacity evaporator coils
- Hot gas bypass to the evaporator inlet
- Suction service valves
- Replaceable core filter driers

Cabinet

- Blank section options
  - Four foot blank—cooling only
  - Eight foot blank—cooling and heating
- Two or three-piece construction
- Single point access doors on both sides of the unit
- Double sloped stainless steel drain pans
- Belt guards for supply and exhaust/return fans
- Burglar bars on select configured units

Mechanical

- Hot gas reheat in accordance with ASHRAE Standard 90.1-2001
- Evaporative condensers
- Total energy recovery wheels rated in accordance to ARI Standard 1060
- Airfoil plenum return fan—standard and low CFM
- Modulating plenum return fan with Statitrac™ direct space sensing building pressurization control
- Forward curved exhaust fan—standard and low CFM
- 100 percent modulating exhaust
- 100 percent modulating exhaust with Statitrac™ direct space sensing building pressurization control
- Outside air CFM compensation on SZVAV and VAV units with VFD and economizer
- Trane air quality (Traq™) outside air measurement damper system
- 0-100% modulating outside air economizer
- 0-25% motorized outside air damper
- Low Leak, Standard Ultra Low Leak, and Ultra Low Leak AMCA 1A Economizer dampers

Filtration

- Pre-evaporator coil filter options
- Filter rack only (no filters)
- Two-inch throwaway filters
- 90-95% bag filters

  - 90-95% cartridge filters
- Final filters
  - Bag filters
  - Standard and high temperature cartridge filters
  - Standard and high temperature HEPA filters

Heat Options

- Electric, gas, steam or hot water
- Gas heat options:
  - 10:1 modulating gas heat 850 MBh
  - 20:1 modulating gas heat 1100, 1800, and 2500 MBh
  - 10 year limited warranty on modulating gas heat

Electrical

- Unit interrupt rating of 65000 amp (480V) and 25000 amp (600V)
- Totally enclosed fan-cooled supply and exhaust/return fan motors
- Supply and exhaust/return motors with Internal Shaft Grounding Ring for VFD applications
- EISA-rated supply and exhaust/return fan motors as standard (60 Hz)
- Marine lights in serviceable compartments
- Electrical convenience outlet
- Through the door non-fused disconnect with external handle

Field Installed Accessories

- Roof curbs
- Wireless zone sensor
- Wireless Comm Interface
- Programmable sensors with night setback—CV and VAV
- Sensors without night setback— CV and VAV
- Remote zone sensors—used for remote sensing with remote panels
- ICS zone sensors used with Tracer system for zone control
- Outdoor temperature sensor for units without economizers
- Remote minimum position control for economizer
- Module kits available for field upgrade of controls

Features Summary

IntelliPak II rooftop features make installation and servicing easy and operation extremely reliable.

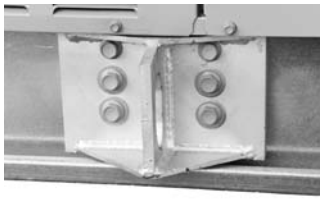
Installation and Service

- Loss of refrigerant charge diagnostics warns of a slightly undercharged situation followed by a warning and a lock out of an undercharged circuit for overall unit performance and compressor protection
- Superheat reading for each circuit displayed at the human interface panel to assist the service technician in troubleshooting
- Microprocessor unit controls coordinate the operation of the rooftop with quality, industry-accepted components for service ease

- Controls are factory installed/commissioned for ease of start up
- Condenser coil cleaning ports conveniently located on the roof of the condenser for efficient servicing
- Full unit points access—no field wiring of required points
- Modularity of unit control design
- Individual replaceable functional boards
- Unit mounted human interface panel standard
  - User-friendly keypad edit parameters
  - Dedicated Human Interface access panel
  - Start up adjustments
  - Advanced diagnostics
- Unit-mounted and remote interface panel key pads are identical
- Single twisted wire pair communication for ICS interface
- Sturdy, double wall, foam injected, hinged access doors with height adjustable single point latches on main compartments for service ease
- Main control box conveniently located on end of unit for layout flexibility in tight spaces
- Built-in, optional features like high withstand rated breakers, belt guards and burglar bars contribute to safety
- Convenience outlet and marine lights for enhanced service capability
- Unit-mounted lifting lugs facilitate installation and can be used as unit tie-down points

Figure 7. Convenience outlet

Figure 8. Lifting lugs



Reliability

- Advanced diagnostics
- Microprocessor controls
- Built-in safeties
- Modular control design
- cULus approval as standard
- All supply, exhaust, and return fans are factory balanced
- Fully insulated floor, roof, panels, and gasketed interfaces reduce ambient air infiltration.
- Fixed-speed evaporator, exhaust/return drives for smooth fan operation and belt durability.
- 200,000 average life fan bearings enhance unit durability.
- Gas heater with free-floating stainless steel heat exchanger relieves the stresses of expansion and contraction. Stainless steel provides corrosion resistance through the entire material thickness.
- Factory-wired and commissioned controls assure efficient and reliable rooftop operation.
- Scroll compressors are designed for tough industrial operation and meet demanding operating conditions both in efficiency and reliability.
- Roll-formed construction enhances cabinet integrity and assures a leak-proof casing.

- AMCA 1A Ultra Low Leak economizer, including linkages and actuators, have a 5 year limited warranty and functional life of 60,000 opening and closed cycles.
- AMCA 1A Ultra Low Leak Economizer includes Fault Detection Diagnostics (FDD) to signal the IntelliPak controls for economizer faults.
- Three-phase, direct-drive totally enclosed condenser fan motors enhance dependability and increase rooftop life.
- Trane industrial quality evaporator and condenser coils help increase rooftop life.

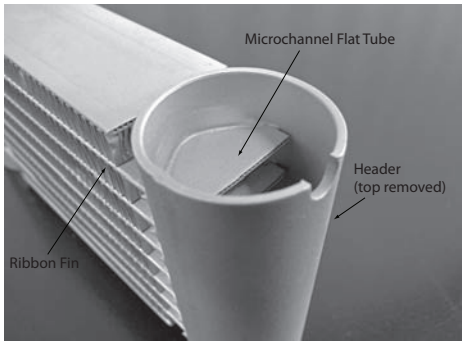
Application Flexibility

- Low CFM fans for low leaving air temperature applications
- Multiple downflow and horizontal air path options
- An array of heating options are available, including electric, natural gas, steam and hot water. The gas heating option provides a choice of two-stage gas heat, as well as full modulating gas heat. Electric heating options provide four to six steps of capacity.
- Indoor Air Quality (IAQ)
  - Traq Damper System for precise outside air measurement
  - Demand Control Ventilation for CO_2 economizer control
  - Compensated outdoor air control
  - Statitrac direct space building pressure control
  - Multiple factory installed filter types, pre evaporator and final filters
  - Humidification control output
  - Comparative enthalpy, reference enthalpy, or dry bulb control for economizers
- Superior building automation interface through LonTalk
- Superior building automation interface through BACnet
- Generic BAS interfaces
- Unit mounted or remote human interface panels
- All parameters are editable from the human interface panel
- Five factory preset ventilation override sequences which can be redefined in the field
- Variable Frequency Drives (VFD) included with or without bypass control for supply and exhaust/return fans
- CV controls stage both compressors and heat based on space requirements

Microchannel Condenser Coils

Microchannel coils are an all aluminum coil that has been successfully used in the automotive industry for many years, and is now being applied in the HVAC industry. The coils have a fully-brazed construction which increases coil rigidity making them more rugged to withstand the rigors of jobsite handling.

Additionally, the light weight simplifies coil handling. The all aluminum construction creates an exceptional heat transfer capability, allowing the refrigerant charge to be reduced to levels that exceed LEED EA-Credit 4 requirements. Bottom line, less refrigerant is being used, which creates a healthier and greener environment.



Energy Savings, Improved IAQ and Comfort

IntelliPak II offers several ways to save energy while improving indoor air quality (IAQ) and zone comfort. Standard factory installed options for energy savings include the energy recovery wheel, hot gas reheat, and evaporative condensers.

Single Zone VAV (SZVAV)

Single Zone VAV (SZVAV) is designed for use in single zone applications such as gymnasiums, auditoriums, manufacturing facilities, retail box stores, and any large open spaces where there is a diversity in the load profile. It is an ideal replacement to "yesterday's" constant-volume (CV) systems, as it reduces operating costs while improving occupant comfort.

SZVAV systems combine Trane application, control and system integration knowledge to exactly match fan speed with cooling and heating loads, regardless of the operating condition. Trane algorithms meet and/or exceed ASHRAE 90.1- 2010 SZVAV energy-saving recommendations and those of CA Title 24. The result is an optimized balance between zone temperature control and system energy savings. Depending on your specific application, energy savings can be as much as 20+%.

Note: *Building system modeling in energy simulation software such as TRACE is recommended to evaluate performance improvements for your application.*

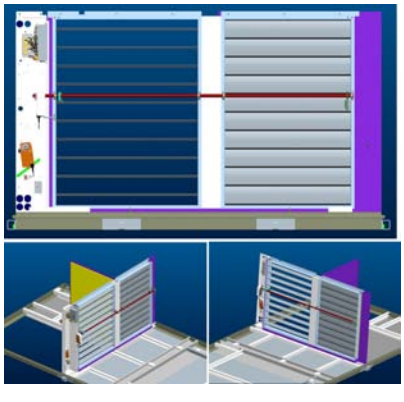
SZVAV is fully integrated into the IntelliPak Control system. It provides the simplest and fastest commissioning in the industry through proven factory-installed, wired, and tested system controllers. All control modules, logic boards and sensors are factory installed and tested to ensure the highest quality and most reliable system available. This means no special programming of algorithms, or hunting at the jobsite for field installed sensors, boards, etc. Single zone VAV is a quick and simple solution for many applications and is available from your most trusted rooftop VAV system solution provider -Trane.

Ultra Low Leak, AMCA 1A Economizer Damper

The pre-engineered design special Ultra Low Leak AMCA 1A Economizer Damper package will meet or exceed requirements of California Title 24, ASHRAE 90.1, and IECC. The economizer, including linkages and actuators, will have a 5 year limited warranty and functional life of 60,000 opening and closed cycles.

Dampers are AMCA 511 Class 1A certified with a maximum leakage rate of 3 CFM/sq-ft at 1.0 in. WC pressure differential. As part of this design special package, Fault Detection and Diagnostics (FDD) control is included to meet California requirements. FDD control monitors the commanded position of the economizer compared to the feedback position of the damper. If the damper position is outside of ±10% of the commanded position, a diagnostic is generated.

Figure 9. Ultra low leak economizer

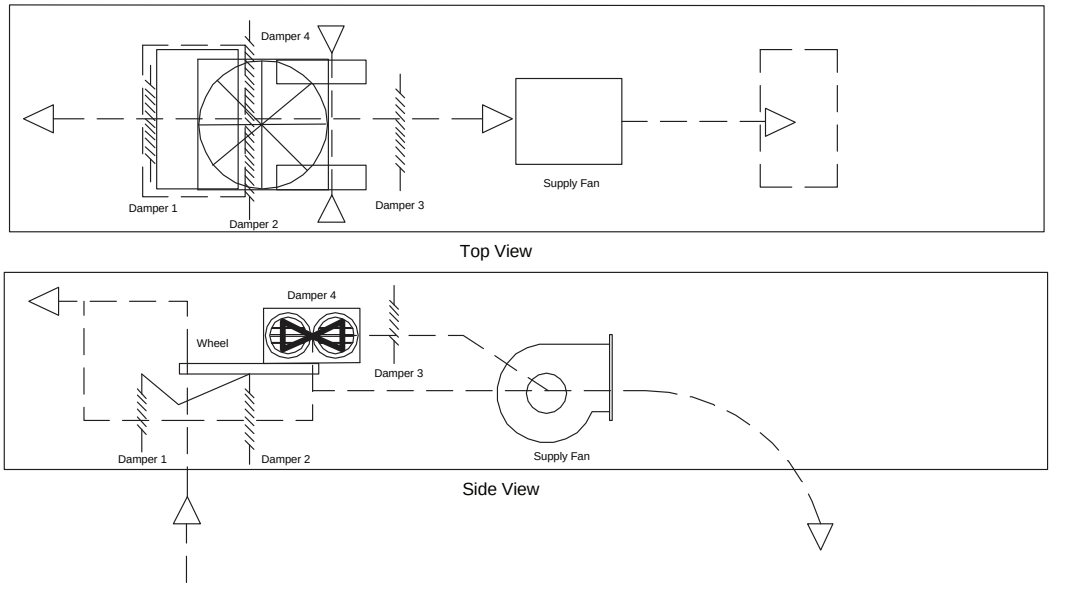


Energy Recovery Wheel

Because the energy recovery wheel has the capability to hold and transfer sensible and latent energy, this option can significantly reduce HVAC system operating energy costs. IntelliPak II offers the total energy wheel option to recover energy from the building exhaust. Benefits of the total energy recovery feature include:

- Energy efficient ventilation to reduce operating costs
- The ability to increase ventilation, allowing for improved indoor air quality (IAQ)
- High efficiency, which permits increased outdoor air quantity without increasing heating or cooling

Figure 10. Energy recovery wheel in economizer mode

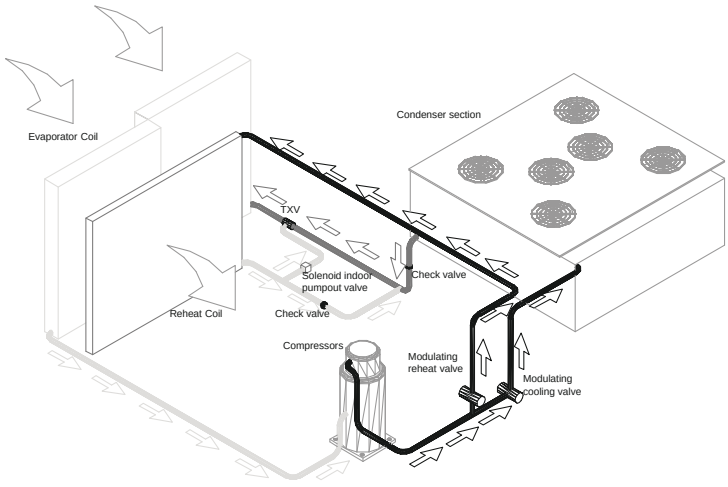


Hot Gas Reheat

By its very nature, the colder the air, the less moisture it contains. With hot gas reheat, the cold air that passes through the DX coil is reheated to an acceptable temperature and returned as dehumidified air to the facility space. The result is both temperature and humidity are maintained while reducing unit operating costs and saving energy.

This energy efficiency helps to meet local energy codes and ASHRAE Standard 90.1 compliance.

Figure 11. Hot gas reheat

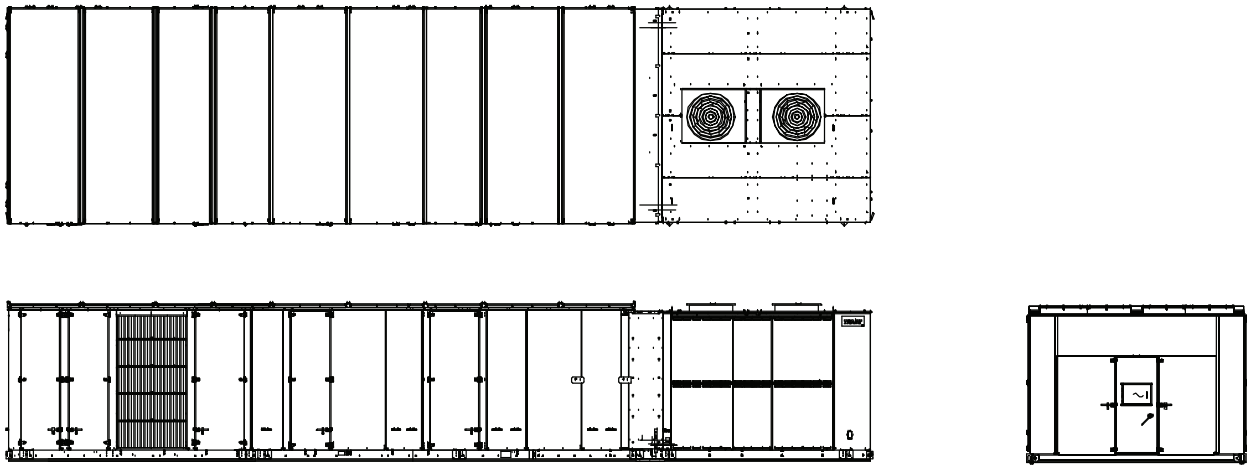


Evaporative Condensing Units

Unlike air-cooled condensers, evaporative condensers are dependent on the ambient wet bulb, rather than dry bulb, temperature. Wet bulb temperature is generally several degrees lower than dry bulb.

Utilizing the lower wet bulb temperature to condense refrigerant vapor can dramatically decrease compressor power consumption by reducing compressor discharge pressure, thereby increasing unit efficiency.

Figure 12. Unit top/left side view—evaporator-cooled condenser



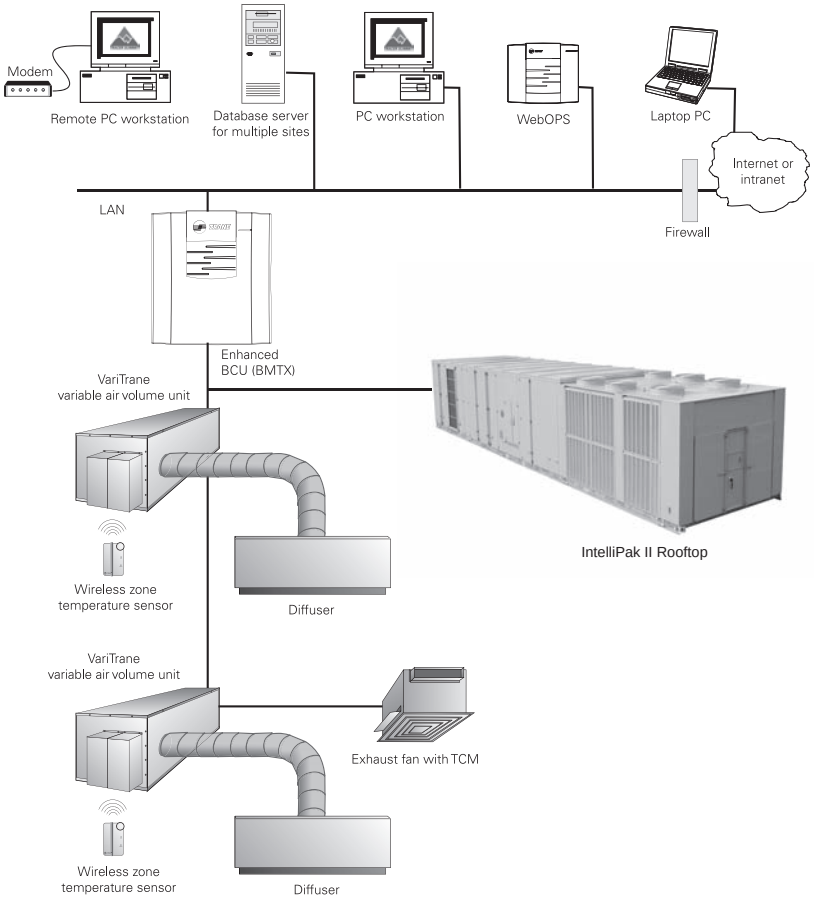
Superior Control Options

Integrated Comfort with Trane Tracer LCI and BCI

The Tracer Integrated Comfort™ System (ICS) or System Controller (SC) improves job profit and increases job control by combining Trane rooftop units with the Trane Tracer building management system. These integrated systems provide total building comfort and control. Some of the primary motivations for building owners/managers in deciding to purchase a HVAC controls system are energy savings, cost control, and the convenience of facility automation.

Simplifying the Comfort System

Figure 13. Trane complete comfort system



Trane technology and innovation brings more capabilities, more flexibility, and offers equipment and systems that are easy to use, easy to install, commission and service. The Tracer Integrated Comfort system and System Controller save time and money by simplifying system design and system installation.

When used with Trane DDC/VAV terminals (or VariTrane), system balancing almost goes away because each VAV box is commissioned and tested before it leaves the factory. All the status information and editing data from the rooftop units, VAV terminals, lighting, exhaust and other auxiliary equipment is available from Tracer for facility control, monitoring and service support.

Tracer, a family of building automation products from Trane, is designed with robust, application specific software packages to minimize custom programming requirements and enable system setup and control through simple editing of parameters in the standard applications software.

When selecting an Integrated Comfort system for a facility, the accountability for equipment, automation and controls lies with Trane. In addition to high quality, high performance, packaged rooftop equipment, Trane provides precise air delivery management with VariTrane VAV terminals. Wireless zone sensors minimize the installation costs of the VariTrane terminals and the packaged rooftop system in general.

The IntelliPak II rooftop, as a part of an Integrated Comfort system or System Controller (SC), provides powerful maintenance monitoring, control and reporting capabilities. The Tracer places the rooftop in the appropriate operating mode for: system on/off, night setback, demand limiting, setpoint adjustment based on outside parameters and much more.

Many different unit diagnostic conditions can be monitored through Tracer: sensor failures, loss of supply airflow, and a compressor trip out. Further, the addition of Building Management Network software offers remote scanning, automatic receipt of alarms, and easy dial-up access to over 100 various Tracer sites across town or across the country.

IntelliPak II rooftops monitoring points available through Tracer

- All active rooftop diagnostics
- history of last 20 unit diagnostics
- All system setpoints
- System sensor inputs
- Supply fan mode and status
- VFD speed
- Unit heat/cool mode
- Exhaust/return fan status
- Exhaust/return damper position
- Economizer position, minimum position setpoint, economizing setpoint
- Refrigerant evaporator and saturated condenser temperatures
- Electric heat stage status
- Ventilation override mode status

Tracer control points

- On/off status of each compressor
- Sensor calibration offsets cooling and heating setpoints
- Zone setpoint offsets for use with demand limiting
- VAV discharge air setpoints
- Supply air pressure setpoint
- Space pressure setpoint
- zone and outdoor temperature values
- Cooling and heating enable/disable
- Economizer enable/disable
- Economizer setpoint
- Economizer minimum position
- Activation of ventilation override modes
- Diagnostics reset
- Unit priority shutdown

Figure 14. Tracer

Setup and configuration information through Tracer

- Supply fan mode
- Configuration of supply air reset
- Ventilation override mode configuration
- Default system setpoint values

Interoperability with LCI and BCI

Integrated Comfort with LonTalk Communication

Trane Tracer LonTalk Control Interface (LCI) for IntelliPak II offers a building automation control system with outstanding interoperability benefits.

LonTalk, which is an industry standard, is an open, secure and reliable network communication protocol for controls, created by Echelon Corporation and adopted by the LonMark Interoperability Association. It has been adopted by several standards, such as: EIA-709.1, the Electronic Industries Alliance (EIA) Control Network Protocol Specification and ANSI/ASHRAE 135, part of the American Society of Heating, Refrigeration, and Air Conditioning Engineer's BACnet control standard for buildings.

Interoperability allows application or project engineers to specify the best products of a given type, rather than one individual supplier's entire system. It reduces product training and installation costs by standardizing communications across products. Interoperable systems allow building managers to monitor and control IntelliPak II equipment with a Trane Tracer Summit or a 3rd party building automation system. It enables integration with many different building controls such as access/intrusion monitoring, lighting, fire and smoke devices, energy management, and a wide variety of sensors (temperature, pressure, light, humidity, occupancy, CO_2 and air velocity). For more information on LonMark, visit www.lonmark.org or Echelon, www.echelon.com.

Integrated Comfort with BACnet Communication

The Trane SC BACnet Control Interface (BCI-I) for IntelliPak II offers a building automation control system with outstanding interoperability benefits. BACnet, which is an industry standard, is an open, secure and reliable network communication protocol for controls, created by American Society of Heating, refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

Interoperability allows application or project engineers to specify the best products of a given type, rather than one individual supplier's entire system. It reduces product training and installation costs by standardizing communications across products. Interoperable systems allow building managers to monitor and control IntelliPak equipment with Tracer SC or a 3rd party building automation system. It enables integration with many different building controls such as access/intrusion monitoring, lighting, fire and smoke devices, energy management, and a wide variety of sensors (temperature, pressure, light, humidity, occupancy, CO_2 and air velocity).

Diagnostic Points:

- All rooftop diagnostics
- System setpoints
- System sensor inputs
- Supply fan mode and status
- VFD speed
- Unit heat/cool mode
- Exhaust/return fan status
- Exhaust/return damper position
- Economizer position, minimum position setpoint, economizing setpoint
- On/off status of each compressor
- Refrigerant evaporator and saturated condenser temperatures
- Hydronic heat valve position
- Electric heat stage status
- Ventilation override mode status

Control Points:

- Cooling and heating setpoints
- Zone setpoint offsets for use with demand limiting
- VAV discharge air setpoints

- Supply air pressure setpoint
- Space pressure setpoint
- Zone and outdoor temperature values
- Cooling and heating enable/disable
- Economizer enable/disable
- Economizer setpoint
- Economizer minimum position
- Activation of ventilation override modes
- Diagnostics reset
- Unit priority shutdown
- Timed override activation

Setup and Configuration:

- Supply fan mode
- Configuration of supply air reset
- Ventilation override mode configuration
- Default system setpoint values
- Sensor calibration offsets

Trane Wireless Comm Interface (WCI)

The Trane Wireless Comm Interface (WCI) is the perfect alternative to BACnet wired communication links (for example, WCI connection between a Tracer SC and a Tracer UC400).

Minimizing communication wires between terminal products, zone sensors, and system controllers has substantial benefits. Installation time and associated risks are reduced. Projects are completed with fewer disruptions. Future re-configurations, expansions, and upgrades are easier and more cost effective.

Optimum Building Comfort Control

The modular control design of the UCM allows for greater application flexibility. Customers can order exactly the options required for the job, rather than one large control package. Unit features are distributed among multiple field replaceable printed circuit boards. The Trane UCM can be setup to operate under one of three control applications:

1. Standalone
2. Interface with Trane Tracer building management system
3. Interface with a generic (non-Trane) building management system. All setup parameters are preset from the factory, requiring less start-up time during installation

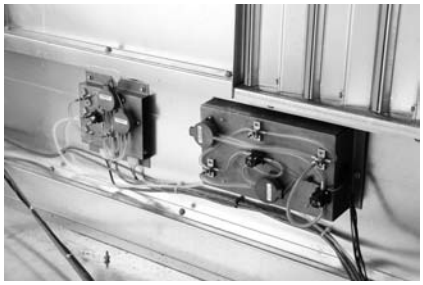
The unit mounted human interface and the remote human interface panels' functions are identical, with the exception of the Service mode which is not available on the remote human interface panel. This common interface feature requires less time for building maintenance personnel to learn to interact with the unit.

All rooftop control parameters are adjustable and can be setup through the remote human interface panel such as, but not limited to: system on/off, demand limiting type, night setback setpoints, and many other setpoints. No potentiometers are required for setpoint adjustment; all adjustments are done through the remote human interface keypad.

Up to 56 different rooftop diagnostic points can be monitored through the human interfaces such as: sensor failures, loss of supply airflow, and compressor trip. No special tools are required for servicing the unit. All diagnostic displays are available in clear English at the remote human interface and will be held in memory, so that the operator/service person can diagnose the root cause of failures.

Statitrac Direct Space Building Pressurization Control

Figure 15. Statitrac



Trane Statitrac control is a highly accurate and efficient method of maintaining building pressure control with a large rooftop air conditioner.

Building space pressurization control is achieved with a 100 percent modulating exhaust system that features a single forward curved fan, with modulating discharge dampers that operates only when needed or a 100% modulating plenum return fan with airfoil wheel that operates continuously with the supply fan.

Most of the operating hours of the 100 percent modulating exhaust system are at part load, resulting in energy savings.

Statitrac, with the 100 percent modulating exhaust system, provides comfort and economy for buildings with large rooftop air conditioning systems. Statitrac, with the 100% modulating plenum return fan provides comfort and space pressure control in more demanding applications with high return static pressure, and applications requiring duct returns.

Statitrac control with exhaust fan is simple! The space pressure control turns the exhaust fans on and off as required and modulates exhaust dampers, or fan speed, to maintain space pressure within the space pressure deadband. Economizer and return air dampers are modulated based on ventilation control and economizer cooling request.

The unit mounted human interface panel can be used to:

1. Adjust space pressure setpoint
2. Adjust space pressure deadband
3. Measure and read building static pressure

The modulating exhaust system maintains the desired building pressure, while saving energy and keeping the building at the right pressure. Proper building pressurization eliminates annoying door whistling, doors standing open, and odors from other zones. The Statitrac direct space building control sequence will also be maintained when a variable frequency drive is used.

Statitrac Control with Plenum Return Fan is State of the Art!

Other manufacturers utilize a fan tracking control scheme whereby the return fan speed tracks the supply fan speed in a linear fashion. This scheme works well at minimum and maximum CFM airflow. However, due to the dissimilar performance characteristics of the supply and return fan, building pressure is difficult to control at points between minimum and maximum CFM airflow.

The Trane return fan/building pressurization control system eliminates the effects of dissimilar supply/return fan characteristics experienced in a linear tracking control system by modulating the exhaust dampers based on space pressure, the return/economizer dampers based on ventilation requirements, and the return fan speed based on return plenum static pressure. The supply fan, return fan, exhaust damper, and return/economizer damper systems act independently from one another to maintain comfort and building pressure.

The return fan operates whenever the supply fan is in operation. The unit exhaust dampers are modulated in response to the space pressure signal to maintain space pressure within the space pressure deadband. The unit economizer and return air dampers are modulated based on ventilation control, minimum outside air economizer position, and economizer cooling request. The return fan speed is modulated based on a return duct static pressure deadband control. Using the unit mounted Human Interface, the operator can:

1. Adjust space pressure setpoint
2. Adjust space pressure deadband

3. Measure and read building space pressure
4. Measure and read return duct static pressure.

Proper building pressurization eliminates annoying door whistling, doors standing open, and odors from other zones.

Variable Frequency Drives (VFD)

Variable Frequency Drives are factory installed and tested to provide supply/exhaust/return fan motor speed modulation. VFD's, as compared to discharge dampers, are quieter, more efficient, and may be eligible for utility rebates. The VFD's are available with or without a bypass option. Bypass control will simply provide full nominal airflow in the event of drive failure.

Rapid Restart

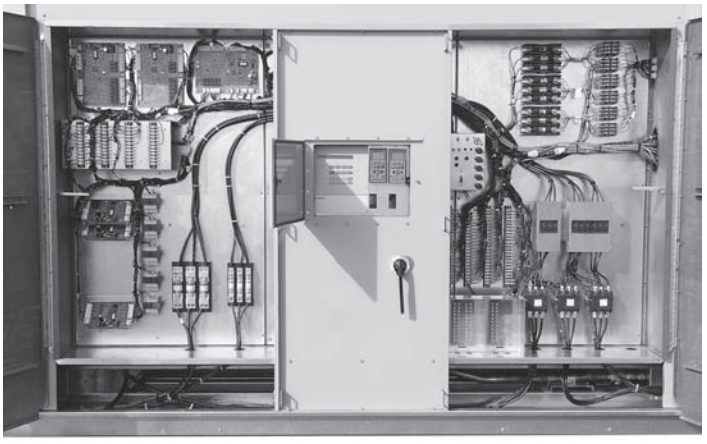
Trane understands that every second counts. Trane equipment, controls, and control sequences are designed to get the system back online and properly functioning should the facility experience a power cycle event.

- Trane HVAC system design is optimized for fast restart.
- IntelliPak Rooftop System controls and equipment provide an integrated, pre-engineered solution for fast restart.
- Proven operational procedures maximize uptime outside of critical outages and get the system up and running as quickly as possible.

With Rapid Restart and use of a backup generator, the IntelliPak Rooftop System can provide full cooling in 120 seconds or less after regaining electrical power. This option is fully integrated into the IntelliPak controls logic via standard human interface. Rapid Restart is a perfect fit in time-sensitive applications where extended down time is not an option and heating/cooling is crucial.

Controls

Figure 16. IntelliPak II control panel



Variable Air Volume (VAV) Only

Note: *When noted in this sequence "human interface panel," the reference is to both the unit mounted and remote mounted human interface panel. All setpoint adjustments can be accomplished at the unit or remote human interface panel.*

Supply Air Pressure Control

Variable Frequency Drive (VFD) Control

Variable frequency drives are driven by a modulating 0-10 VDC signal from the Rooftop Module (RTM). A pressure transducer measures duct static pressure, and the VFD is modulated to maintain the supply air static pressure within an adjustable user-defined range. The range is determined by the supply air pressure setpoint and supply air pressure deadband, which are set through the human interface panel or BAS/Network.

Variable frequency drives provide supply fan motor speed modulation. The drive will accelerate or decelerate as required to maintain the supply static pressure setpoint. When subjected to high ambient return conditions the VFD will reduce its output frequency to maintain operation. Bypass control is offered to provide full nominal airflow in the event of drive failure.

Supply Air Static Pressure Limit

The opening of VAV terminals, and the amount of supply air provided by the variable frequency drive are coordinated during start up and transition to/from Occupied/Unoccupied modes to prevent over pressurization of the supply air ductwork. However, if for any reason the supply air pressure exceeds the user-defined supply air static pressure limit that was set at the human interface panel, the supply fan and VFD are shut down. The unit is then allowed to restart three times. If the over pressurization condition occurs on the third time, the unit is shut down and a manual reset diagnostic is set and displayed at the human interface panel and BAS/network.

Supply Air Temperature Controls

Cooling/Economizer

During Occupied cooling mode of operation, the economizer (if available) and mechanical cooling are used to control the supply air temperature. The supply air temperature setpoint and deadband are user-defined at the human interface panel. The supply air temperature setpoint may be user-defined from the BAS/network. If the conditions of the outside air are appropriate to use "free cooling," the economizer will first be used in an attempt to satisfy the supply air setpoint; then, if

required, the mechanical cooling will be staged on to maintain supply air temperature setpoint. Minimum On/Off timing of the mechanical cooling prevents rapid cycling.

On units with economizer, a call for cooling will modulate the outside air dampers open. The rate of economizer modulation is based on deviation of the supply air temperature from setpoint, i.e., the further away from setpoint, the faster the outside air damper will open. First stage of cooling will be allowed to start after the economizer reaches full open.

Note: *The economizer is only allowed to function freely if one of the following conditions is met. For dry bulb economizer control the ambient temperature must be below the dry bulb temperature control setting. For reference enthalpy economizer control, outdoor air enthalpy must be below the enthalpy control setting. At outdoor air conditions above the enthalpy control setting, mechanical cooling only is used and the outside air dampers remain at minimum position. For comparative enthalpy economizer control, outdoor air enthalpy must be below the enthalpy of the return air.*

If the unit does not include an economizer, mechanical cooling only is used to satisfy cooling requirements. The outdoor air dampers may be set for a maximum of 25% outdoor air, through the unit mounted human interface panel or a signal from the BAS/network, if the rooftop is equipped with 0 to 25% motorized outside air dampers.

Heating

Modulating Gas

Upon a call for heating, the HEAT module closes the heating contacts, beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a 60 second pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition.

Once ignited, as additional heat is required, the combustion air damper opens, increasing the firing rate.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be locked out until reset at the unit mounted Human Interface panel.

As the heating requirement is satisfied, the HEAT module will modulate the combustion air damper closed and the firing rate will lower to maintain the desired outlet temperature. When the requirement is fully satisfied, the heating contacts are opened, de-energizing the heat. The specific sequence of operation of the gas heat will depend on the size of the heat exchanger.

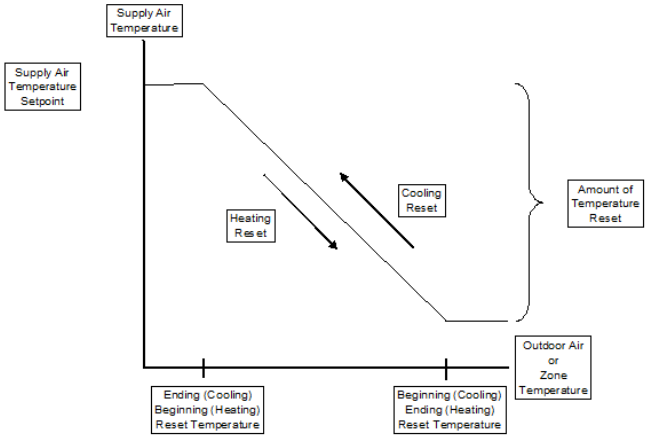
Electric Heating

The individual stages of electric heat will be sequenced on the zone demand. The number of available stages will depend on the unit size and heat capacity selected.

Hot Water or Steam

On units with hot water or steam heating, the supply air temperature can be controlled to a heating setpoint during the Occupied mode. The supply air temperature heating setpoint and deadband are user-defined at the Human Interface Panel. VAV Occupied heating on hot water and steam heat units is enabled by closing a field-supplied switch or On units with hot water or steam heating, the supply air temperature can be controlled to a heating setpoint during the Occupied mode. The supply air temperature heating setpoint and deadband are user-defined at the Human Interface Panel. VAV Occupied heating on hot water and steam heat units is enabled by closing a field-supplied switch or contacts connected to an changeover input on the RTM.

Figure 17. Supply air temperature reset



Supply Air Setpoint Reset

Supply air setpoint reset can be used to adjust the supply air temperature setpoint on the basis of a zone temperature or on outdoor air temperature. Supply air setpoint reset adjustment is available from the Human Interface Panel for supply air heating and supply air cooling control.

Outdoor air cooling reset is sometimes used in applications where the outdoor temperature has a large effect on building load. When the outside air temperature is low and the building cooling load is low, the supply air setpoint can be raised, thereby preventing subcooling of critical zones. This reset can lower usage of mechanical cooling, thus savings in compressor kW, but an increase in supply fan kW may occur.

Outdoor air heating reset is the inverse of cooling, with the same principles applied.

For both outdoor air cooling reset and heating reset, there are three user-defined parameters that are adjustable through the Human Interface Panel:

- Beginning reset temperature
- Ending reset temperature
- Amount of temperature reset

Zone reset is applied to the zone(s) in a building that tend to over cool or overheat. The supply air temperature setpoint is adjusted based on the temperature of the critical zone(s). This can have the effect of improving comfort and/or lowering energy usage. The user-defined parameters are the same as for outdoor air reset. See Figure 16, p. 16

Supply Air Tempering

Modulating gas, electric, hot water and steam heat units only—when supply air temperature falls below the supply air temperature deadband low end, the heat valve is modulated open to maintain the set minimum supply air temperature.

Zone Temperature Control

Unoccupied Zone Heating and Cooling

During Unoccupied mode, the unit is operated as a CV unit. VFDs operate at 100% and VAV boxes are driven full open. The unit controls zone temperature within the Unoccupied zone cooling and heating (heating units only) setpoints.

Daytime warm-up

This feature is available on all types of heating units. During Occupied mode, if the zone temperature falls to a preset, user-defined zone low limit temperature setpoint, the unit is put into Unoccupied mode and Daytime Warm-up is initiated. The system changes over to CV heating (full unit airflow), the VAV boxes are fully opened and full heating capacity is provided until the Daytime Warm-up setpoint is reached. The unit is then returned to normal Occupied mode.

Outside Air Measurement

Trane air quality (Traq) outside air measurement damper system utilizes velocity pressure sensing rings. Based on unit design CFM, the ventilation control module (VCM) monitors and controls the quantity of outside air entering the unit. The outside airflow can be calibrated to accommodate for altitude.

a. An optional temperature sensor may be connected to the ventilation control module to enable it to control a field-installed pre-heater.

b. An optional CO_2 sensor may be connected to the ventilation control module to control outside air based on CO_2 Demand Control Ventilation (DCV).

Outside Air CFM Compensation

As the supply fan modulates, this function proportionally adjusts the economizer minimum position to compensate for the change in total airflow, in order to maintain a constant percent of outside air. The modified economizer minimum position is computed as a linear function, based on VFD position, given the two endpoints,

a. Minimum Position with VFD @ 0%

b. Minimum Position with VFD @ 100%

Both are user adjustable at the Human Interface Panel.

Single Zone Variable Air Volume (SZVAV) Only

The IntelliPak controls platform will support Single Zone VAV as an optional unit control type in order to meet ASHRAE 90.1. The basic control will be a hybrid VAV/CV configured unit that provides discharge temperature control to a varying discharge air temperature target setpoint based on the space temperature and/or humidity conditions. Concurrently, the unit will control and optimize the supply fan speed to maintain the zone temperature to a zone temperature setpoint.

Supply Fan Output Control

Units configured for Single Zone VAV control will utilize the same supply fan output control scheme as on traditional VAV units except the VFD signal will be based on zone heating and cooling demand instead of the supply air pressure.

VFD Control

Single Zone VAV units will be equipped with a VFD-controlled supply fan which will be controlled via a 0-10 VDC signal from the Rooftop Module (RTM). With the RTM supply fan output energized and the RTM VFD output at 0 VDC, the fan speed output is 37% (22Hz) from the VFD by default; and at 10 VDC the fan speed output is 100% (60Hz). The control scales the 0-10 VDC VFD output from the RTM linearly to control between the 37-100% range. The VFD will modulate the supply fan motor speed, accelerating or decelerating as required to maintain the zone temperature to the zone temperature setpoint. When subjected to high ambient return conditions the VFD will reduce its output frequency to maintain operation. Bypass control is offered to provide full nominal airflow in the event of drive failure.

Ventilation Control

Units configured for Single Zone VAV control will require special handling of the OA Damper Minimum Position control in order to compensate for the non-linearity of airflow associated with the variable supply fan speed and damper combinations. Units configured for TRAQ with or without DCV will operate identically to traditional units with no control changes.

Space Pressure Control

For units configured with Space Pressure Control with or without Statitrac, the new schemes implemented for economizer minimum position handling require changes to the existing Space Pressure Control scheme in order to prevent over/under pressurization. The overall scheme will remain very similar to VAV units with Space Pressure Control with the exception of the dynamic Exhaust Enable Setpoint.

For SZVAV an Exhaust Enable Setpoint must be selected during the 100% Fan Speed Command. Once selected, the difference between the Exhaust Enable Setpoint and Design OA Damper Minimum Position at 100% Fan Speed Command will be calculated. The difference calculated will be used as an offset and added to the Active Building Design OA Minimum Position Target in order to calculate the dynamic Exhaust Enable Target, which will be used throughout the Supply Fan Speed/OA Damper Position range.

The Exhaust Enable Target could be above or below the Active Building Design OA Minimum Position Target Setpoint, based on the Active Exhaust Enable Setpoint being set above or below the Building Design Minimum Position at 100% Fan Speed Command. Note that an Exhaust Enable Setpoint of 0% will result in the same effect on Exhaust Fan control as on VAV applications with and without Statitrac.

Occupied Cooling Operation

For normal cooling operation, cooling capacity will be staged or modulated in order to meet the calculated discharge air target setpoint. If the current active cooling capacity is controlling the discharge air within the deadband, no additional cooling capacity change will be requested. As the Discharge Air Temperature rises above the deadband, the algorithm will request additional capacity as required (additional compressors or economizer). As the Discharge Air Temperature falls below the deadband, the algorithm will request a reduction in active capacity.

Default Economizer Operation

By default, the unit will be setup to optimize the minimum supply fan speed capability during Economizer Only operation. If the economizer is able to meet the demand alone, due to desirable ambient conditions, the supply fan speed will be allowed to increase above the minimum prior to utilizing mechanical cooling if discharge air setpoint falls below the discharge air Lower Limit (Cooling) setpoint.

Unoccupied Mode

In Unoccupied periods the unit will utilize setback setpoints, 0% Minimum OA Damper position, and Auto Fan Mode operation as on normal Constant Volume units. The Supply Fan speed will be forced to 100% for all active heating and cooling requests in this mode.

Occupied Heating Operation

Occupied heating operation will utilize two separate control methodologies based on heating configurations. For all "Staged" Heating types, the unit will utilize full airflow during all active heating periods exactly like traditional Constant Volume units. For "Modulating" Heating types the unit will have the ability to utilize SZVAV Heating, much like Active Cooling, in order to maintain the Zone Temperature to the Zone Heating setpoint. Also, on units configured with a Modulating Heat type, the customer will have the ability to select between the new SZVAV Heating control, or to utilize traditional Constant Volume, full airflow heating based on the associated unit setup.

Compressor (DX) Cooling

Compressor control and protection schemes will function identical to that of a traditional unit. Normal compressor proving and disable input monitoring will remain in effect as well as normal 3-minute minimum on, off, and inter-stage timers. Also, all existing head pressure control schemes will be in effect.

Cooling Sequence

If the control determines that there is a need for active cooling capacity in order to meet the calculated discharge air target setpoint, once supply fan proving has been made, the unit will begin to stage compressors accordingly. Note that the compressor staging order will be based on unit configuration and compressor lead/lag status.

Once the discharge air target setpoint calculation has reached the Minimum Setpoint and compressors are being utilized to meet the demand, as the discharge air target setpoint value continues to calculate lower the algorithm will begin to ramp the supply fan speed up toward 100%. Note that the supply fan speed will remain at the compressor stage's associated minimum value (as described below) until the discharge air target setpoint value is calculated below the discharge air temperature Minimum Setpoint (limited discharge air target setpoint).

As the cooling load in the zone decreases the zone cooling algorithm will reduce the speed of the fan down to minimum per compressor stage and control the compressors accordingly. As the compressors begin to de-energize, the supply fan speed will fall back to the Cooling Stage's associated minimum fan speed, but not below. As the load in the zone continues to drop, cooling capacity will be reduced in order to maintain the discharge air within the ±½ discharge air target deadband.

Constant Volume (CV) Only

Occupied Zone Temperature Control

Cooling/Economizer

During Occupied cooling mode, the economizer (if provided) and mechanical cooling are used to control zone temperature. The zone temperature cooling setpoint is user-defined at the Human Interface Panel or from the BAS/Network. If the conditions of outside air is appropriate to use "free cooling", the economizer will be used first to attempt to satisfy the cooling zone temperature setpoint; then the compressors will be staged up as necessary. Minimum on/off timing of compressors prevents rapid cycling.

On units with economizer, a call for cooling will modulate the outside air dampers open. The rate of economizer modulation is based on deviation of the zone temperature from setpoint, i.e., the further away from setpoint, the faster the outside air damper will open. First stage of cooling will be allowed to start after the economizer reaches full open.

Note: *The economizer is only allowed to function freely if one of the following conditions is met: For dry bulb economizer control, the ambient temperature must be below the dry bulb temperature control setting. For reference enthalpy economizer control, outdoor air enthalpy must be below the enthalpy control setting. At outdoor air conditions above the enthalpy control setting, mechanical cooling only is used and the outdoor air dampers remain at minimum position. For comparative enthalpy economizer control, outdoor air enthalpy must be below the enthalpy of the return air.*

If the unit does not include an economizer, mechanical cooling only is used to satisfy cooling requirements.

The outdoor air dampers may be set for a maximum of 25% outdoor air, through the unit mounted Human Interface Panel or a signal from the BAS/network, if the rooftop is equipped with 0 to 25% motorized outside air dampers.

Heating

Gas Heating: Two-Stage

Upon a call for heating, the HEAT module closes the first stage heating contacts beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a 60 second pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition. As additional heat is required, the HEAT module will close the second stage heating contacts and depending on heat module size, will open either the second stage of the gas valve, or a second stage gas valve.

During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down. On the low heat for all unit sizes and the medium heat for the 90 and 105 ton, after a one minute delay, plus another 60 second pre-purge cycle the ignition cycle begins. On all other heat sizes the heating section will be shutdown and locked out until manually reset at the ignition module and unit mounted Human Interface Panel after the first shutdown due to flame instability.

As the heating requirement is satisfied, the HEAT module will open the second stage heating relay, de-energizing the second stage of heat. When the requirement is fully satisfied, the first stage contacts are opened, de-energizing the first stage of heat.

Gas Heating: Modulating Gas

Upon a call for heating, the HEAT module closes the heating contacts, beginning the firing sequence. First, the heat exchanger combustion blower begins operation. Upon positive proving of combustion airflow, a pre-purge cycle is executed. Then the ignition sequence takes place.

If ignition is not proven, the safety control locks out and must be manually reset. As long as there is a call for heat, the safety control can be reset, which starts another purge cycle and try for ignition.

Once ignited, as additional heat is required, the combustion air damper opens, increasing the firing rate. During heating operation, an electronic flame safety control provides continuous flame supervision. If combustion should become unstable for any reason, heating will automatically shut down and be blocked out until reset at the unit mounted Human Interface panel.

As the heating requirement is satisfied, the HEAT module will modulate the combustion air damper closed, and the firing rate will lower to maintain the desired outlet temperature. When the requirement is fully satisfied, the heating contacts are opened, de-energizing the heat. The specific sequence of operation of the gas heat will depend on the size of the heat exchanger.

Electric Heating

The individual stages of electric heat will be sequenced on the zone demand. The number of available stages will depend on the unit size and heat capacity selected.

Hot Water or Steam Heating

Upon a call for heat, the UCM will send a varying voltage signal to the valve actuator. The valve will modulate to meet building demand as indicated by the voltage signal. When heating is satisfied, the valve will modulate closed. A temperature sensor is located on the coldest section of the coil. When it senses an impending freeze condition, a signal is sent to the hydronic valve to drive it full open. If the supply fan is on, or if the outside air damper is open when this freezing condition is sensed, the supply fan is turned off and the outside air damper is closed.

Supply Air Tempering

For staged gas and electric heat units in the occupied Heating mode but not actively heating, if the supply air temperature drops to 10°F below the Occupied zone heating temperature setpoint, one stage of heat will be brought on to maintain a minimum supply air temperature. The heat stage is

turned off if the supply air temperature rises to 10°F above the Occupied zone heating temperature setpoint. On units with hot water or steam heating, if the supply air temperature drops below 48°F, the heating valve is modulated to maintain 50°F supply air temperature with a 4°F deadband.

Auto Changeover

When the System Mode is "Auto," the mode will change to cooling or heating as necessary to satisfy the zone cooling and heating setpoints. The zone cooling and heating setpoints can be as close as 2°F apart.

Unoccupied Zone Temperature Control

Cooling and Heating

Cooling and/or heating modes can be selected to maintain Unoccupied zone temperature setpoints. For Unoccupied periods, heating, economizer operation or compressor operation can be selectively locked out at the Human Interface Panels.

CV, SZVAV, and VAV

Note: *SZVAV exceptions are noted in parenthesis.*

Space Pressure Control - Statitrac

A pressure transducer is used to measure and report direct space (building) static pressure. The user-defined control parameters used in this control scheme are space static pressure setpoint, space pressure deadband and exhaust enable point. As the economizer opens, the building pressure rises and once above the exhaust enable point, enables the exhaust fan and dampers or exhaust VFD. The exhaust dampers or VFD then modulate to maintain space pressure within the deadband.

Morning Warm-up Options (Not applicable to SZVAV)

This feature may be enabled on all types of factory installed heat units as well as cooling only units configured as "External Heat" (for example, VAV boxes with reheat). At the conclusion of Unoccupied mode, while the economizer (if supplied) is kept closed, the selected zone is heated to the user-defined Morning Warm-up setpoint. The unit is then released to Occupied mode. There are two types of Morning Warm-up: full capacity or cycling capacity.

1. Full Capacity Morning Warm-up (MWU)

Full capacity Morning Warm-up uses full heating capacity, and heats the zone up as quickly as possible. Full heating capacity is provided until the Morning Warm-up setpoint is met. At this point, the unit is released to occupied mode.

2. Cycling Capacity Morning Warm-up (MWU)

Cycling capacity Morning Warm-up provides a more gradual heating of the zone. Normal zone temperature control with varying capacity is used to raise the zone temperature to the MWU zone temperature setpoint. This method of warm-up is used to overcome the "building sink" effect. Cycling capacity MWU will operate until the MWU setpoint is reached or for 60 minutes, then the unit switches to Occupied mode. A control algorithm is used to increase or decrease the amount of heat in order to achieve the MWU zone temperature setpoint.

Note: *When using the Morning Warm-up option in a VAV heating/cooling rooftop, airflow must be maintained through the rooftop unit. This can be accomplished by electrically tying the VAV boxes to the VAV box output relay contacts on the Rooftop Module (RTM) or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory heating of the building.*

Emergency Override

When a LonTalk or BACnet communication module is installed, the user can initiate from theTrane Tracer Summit (in the case of LCI), Tracer SC or 3rd Party BAS (with either BCI or LCI) one of five (5) predefined, not available to configure, Emergency Override sequences. All compressors, condenser fans and the Humidification output are deenergized for any Emergency Override sequence. Each Emergency Override sequence commands the unit operation as follows:

1. PRESSURIZE_EMERG:
   - Supply Fan - On
   - Supply Fan VFD - Max (if so equipped)
   - Exhaust Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - OA Dampers - Open; Return Damper - Closed
   - Heat - All heat stages off; Mod Heat output at 0 VDC
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - Return VFD - Min (if so equipped)
2. EMERG_DEPRESSURIZE:
   - Supply Fan - Off
   - Supply Fan VFD - Min (if so equipped)
   - Exhaust Fan - On; Exhaust Dampers - Open/Max (if so equipped)
   - OA Dampers - Closed; Return Damper - Open
   - Heat - All heat stages off; Mod Heat output at 0 VDC
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - On; Exhaust Dampers - Open (if so equipped)
   - Return VFD - Max (if so equipped)
3. EMERG_PURGE:
   - Supply Fan - On
   - Supply Fan VFD - Max (if so equipped)
   - Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
   - OA Dampers - Open; Return Damper - Closed
   - Heat - All heat stages off; Mod Heat output at 0 VDC
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - On; Exhaust Dampers - Open (if so equipped)
   - Return VFD - Max (if so equipped)
4. EMERG_SHUTDOWN:
   - Supply Fan - Off
   - Supply Fan VFD - Min (if so equipped)

- Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized (if so equipped)
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)

5. EMERG_FIRE - Input from fire pull box/system:
   - Supply Fan - Off
   - Supply Fan VFD - Min (if so equipped)
   - Exhaust Fan - Off; Exhaust Dampers Closed (if so equipped)
   - OA Dampers - Closed; Return Damper - Open
   - Heat - All heat stages off; Mod Heat output at 0 VDC
   - Occupied/Unoccupied/VAV box output - Energized
   - VOM Relay - Energized (if so equipped)
   - Preheat Output - Off
   - Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - Return VFD - Min (if so equipped)

Ventilation Override Module (VOM)

The user can customize up to five (5) different override sequences for purposes of ventilation override control. If more than one VOM sequence is being requested, the sequence with the highest priority is initiated first. Sequence hierarchy is the sequence "A" (UNIT OFF) is first, with sequence "E" (PURGE with Duct Pressure Control) last. A ventilation override mode can be initiated by closing any of the five (5) corresponding binary input on the VOM module. A binary output is provided on the VOM module to provide remote indication of an active VOM mode. All compressors, condenser fans and the Humidification output are deenergized for any VOM sequence. The factory default definitions for each mode are as follows:

1. UNIT OFF sequence "A"
   - When complete system shutdown is required the following sequence can be used.
   - Supply Fan - Off
   - Supply Fan VFD - Min (if so equipped)
   - Exhaust Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - OA Dampers - Closed; Return Damper - Open
   - Heat - All heat stages off; Mod Heat output at 0 VDC
   - Occupied/Unoccupied/VAV box output - Deenergized
   - VOM Relay - Energized
   - Preheat Output - Off
   - Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
   - Return VFD - Min (if so equipped)
   - OA Bypass Dampers - Open (if so equipped)
   - Exhaust Bypass Dampers - Open (if so equipped)

2. PRESSURIZE sequence “B”

Perhaps a positively pressurized space is desired instead of a negatively pressurized space. In this case, the supply fan should be turned on with VFD at 100% speed and exhaust fan should be turned off.

- Supply Fan - On
- Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - Off; Exhaust Dampers - Closed (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - Off; Exhaust Dampers - Closed (if so equipped)
- Return VFD - Min (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

3. EXHAUST sequence “C”

With only the exhaust fans running (supply fan off), the space that is conditioned by the rooftop would become negatively pressurized. This is desirable for clearing the area of smoke from the now-extinguished fire, possibly keeping smoke out of areas that were not damaged.

- Supply Fan - Off
- Supply Fan VFD - Min (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Closed; Return Damper - Open
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Deenergized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

4. PURGE sequence “D”

Possibly this sequence could be used for purging the air out of a building before coming out of Unoccupied mode of operation on VAV units or for the purging of smoke or stale air if required after a fire.

- Supply Fan - On
- Supply Fan VFD - Max (if so equipped)
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized

- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

5. PURGE with duct pressure control sequence "E"

This sequence can be used when supply air control is required for smoke control.

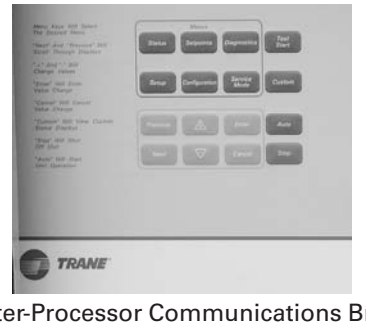
- Supply Fan - On
- Supply Fan VFD - (If so equipped) Controlled by Supply Air Pressure Control function; Supply Air Pressure High Limit disabled
- Exhaust Fan - On; Exhaust Dampers Open (if so equipped)
- OA Dampers - Open; Return Damper - Closed
- Heat - All heat stages off; Mod Heat output at 0 VDC
- Occupied/Unoccupied/VAV box output - Energized
- VOM Relay - Energized
- Preheat Output - Off
- Return Fan - On; Exhaust Dampers - Open (if so equipped)
- Return VFD - Max (if so equipped)
- OA Bypass Dampers - Open (if so equipped)
- Exhaust Bypass Dampers - Open (if so equipped)

Human Interface Panel (HI)

The Human Interface (HI) Panel provides a 2 line X 40 character clear English liquid crystal display and a 16 button keypad for monitoring, setting, editing and controlling. The Human Interface Panel is mounted in the unit's main control panel and is accessible through an independent door, see Figure 18.

The optional remote mount version of the Human Interface (RHI) Panel has all the functions of the unit mount version except Service Mode.

Figure 18. Human interface panel (HI)



To use a RHI the unit must be equipped with an optional Inter-Processor Communications Bridge (IPCB) module. The RHI can be located up to 1,000 feet from the unit. A single RHI can be used to monitor and control up to four (4) rooftops, each containing an IPCB.

Human Interface Panel Main Menu

- STATUS - used to monitor all temperatures, pressures, humidities, setpoints, input and output status.
- CUSTOM - allows the user to create a custom status menu consisting of up to four (4) screens of the data available in the Status menu.
- SETPOINTS - used to review and/or modify all the factory preset Default setpoints and setpoint source selections.
- DIAGNOSTICS - used to review active and historical lists of diagnostic conditions. Over one hundred different diagnostics can be read at the Human Interface Panel. The last 20 unique diagnostics can be held in an active history buffer log.

- SETUP - Control parameters, sensor source selections, function enable/disable, output definitions, and numerous other points can be edited in this menu. All points have factory preset values so unnecessary editing is kept to a minimum.
- CONFIGURATION - Preset with the proper configuration for the unit as it ships from the factory, this information would be edited only if certain features were physically added or deleted from the unit. For example, if a field supplied Ventilation Override Module was added to the unit in the field, the unit configuration would need to be edited to reflect that feature.
- SERVICE - used to selectively control outputs (for compressors, fans, damper position, etc.) for servicing or troubleshooting the unit. This menu is accessible only at the unit mounted Human Interface Panel.

Demand Limit (Not applicable to SZVAV)

This mode is used to reduce electrical consumption at peak load times. When demand limiting is needed, mechanical cooling and/or heating operation are either partially or completely disabled in order to save energy.

The definition of Demand Limit is user-definable at the Human Interface Panel. Demand Limit mode is initiated via a field supplied switch or contact closure (GBAS 0-5 VDC module or GBAS 0-10 VDC module) or via a communicated request (LCI or BCI). When the request for demand limit has been cancelled, the unit cooling and/or heating functions will become fully enabled.

Generic Building Automation System Module (GBAS 0-5 VDC)

The Generic Building Automation System Module (GBAS 0-5 VDC) is used to provide broad control capabilities for building automation systems other than Trane's Tracer system. The following inputs and outputs are provided:

Analog Inputs - Four analog inputs, controlled via a field provided potentiometer or a 0-5 VDC signal, that can be configured to be any of the following:

1. Occupied Zone Cooling Setpoint (CV & SZVAV)
2. Unoccupied Zone Cooling Setpoint (CV & SZVAV)
3. Occupied Zone Heating Setpoint (CV & SZVAV)
4. Unoccupied Zone Heating Setpoint (CV & SZVAV)
5. Supply Air Cooling Setpoint (VAV & SZVAV)
6. Supply Air Heating Setpoint (VAV & SZVAV)
7. Space Static Pressure Setpoint
8. Supply Air Static Pressure Setpoint (CV & VAV)
9. Minimum Outside Air Flow Setpoint
10. Morning Warm Up Setpoint (CV & VAV)
11. Economizer Dry Bulb Enable Setpoint
12. Supply Air Reheat Setpoint
13. Minimum Outside Air Position Setpoint
14. Occupied Dehumidification Setpoint
15. Unoccupied Dehumidification Setpoint
16. Occupied Humidification Setpoint
17. Unoccupied Humidification Setpoint

Binary Outputs - each of the five (5) relay outputs can be mapped to any/all of the available diagnostics.

Binary Input - the single binary input can initiate or terminate the Demand Limit mode of operation via a field supplied switch or contact closure.

Generic Building Automation System Module (GBAS 0-10 VDC)

The Generic Building Automation System Module (GBAS 0-10 VDC) is used to provide broad control capabilities for building automation systems other than Trane's Tracer system. The following inputs and outputs are provided:

Analog Inputs—Four analog inputs, controlled via a field provided potentiometer or a 0-10 VDC signal that can be configured to be any of the following:

1. Occupied Zone Cooling Setpoint (CV & SZVAV)
2. Unoccupied Zone Cooling Setpoint (CV & SZVAV)
3. Occupied Zone Heating Setpoint (CV & SZVAV)
4. Unoccupied Zone Heating Setpoint (CV & SZVAV)
5. Supply Air Cooling Setpoint (VAV & SZVAV)
6. Supply Air Heating Setpoint (VAV & SZVAV)
7. Space Static Pressure Setpoint
8. Supply Air Static Pressure Setpoint (CV & VAV)
9. Minimum Outside Air Flow Setpoint
10. Morning Warm Up Setpoint (CV & VAV)
11. Economizer Dry Bulb Enable Setpoint
12. Supply Air Reheat Setpoint
13. Minimum Outside Air Position Setpoint
14. Occupied Dehumidification Setpoint
15. Unoccupied Dehumidification Setpoint
16. Occupied Humidification Setpoint
17. Unoccupied Humidification Setpoint

Analog Outputs—Four analog outputs that can be configured to be any of the following:

1. Outdoor Air Temperature
2. Zone Temperature
3. Supply Air Temperature (VAV & SZVAV)
4. Supply Air Pressure (VAV & SZVAV)
5. Space Pressure
6. Space Relative Humidity
7. Outdoor Air Relative Humidity
8. Space CO_2 Level
9. Compressor Staging (%)
10. Heat Staging (%)
11. Outdoor Air Damper Position
12. Outdoor Airflow

Binary Output - the single relay output can be mapped to any/all of the available diagnostics.

Binary Input - the single binary input can initiate or terminate the Demand Limit mode of operation, via a field supplied switch or contact closure.

Evaporator Coil Frost Protection - Frostat

A temperature sensor on each evaporator circuit is used to determine if the coil is getting close to a freezing condition. Mechanical cooling capacity is shed as necessary to prevent icing.

The Frostat system eliminates the need for hot gas bypass and adds a suction line surface temperature sensor near the TXV bulb location to shed cooling when coil frosting conditions occur. The supply fans are not shut off and will de-ice the coil. Timers prevent the compressors from rapid cycling.

Steam and Hot Water Coil - Freeze Avoidance

Freeze Avoidance is a feature which helps prevent freezing of steam or hot water heat coils during periods of unit inactivity and low ambient temperatures. Whenever the unit supply fan is off, the outdoor air temperature is monitored. If the temperature falls below a predetermined value, the heating valve is opened to a position selected at the unit mounted Human Interface to allow a minimum amount of steam or hot water to flow through the coil and avoid freezing conditions.

Occupied/Unoccupied Switching

Description - 3 ways to switch Occupied/Unoccupied:

1. Night Setback (NSB) Panel
2. Field-supplied contact closure (hard wired binary input to RTM) (CV, SZVAV & VAV)
3. Tracer (or 3rd Party BAS with LCI or BCI module)

Night Setback Sensors

Trane's night setback sensors are programmable with a time clock function that provides communication to the rooftop unit through a 2-wire communications link. The desired transition times are programmed at the night setback sensor and communicated to the rooftop.

Night setback (unoccupied mode) is operated through the time clock provided in the sensors with night setback. When the time clock switches to night setback operation, the outdoor air dampers close and heating/cooling can be enabled or disabled depending on setup parameters. As the building load changes, the night setback sensor energizes the rooftop heating/cooling (if enabled) function and the evaporator fan. The rooftop unit will cycle through the evening as heating/cooling (if enabled) is required in the space. When the time clock switches from night setback to occupied mode, all heating/cooling functions begin normal operation.

When using the night setback options with a VAV heating/cooling rooftop, airflow must be maintained through the rooftop unit. This can be accomplished by electrically tying the VAV boxes to the VAV Box output relay contacts on the Rooftop Module (RTM) or by using changeover thermostats. Either of these methods will assure adequate airflow through the unit and satisfactory temperature control of the building.

Occupied/Unoccupied input on the RTM

This input accepts a field supplied switch or contacts closure such as a time clock.

Trane Tracer or BAS System

The Trane Tracer System or a 3rd party BAS (with LCI or BCI module) can control the Occupied/Unoccupied status of the rooftop.

Timed Override Activation - ICS

This function is operational when the RTM is selected as the Zone Temperature Sensor source at the Human Interface Panel. When this function is initiated by the push of a override button on the ICS sensor, the Tracer will switch the unit to the Occupied mode. Unit operation (Occupied mode) during timed override is terminated by a signal from Tracer.

Timed Override Activation - Non-ICS

This function is active whenever the RTM is selected as the Zone Temperature Sensor source at the Human Interface Panel. When this function is initiated by the push of an override button on the zone sensor, the unit will switch to the Occupied mode. Automatic Cancellation of the Timed Override Mode occurs after three hours of operation.

Comparative Enthalpy Control of Economizer

An optional Comparative Enthalpy system is used to control the operation of the economizer, and measures the temperature and humidity of both return air and outside air to determine which source has lower enthalpy. This system allows true comparison of outdoor air and return air enthalpy by measurement of outdoor air and return air temperatures and humidities.

Reference Enthalpy Control of Economizer

The optional reference enthalpy compares outdoor air temperature and humidity to the economizer enthalpy control setpoint. If outdoor air temperature and humidity are below the economizer enthalpy control setpoint, the economizer will operate freely.

This system provides more sophisticated control where outdoor air humidity levels may not be acceptable for building comfort and indoor air quality.

Dry Bulb Temperature Control of Economizer

The optional dry bulb system measures outdoor temperature comparing it to the economizer control temperature setpoint. If the outdoor temperature is below the economizer dry bulb temperature control setpoint, the economizer will operate freely. This system is best suited for arid regions where the humidity levels of outside air would not be detrimental to building comfort and indoor air quality.

Refrigeration Circuit Lead/Lag

Refrigeration Circuit lead/lag is a user-selectable feature through the Human Interface Panel available on all units. After each request for compressor operation, the lead refrigeration circuit switches, thereby causing a more equitable or balanced run time among compressors.

Emergency Stop Input

A binary input is provided on the Rooftop Module (RTM) for installation of field provided switch or contacts for immediate shutdown of all unit functions.

Anti-short Recycle Protection

A standard feature provided to prevent excessive cycling, and premature wear, of the compressors, contactors and related components.

High Duct Temperature Sensor

Two manual reset, high temperature limit thermostats are provided. One is located in the discharge section of the unit set at 240°F and the other in the return air section of the unit set at 135°F. If either setpoint is reached, the rooftop unit is shut down.

CO_2 Control - Demand Control Ventilation (DCV)

A ventilation reset function that provides the necessary ventilation for occupants and reduces energy consumption by minimizing the outdoor air damper position (or the OA flow setpoint with TRAQ) below the Building Design Minimum, while still meeting the ASHRAE Std 62.1-2004 ventilation requirements.

If the space CO_2 level is greater than or equal to the CO_2 Design Setpoint, the outdoor air damper will open to the Design Min Outdoor Air Damper (or OA Flow) Setpoint. If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.

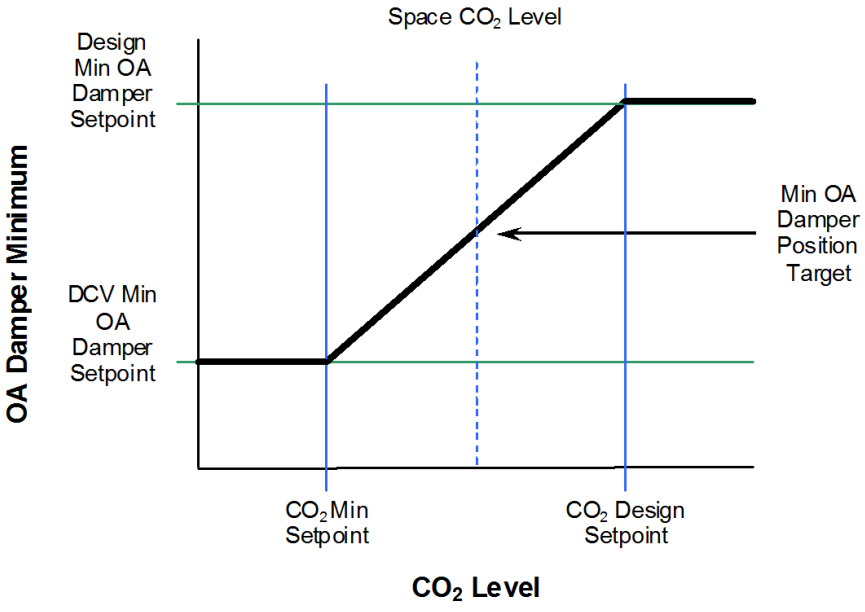
If the space CO_2 level is less than or equal to the CO_2 Minimum Setpoint, the outdoor air damper will close to the DCV Minimum Outdoor Air Damper (or OA Flow) Setpoint. If there is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request.

If the space CO_2 level is greater than the CO_2 Minimum Setpoint and less than the CO_2 Design Setpoint, the outdoor air damper position is (or OA flow) modulated proportionally to the Space CO_2 level relative to a point between the CO_2 Min Setpoint and the CO_2 Design Setpoint. If there

is a call for economizer cooling, the outdoor air damper may be opened further to satisfy the cooling request. See Figure 19, p. 37.

Note: *CO_2 sensor used with Demand Control Ventilation must be powered from an external power source or separate 24 VAC transformer.*

Figure 19. CO_2 control



Humidification Control

A relay output is provided to control an externally connected, field supplied humidifier. Logic is provided for Occupied and Unoccupied humidification control with safeguards to prevent cycling between humidification and dehumidification

Return Fan Control

A return fan reduces the load on the supply fan motor or can allow a unit to operate at a higher static pressure. The return fan VFD is modulated independently to maintain desired return air plenum pressure. In all other cases the return fan is turned on or off with the supply fan.

Low Charge Protection

The low charge feature measures the entering and leaving evaporator temperatures on each circuit to calculate a superheat value for each circuit. The superheat value is used for multiple purposes:

1. Displayed at the Human Interface panel to assist the service technician with unit charging and diagnostics
2. A diagnostic message displayed at the Human Interface panel, warning of a low charge situation when the unit is just slightly undercharged. The unit will be allowed to run.
3. A diagnostic message displayed at the Human Interface panel, warning of a low charge situation when the unit is undercharged. The undercharged circuit will be locked out to protect the compressors.

Condenser Fan Cycling

The IntelliPak II controller cycles condenser fans based on ambient temperature and saturated condensing temperature to ensure the optimum operating conditions for the unit.

LonTalk Building Automation System

The LonTalk Communication Interface for IntelliPak II (LCI-I) controller expands communications from the unit UCM network to a Trane Tracer Summit or a 3rd party building automation system, utilizing LonTalk, and allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The LCI-I utilizes an FTT-10A free topology transceiver, which supports non-polarity sensitive, free topology wiring, which allows the system installer to utilize star, bus, and loop architectures. This controller works in standalone mode, peer-to-peer with one or more other units, or when connected to a Trane Tracer Summit or a 3rd party building automation system that supports LonTalk. The LCI-I controller is available as a factory or field-installed kit.

BACnet Building Automation System

The BACnet Communication Interface for IntelliPak II (BCI-I) controller expands communications from the unit UCM network to Tracer SC or a 3rd party building automation system, utilizing BACnet, and allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The BCI-I utilizes the BACnet defined MS/TP protocol as defined in ASHRAE standard 135-2004. This controller works in standalone mode, with Tracer SC or when connected to a 3rd party building automation system that supports BACnet. The BCI-I controller is available as a factory or field-installed kit.

Wireless Comm Interface

Trane Wireless Comm replaces the BACnet communication link and sensor wire on Tracer building automation systems for faster, easier, lower-risk installation and life-cycle savings.

Twinning

Twinning is a master unit and one or more similarly configured slave unit(s) operating cooperatively, to provide higher capacity and/or redundancy at partial capacity.

Twinning requires an LCI module be installed in each unit and is accomplished by binding variables between unit communication modules, communicating common setpoints and conditions (temperatures, pressures, fan speeds, damper positions, occupancy, states, etc.), and allowing each unit to run independent algorithms.

Note: *BCI-I does not have twinning capabilities.*

Twinned units must share a common supply and return duct network.
Twinned units operate:

a. as part of a Trane Integrated Comfort System installation, with Tracer Summit.

b. on an inter-operable project with a 3rd party LonTalk.

c. as an independent group (bound via Rover or 3rd party tool).

Energy Recovery Wheel

Variable effectiveness is a means to control the capacity of an energy wheel. Normal wheel sizing is for worst case winter/summer load; therefore, at part load the wheel may be oversized and variable effectiveness is justifiable.

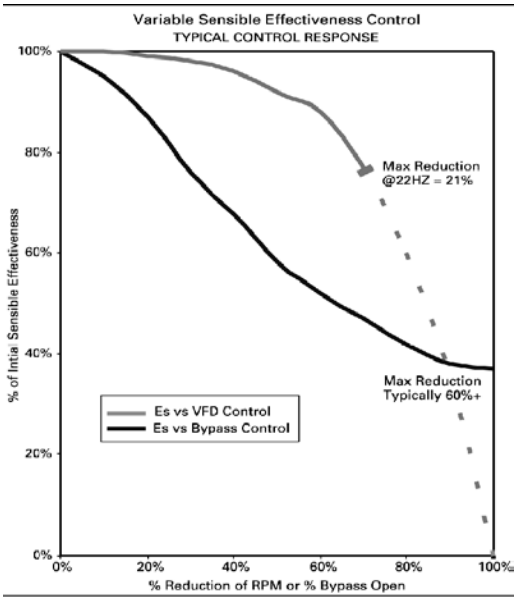
Variable effectiveness control can be used in any application where the outdoor air temperature may fall between the discharge air setpoint and the temperature at which heating is required.

For example, a job may have a required supply air set point of 55°F. A typical return air temperature may be 70°F and the outside air temperature 40°F. The energy wheel could heat the supply air to over 60°F, but by employing variable effectiveness, the energy wheel capacity can be modulated to exactly match the required supply air temperature without using additional heating or cooling. Therefore, variable effectiveness control can significantly add to the amount of energy saved in a year.

Variable effectiveness can be accomplished by varying the wheel rotational speed or by bypassing a portion of the exhaust air around the wheel matrix. IntelliPak II utilizes an exhaust air bypass damper for capacity control.

When unit mode and psychrometric conditions allow, the energy recovery wheel will turn "ON". The wheel uses energy from the return air stream to temper the outside air stream, thereby reducing the load of the space without utilizing mechanical cooling and heating.

Figure 20. Variable sensible effectiveness control



Hot Gas Reheat (Modulating Reheat Dehumidification)

When space conditions allow, the modulating dehumidification function activates the reheat mode providing dehumidification of the space.

The reheat valve and cooling valve are modulated to control the discharge air temperature to the discharge air temperature reheat setpoint (default 70F).

In reheat mode, the reheat valve is commanded (5 to 85%) to control to the discharge air reheat setpoint and the cooling valve mirrors the reheat valve position (85 to 5%).

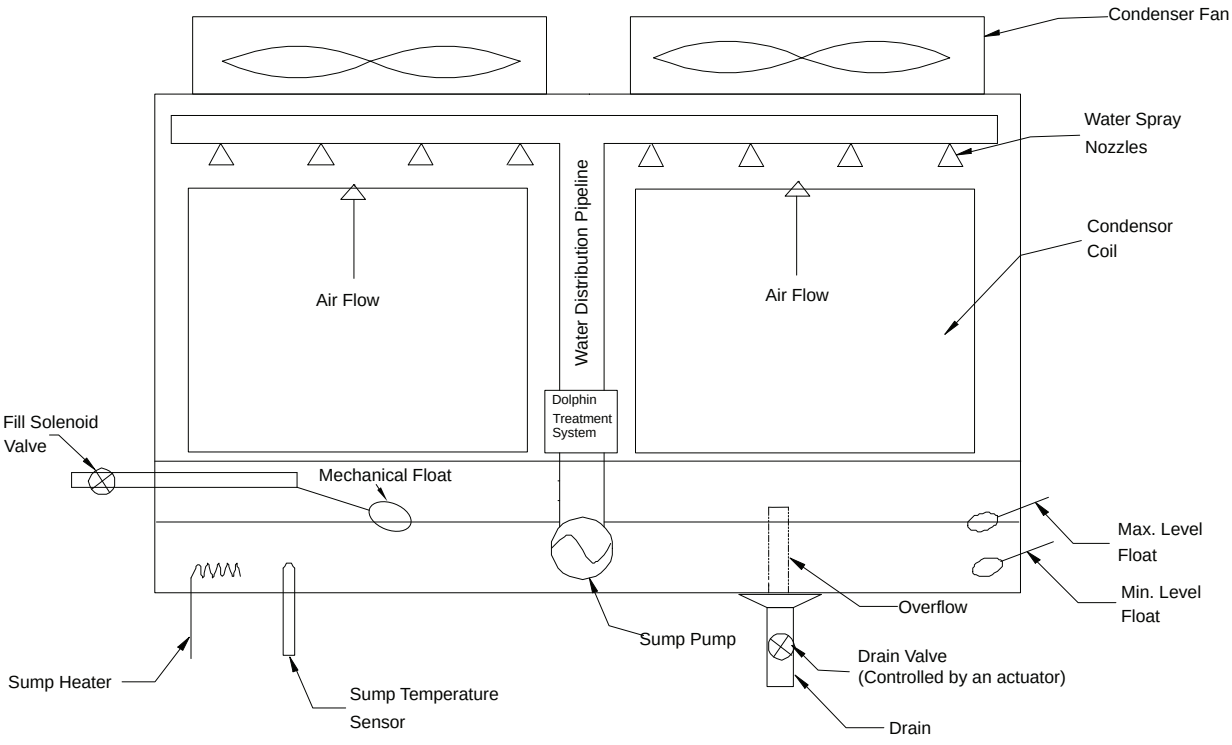
Low Ambient Function

The low ambient function is a head pressure control scheme to allow compressor operation at lower ambient temperatures without tripping the low pressure cutout switch (LPC). For this function, normal condenser fan staging applies. The first condenser fan on each circuit is modulated by a VFD. The fan speed is modulated to control to the saturated condenser temperature control Setpoint.

Low Ambient Compressor Lockout

This function will lock out the compressor if the outdoor air temperature is below the low ambient compressor lock out temperature setpoint. The factory setpoint is 50°F on standard units and 0°F on low ambient units. This setpoint is adjustable at the Human Interface Panel. Compressors will be locked out when outdoor air temperatures falls below that selected temperature and will be allowed to start again when the temperature rises 5°F above the setpoint.

Figure 21. Evaporative condenser flow schematic



Evaporative Condenser

The evaporative condenser function is a method of head pressure control utilizing water as the condensing medium rather than air. This method of head pressure control provides increased unit efficiency.

The function activates whenever a compressor is active on a circuit. The function modulates the condenser fan speed to control to Saturated Condenser Temperature (SCT) Control Setpoint. If the saturated condenser temperature continues to rise above the SCT upper limit, sump pump will be energized.

Once the temperature falls below the SCT lower limit, the sump pump will be de-energized.

The function has sump water freeze protection, periodic partial water flush to reduce contaminant build up, external drain request, and optional water treatment.

Application Considerations

Exhaust/Return Fan Options

When is it necessary to provide building exhaust? Whenever an outdoor air economizer is used, a building generally requires an exhaust system. The purpose of the exhaust system is to exhaust the proper amount of air to prevent over or under-pressurization of the building. The goal is to exhaust approximately 10% less air than the amount of outside air going into the building. This maintains a slightly positive building pressure.

The reason for applying either a return, or exhaust fan is to control building pressure. The Trane 100% modulating exhaust system with Statitrac is an excellent choice for controlling building pressure in the majority of applications. For more demanding applications, Trane's 100% modulating return fan system with Statitrac is an excellent choice for systems with high return static pressure losses, or duct returns. Both systems employ direct digital control technology to maintain building pressure. Either return or exhaust fan systems with Statitrac may be used on any rooftop application that has an outdoor air economizer.

A building may have all or part of its exhaust system in the rooftop unit. Often, a building provides exhaust external to the air conditioning equipment. This external exhaust must be considered when selecting the rooftop exhaust system.

With an exhaust fan system, the supply fan motor and drives must be sized to overcome the total system static pressure, including return losses, and pull return air back to the unit during non-economizer operation. However, a supply fan can typically overcome return duct losses more efficiently than a return air fan system. Essentially, one large fan by itself is normally more efficient than two fans in series because of only one drive loss, not two as with return fan systems.

In a return fan system, the return fan is in series with the supply fan, and operates continuously whenever the supply fan is operating to maintain return air volume. The supply fan motor and drives are sized to deliver the design CFM based on internal and discharge static pressure losses only. The return fan motor and drives are sized to pull the return CFM back to the unit based on return duct static. Therefore, with a return fan system, the supply fan ordinarily requires less horsepower than a system with an exhaust fan

Exhaust/Return Fan Systems

1. 100% modulating exhaust with Statitrac direct space sensing building pressurization control (with or without exhaust variable frequency drives)

2. 100% modulating exhaust without Statitrac

3. 100% modulating plenum return airfoil fan with Statitrac direct space sensing building pressurization control with variable frequency drive

4. 100% modulating plenum return airfoil fan without Statitrac

Drivers for applying either return or exhaust fan systems include economy, building pressure control, code requirements, and generally accepted engineering practices.

Application Recommendations

100% Modulating Exhaust with Statitrac Control, CV and VAV Units

For both CV and VAV rooftops, the 100% modulating exhaust discharge dampers (or VFD) are modulated in response to building pressure. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure. The FC exhaust fan is turned on when required to lower building static pressure to setpoint. The Statitrac control system then modulates the discharge dampers (or VFD) to control the building pressure to within the adjustable, specified deadband that is set at the human interface panel. Economizer and return air dampers are modulated independent of the exhaust dampers (or VFD) based on ventilation control and economizer cooling requests.

Advantages:

- The exhaust fan runs only when needed to lower building static pressure.
- Statitrac compensates for pressure variations within the building from remote exhaust fans and makeup air units.
- The exhaust fan discharges in a single direction resulting in more efficient fan operation compared to return fan systems.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100% open.

The Trane 100% modulating exhaust system with Statitrac provides efficient control of building pressure in most applications simply because 100 percent modulating exhaust discharge dampers (or VFD) are controlled directly from building pressure, rather than from an indirect indicator of building pressure, such as outdoor air damper position.

100% Modulating Exhaust System without Statitrac, CV Units Only

This fan system has performance capabilities equal to the supply fan. The FC exhaust fans are started by the economizer's outdoor air damper position and the exhaust dampers track the economizer outdoor air damper position. The amount of air exhausted by this fan is controlled by modulating discharge dampers at the fan outlet. The discharge damper position is controlled by a signal that varies with the position of the economizer dampers. When the exhaust fans start, the modulating discharge dampers are fully closed, and exhaust airflow is 15 to 20% of total exhaust capabilities.

100% Modulating Exhaust with or without Statitrac Control, SZVAV Units

The overall scheme will remain very similar to non-Single Zone VAV units with Space Pressure Control with the exception of the dynamic Exhaust Enable Setpoint.

For SZVAV the user will select an Exhaust Enable Setpoint during the 100% Fan Speed Command. Once selected, the difference between the Exhaust Enable Setpoint and Design OA Damper Minimum Position at 100% Fan Speed Command will be calculated. The difference calculated will be used as an offset to be added to the Active Building Design OA Minimum Position Target to calculate the dynamic Exhaust Enable Target to be used throughout the Supply Fan Speed/OA Damper Position range.

Advantages:

- The exhaust fan runs only when the economizer reaches the desired exhaust enable point.
- Exhaust dampers are modulated based on the economizer position.
- The exhaust fan discharges in a single direction resulting in more efficient fan operation compared to return fan systems.
- When discharge dampers are utilized to modulate the exhaust airflow, the exhaust fan may be running unloaded whenever the economizer dampers are less than 100% open.

The Trane 100% modulating exhaust system provides excellent linear control of building exhaust in most applications where maintaining building pressure is not important.

100% Modulating Return Fan Systems with Statitrac Control, CV and VAV units

For both CV and VAV applications, the IntelliPak II rooftop unit offers 100% modulating return fan systems. A differential pressure control system, Statitrac, uses a differential pressure transducer to compare indoor building pressure to atmospheric pressure.

The return fan exhaust dampers are modulated, based on space pressure, to control the building pressure to within the adjustable, specified deadband that is set at the Human Interface Panel. A VFD modulates the return fan speed based on return duct static pressure.

Economizer and return air dampers are modulated independent of the exhaust dampers based on ventilation control and economizer cooling requests.

Advantages:

- The return fan operates independently of the supply fan to provide proper balance throughout the airflow envelope.
- Statitrac compensates for pressure variations within the building from remote exhaust fans and makeup air units.
- The return fan acts as both exhaust and return fan based on operation requirements.

The Trane 100% modulating return system with Statitrac provides efficient control of building pressure in applications with higher return duct static pressure and applications requiring duct returns. Exhaust discharge dampers are controlled directly from building pressure, return fan VFD is controlled from return static pressure, and return/economizer dampers are controlled based on ventilation control and economizer cooling requests.

100% Modulating Return Fan without Statitrac Control, CV Units Only

The exhaust discharge dampers are modulated in response to building pressure. The return fan runs continuously while the supply fan is energized. Economizer and return air dampers are modulated independent of the exhaust dampers based on ventilation control, and economizer cooling requests.

Advantages:

- The exhaust dampers are modulated as needed through a space pressure sensor input to maintain building pressure.
- The return fan discharges in two directions, thereby balancing exhaust and unit return air volumes.

Other Cooling Options

Cooling, Rapid Restart Units Only

This is for applications where the space has a high heat load with critical temperature control requirements. A typical application is a computer room that has a large number of routers and servers. If the cooling capacity is lost due to a power interruption, the temperature in the room can rise as much as 3-4°F per minute. Once power is restored (e.g., backup generator has started), the cooling capacity needs to be maximized as soon as possible to help get the space under control. Once cooling capacity has been maximized, the unit can then manage the load using its normal capacity control algorithms.

Supply and Return Airflow Configurations

The typical rooftop installation has both the supply and return air paths routed through the roof curb and building roof. However, many rooftop installations require horizontal supply and/or return from the rooftop because of a building's unique design or for acoustic considerations.

With IntelliPak II, there are several ways to accomplish horizontal supply, see Table 1, p. 44 and/or return, see Table 2, p. 45.

Figure 22. Left/right unit orientation and horizontal airflow

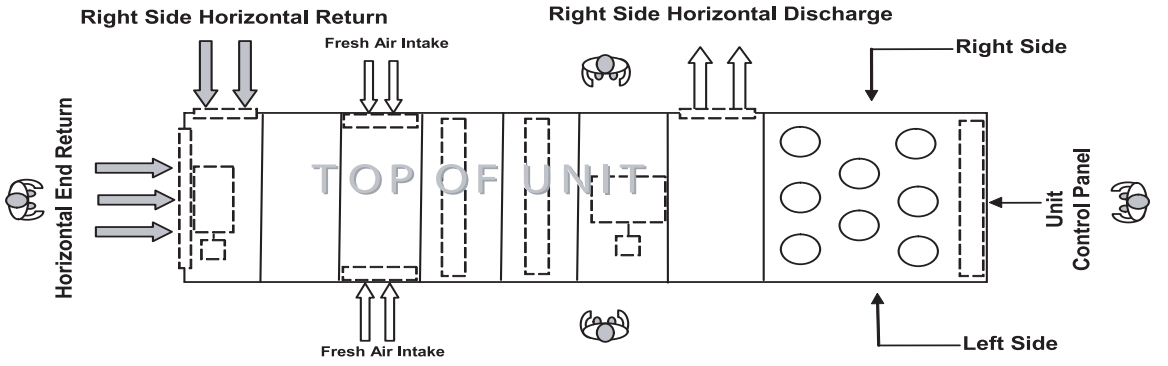


Table 1. Supply airflow configuration

Cabinet Configuration	Supply Airflow Discharge Direction[a]	Type	Acceptable Application	With Bag Final Filters	With Cartridge Final Filters	With HEPA Final Filters
Standard Length	Downflow - Standard Option	Cooling Only	Yes	No	No	No
Standard Length	Horizontal - Right Side - Standard Option	Cooling Only	Yes	No	No	No
Standard Length	Horizontal - Left Side - Field Convertible	Cooling Only	Field Convert	No	No	No
Standard Length	Downflow - Standard Option	Gas, Electric, Steam, Hot Water Heat	Yes	No	No	No
Standard Length	Horizontal - Right Side - Standard Option	Gas, Electric, Steam, Hot Water Heat	Yes	No	No	No
Standard Length	Horizontal - Left Side - Field Convertible	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Four Foot Blank Section	Downflow - Standard Option	Cooling Only	Yes	Yes	Yes	Yes
Four Foot Blank Section	Horizontal - Right Side - Standard Option	Cooling Only	Yes	Yes	Yes	Yes
Four Foot Blank Section	Horizontal - Left Side - Field Convertible	Cooling Only	Field Convert	Yes	Yes	Yes
Four Foot Blank Section	Downflow - Standard Option	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Four Foot Blank Section	Horizontal - Right Side - Standard Option	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Four Foot Blank Section	Horizontal - Left Side - Field Convertible	Gas, Electric, Steam, Hot Water Heat	No	No	No	No
Eight Foot Blank Section	Downflow - Standard Option	Cooling Only, Steam Heat, Hot Water Heat	Yes	Yes	Yes	Yes
Eight Foot Blank Section	Horizontal - Right Side - Standard Option	Cooling Only, Steam Heat, Hot Water Heat	Yes	Yes	Yes	Yes
Eight Foot Blank Section	Horizontal - Left Side - Field Convertible	Cooling Only, Steam Heat, Hot Water Heat	Field Convert	Yes	Yes	Yes
Eight Foot Blank Section	Downflow - Standard Option	Gas[b] or Electric[c]	Yes	No	High Temperature	High Temperature
Eight Foot Blank Section	Horizontal - Right Side - Standard Option	Gas[ii] or Electric[iii]	Yes	No	High Temperature	High Temperature
Eight Foot Blank Section	Horizontal - Left Side - Field Convertible	Gas[ii] or Electric[iii]	Field Convert	No	High Temperature	High Temperature

(a) For left/right unit orientation, see Figure 22, p. 44
(b) Not available with 2.5M MBh heater
(c) Multi-piece units with electric heat and eight foot blank section are not field convertible from right side horizontal to left side horizontal configuration.

Table 2. Return airflow configuration

Airflow Config[a]	Exhaust Fan VFD	Exhaust Fan No VFD	Return Fan VFD	Return Fan No VFD
Vertical	Yes	Yes	Yes	Yes
Horizontal - Right	Yes	Yes	Yes	Yes
Horizontal - Left	No	Field Convert	No	No
Horizontal - End	Yes	Yes	No	No

(a) For left/right unit orientation, see Figure 22, p. 44.

When using an IntelliPak II rooftop for horizontal supply and/or return, an additional pressure drop must be added to the supply external static to account for the 90 degree turn the air is making. This additional pressure drop depends on airflow and rooftop size, but a range of 0.10 inches to 0.30 inches can be expected. The openings on the rooftop all have a one inch lip around the perimeter to facilitate ductwork attachment.

Corrosive Atmospheres

Trane's IntelliPak rooftops are designed and built to industrial standards and will perform to those standards for an extended period depending on the hours of use, the quality of maintenance performed, and the regularity of that maintenance. One factor that can have an adverse effect on unit life is its operation in a corrosive environment. Since the microchannel condenser coil is an all-aluminum design, it provides a high level of corrosion protection on its own. Uncoated, it withstands a salt spray test in accordance with ASTM B117 for 1,000 hours. When rooftops are operated in highly corrosive environments, Trane recommends the corrosion protected condenser coil option.

This corrosion protection option meets the most stringent testing in the industry, including ASTM B117 Salt Spray test for 6,000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2,400 hours. The acid fog test is the most stringent available today. This coating is added after coil construction covering all tubes, headers, fins and edges. The design provides superior protection from any corrosive agent. For evaporator coils, copper fins can be utilized as a design special.

Note: *Field coating is not allowed on Microchannel coils.*

Ventilation Override Sequences

One of the benefits of using an exhaust fan rather than a return fan, in addition to the benefits of lower energy usage and improved building pressurization control, is that the rooftop can be used as part of a ventilation override system. Several types of sequences can be easily done when exhaust fans are a part of the rooftop system.

What would initiate the ventilation override control sequence? Typically, a manual switch is used and located near the fire protection control panel. This enables the fire department access to the control for use during or after a fire. It is also possible to initiate the sequence from a field-installed automatic smoke detector. In either case, a contact closure begins the ventilation override control sequence.

Trane can provide five (5) different ventilation override sequences on both CV and VAV IntelliPak II rooftops. For convenience, the sequences are factory preset but are fully field edited from the Human Interface Panel or Tracer. Any or all five sequences may be “locked” in by the user at the Human Interface Panel.

The user can customize up to five (5) different override sequences for purposes such as smoke control. The following parameters within the unit can be defined for each of the five sequences:

- Supply Fan - on/off
- Variable Frequency Drives - on (60 Hz)/off (0 Hz)/controlling
- Exhaust/Return Fan - on/off
- Exhaust Dampers - open/closed

- Economizer dampers - open/closed
- Heat - off/controlling (output for) VAV Boxes - open/controlling

Compressors and condenser fans are shut down for any Ventilation Override sequence. Factory preset sequences include unit Off, Exhaust, Purge, Purge with duct pressure control, and Pressurization. Any of the user-defined Ventilation Override sequences can be initiated by closing a field supplied switch or contacts connected to an input on the Ventilation Override Module. If more than one ventilation override sequence is being requested, the sequence with the highest priority is initiated. Refer to the Ventilation Override Module (VOM) information in the Control section of this catalog for more details on each override sequence.

Natural Gas Heating Considerations

Trane uses heavy gauge 304 L stainless steel throughout the construction of its natural gas drum and tube heat exchangers for the IntelliPak II product. These heat exchangers can be applied with confidence, particularly with full modulation control, when mixed air temperatures are below 50°F, and low ambient temperatures can cause condensation to form on the heat exchanger. IntelliPak II natural gas heat exchangers are not recommended for applications with mixed air conditions entering the heat exchanger below 30°F to ensure adequate leaving air heating temperature. For airflow limitations and temperature rise across the heat exchanger information, see Table 42, p. 137.

Acoustical Considerations

The ideal time to make provisions to reduce sound transmission to the space is during the project design phase. Proper placement of rooftop equipment is critical to reducing transmitted sound levels to the building. The most economical means of avoiding an acoustical problem is to place any rooftop equipment away from acoustically critical areas. If possible, rooftop equipment should not be located directly above areas such as: offices, conference rooms, executive office areas and classrooms. Ideal locations are above corridors, utility rooms, toilet facilities, or other areas where higher sound levels are acceptable.

Several basic guidelines for unit placement should be followed to minimize sound transmission through the building structure:

1. Never cantilever the condensing section of the unit. A structural cross member must support this end of the unit.

2. Locate the unit's center of gravity close to or over a column or main support beam to minimize roof deflection and vibratory noise.

3. If the roof structure is very light, roof joists should be replaced by a structural shape in the critical areas described above.

4. If several units are to be placed on one span, they should be staggered to reduce deflection over that span.

It is impossible to totally quantify the effect of building structure on sound transmission, since this depends on the response of the roof and building members to the sound and vibration of the unit components. However, the guidelines listed above are experience proven guidelines which will help reduce sound transmission. The ASHRAE publication "A Practical Guide to Noise and Vibration Control for HVAC Systems" also provides valuable information.

There are several other sources of unit sound, i.e., supply fan, compressors, exhaust/return fans, condenser fans and aerodynamic noise generated at the duct fittings. Refer to the ASHRAE Applications Handbook, Chapter 47, 2003 edition for guidelines for minimizing the generation of aerodynamic noise associated with duct fittings. A good source of information on general acoustical considerations for rooftops is the 2000 ASHRAE Journal article titled, "Controlling Noise from Large Rooftop Units".

The Trane Acoustic Program (TAP) allows complete modeling of rooftop acoustical installation parameters. The software models airborne sound from supply and return ducts, as well as duct

breakout and roof transmission sound, so that the designer can identify potential sound problems and make design alterations before equipment installation. Output of the program shows the resulting NC (or RC) level for any point in the occupied space. TAP is also capable of modeling the effect of outdoor sound on the surrounding area. This program is available from Trane's Customer Direct Service Network (C.D.S.), ask your local Trane representative for additional information on this program.

Clearance Requirements

The recommended clearances identified in Figure 40, p. 176 should be maintained to assure adequate service capability, maximum capacity and peak operating efficiency. A reduction in unit clearance could result in condenser coil starvation or warm condenser air recirculation. If the clearances shown are not possible on a particular job, consider the following:

- Do the clearances available allow for major service work such as changing compressors or coils?
- Do the clearances available allow for proper outside air intake, exhaust air removal and condenser airflow?
- If screening around the unit is being used, is there a possibility of air recirculation from the exhaust to the outside air intake or from condenser exhaust to condenser intake?

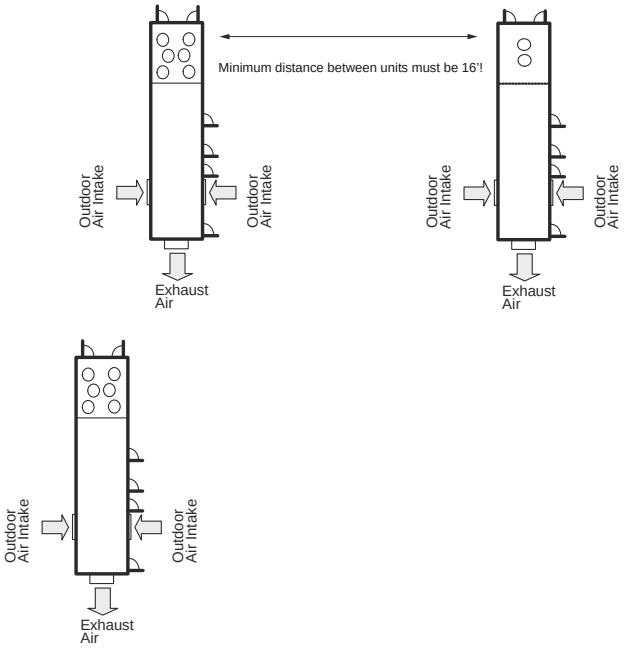
Actual clearances which appear inadequate should be reviewed with a local Trane sales engineer.

When two or more units are to be placed side by side, the distance between the units should be increased to 150 percent of the recommended single unit clearance. The units should also be staggered, see Figure 23, for two reasons:

1. To reduce span deflection if more than one unit is placed on a single span. Reducing deflection discourages sound transmission.

2. To assure proper diffusion of exhaust air before contact with the outside air intake of adjacent unit.

Figure 23. Unit placement



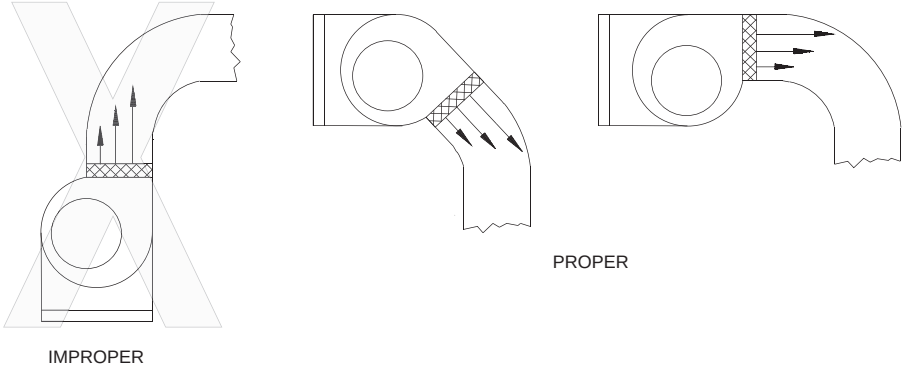
Duct Design

It is important to note that the rated capacities of the rooftop can be met only if the rooftop is properly installed in the field. A well-designed duct system is essential in meeting these capacities.

The satisfactory distribution of air throughout the system requires that there be an unrestricted and uniform airflow from the rooftop discharge duct. This discharge section should be straight for at least several duct diameters to allow the conversion of fan energy from velocity pressure to static pressure.

However, when job conditions dictate elbows be installed near the rooftop outlet, the loss of capacity and static pressure may be reduced through the use of guide vanes and proper direction of the bend in the elbow. The high velocity side of the rooftop outlet should be directed at the outside radius of the elbow rather than the inside as illustrated in Figure 24.

Figure 24. Duct design



Energy Recovery Wheel

For applications where the air streams within the rooftop must be isolated, consider using alternative technologies that guarantee separation of the air streams.

Important: *Do not use energy wheels in applications where the exhaust air is contaminated with harmful toxins or biohazards or where even a minor mixing of the air streams presents a health risk. See Installation Operation Maintenance (RT-SVX24*-EN) for more information.*

The energy recovery option was designed as a partial flow outside air system, where the required outside air is less than 100 percent. IntelliPak II monitors outside air, return air, and zone conditions. It compares them with setpoints (set in the rooftop human interface) and checks for suitable energy recovery system operation. Energy recovery can be activated when both supply and exhaust fans are in operation. Heat can be recovered when the return air dry bulb temperature is greater than the outside air dry bulb temperature.

Energy recovery is disabled when economizer cooling operation is requested. Economizer cooling in energy recovery wheel equipped units requires the exhaust air and outside air bypass dampers to be open and the recovery wheel motor to be off. The energy recovery wheel can provide free cooling when outside air enthalpy is greater than return air enthalpy. In general, energy recovery works well in applications where a high outside airflow minimum is required, often because of high occupancy.

Hot Gas Reheat

In general, applications where non-peak load conditions can be dominated by latent loads are candidates for the dehumidification option. This includes many applications subject to ASHRAE Standard 62 requirements.

For applications where the unit is utilized as a make-up air or 100% outside air unit, please consider using an alternate solution. These applications are not appropriate for the Trane dehumidification option with hot gas reheat.

Evaporative Condenser

Water Supply—Suspended particulate matter, mineral concentrations, trash and debris can adversely affect performance of any water-cooled device. If not managed, mineral concentrations can result in clogged water system hardware, heat exchanger restriction and heat transfer loss. Trane's evaporative condenser is designed to greatly minimize performance problems that may occur from the by-products of water evaporation.

Incoming Water Supply Line—A float valve is provided to maintain sump water level during condenser operation. A field installed gate valve may be installed on the condenser water supply line. An 80 to 100 mesh field supplied strainer may be installed in the condenser water supply line to help prevent the introduction of debris. The condenser water supply line should be flushed thoroughly prior to connection to the unit. Local codes may require back-flow prevention on the condenser water supply line.

Water Discharge and Drain Line—Care and judgment should be exercised in selecting a water discharge site.

Local Site Discharge—Rooftop or simple storm sewer discharge is generally acceptable. Do not routinely direct sump discharge onto areas where the byproducts of water evaporation or water treatment products are undesirable.

Sewer Discharge—The quantities of mineral and debris in the discharge water are actually very small, and do not cause problems when diluted in normal sewer flow. Check local codes to identify any special requirements for sewer discharge.

Regardless of the disposal method used, local codes, state or federal standards for water disposal must be followed.

Freeze Protection—For operation in ambient temperatures below 32°F, optional sump heater and controls are available to provide operation down to 10°F. In colder climates water supply line and drain piping will require field installed freeze protection. Generally low wattage heat tape on the water lines is sufficient protection.

Make-up Water Considerations:

Water Saving Methods—A programmable flush cycle is initiated to remove mineral deposits and particulates from the sump.

Fresh water can be cycled into the sump as a portion of the existing water is drained. The intervals between drains are adjustable from 0 - 12 hours. When set to 0, the periodic blowdown is disabled.

A more efficient approach is utilizing the Conductivity Controller option, which performs blowdowns based on water quality readings from the conductivity sensor in the sampling tube. Users can set a limit based on water quality testing they have performed in their area, when this adjustable setpoint is exceeded the unit will conduct a blowdown for a period of time set by the user. This allows the user to save water by only performing blowdowns when they are required. Water level is maintained by the internal float valve.

Water Treatment—Water treatment is required on all evaporative condensing units. Even when an optional Dolphin WaterCare System is utilized, water must still be maintained and monitored throughout the unit life cycle.

Note: *Local codes may require the use of chemicals for water treatment. Different chemical feeder systems are available to fit a wide variety of requirements and budgets. Check with local code officials to determine installation requirements.*

Low Ambient Operation— Remote Human Interface Recommendation

For low ambient operation, the use of a remote mounted human interface panel is recommend for service and troubleshooting.

Selection Procedure

Air-Cooled Rooftop

This section outlines a step-by-step procedure that may be used to select a Trane air-cooled single-zone air conditioner. Air-cooled models should be selected based on dry bulb (DB) conditions. For specific model selection, utilize TOPSS or contact the local Trane Sales Office. This sample selection is based on the following conditions:

Note: *When calculating capacities for evaporative condensers, use ambient wet bulb (WB).*

Summer Design:

- Summer outdoor design conditions - 95 DB/76 WB ambient temperature
- Summer room design conditions -78 DB/65 WB
- Total cooling load - 980 MBh (81.6 tons)
- Sensible cooling load - 735 MBh (61.25 tons)
- Outdoor air ventilation load - 154.0 MBh (12.8 tons)
- Return air temperature - 78 DB / 65 WB

Winter Design:

- Winter outdoor design conditions - 0°F
- Return air temperature - 70°F
- Total heating load - 720 MBh
- Winter outdoor air ventilation load - 288.6 MBh
- Total winter heating load - 1008.6 MBh

Air Delivery Data:

- Supply fan CFM - 36,000 CFM
- Supply duct static pressure - 1.86 in wg
- Minimum outdoor air ventilation - 3,600 CFM
- Exhaust fan CFM - 36,000 CFM
- Return air duct negative static pressure - 0.3 in wg

Electrical Characteristics:

- Voltage/cycle/phase - 460/60/3

Unit Accessories:

- Gas fired heat exchanger - high heat
- Downflow supply and upflow return
- High efficiency throwaway filters
- Economizer
- Modulating 100% exhaust

Cooling Capacity Selection

Step 1—Nominal Unit Size Selection

A summation of the peak cooling load and the outside air ventilation load shows: 980 MBh + 154.0 MBh = 1134.0 MBh required unit capacity.

From Table 10, p. 68, a 105 ton unit with standard capacity evaporator coil at 80 DB / 65 WB, 95°F outdoor air temperature and 36,000 total supply CFM is 1,237 MBh total and 1,037 MBh sensible. Thus, a nominal 105 ton unit with standard capacity evaporator coil is selected.

Step 2—Evaporator Coil Entering Conditions

Mixed air dry bulb temperature determination:

Using the minimum percent of OA (3,600 CFM ÷ 36,000 CFM = 10%), determine the mixture dry bulb to the evaporator.

RADB + % OA (OADB - RADB) = 78 + (0.10) (95 - 78) = 78 + 1.5 = 79.5°F

Approximate wet bulb mixture temperature:

RAWB + % OA (OAWB - RAWB) = 65 + (0.10) (76 - 65) = 65 + 1.1 = 66.1°F

Step 3 - Determine Supply Fan Motor Heat Gain

Having selected a nominal 105 ton unit, the supply fan bhp can be calculated. The supply fan motor heat gain must be considered in final determination of unit capacity.

Supply Air Fan

Determine unit total static pressure at design supply CFM:

Supply Duct Static Pressure	2.2 inches
Evaporator Coil Table 49, p. 142	0.64 inches
Return Duct Negative Static Pressure	0.30
Heat Exchanger Table 49, p. 142	0.03
Throwaway Filter Table 49, p. 142	0.26
Economizer Damper[a] Table 49, p. 142	0.57
Unit Total Static Pressure	4.0

(a) Add either the economizer damper value or return damper value, depending on which static pressure is greater. (Do not use both.)

Using total of 36,000 CFM and total static pressure of 4.0 inches, enter Table 33, p. 114. The table shows 40.4 bhp with 1,097 rpm required for the 36" supply fan.

From Figure 25, p. 53 supply fan motor heat gain =
109.0 MBh, or 109.0 MBh ÷ 36000 CFM x 1.085 = 2.8°F supply fan motor heat

Step 4 - Determine Total Required Cooling Capacity

Required capacity = Total peak load + OA load + supply air fan motor heat

Required capacity = 980.0 + 154.0 + 109.0 = 1243.0 MBh (103.6 tons)

Step 5 - Determine Unit Capacity

From Table 10, p. 68, unit total capacity at 79.5 DB/66.1 WB entering the evaporator, 36,000 supply air CFM, 95°F outdoor ambient is 1,251 MBh (104.2 tons) with 996 MBh (83 tons) sensible capacity.

Step 6 - Determine Leaving Air Temperature

Unit sensible heat capacity corrected for supply air fan motor heat = 996 MBh sensible - 109.0 MBh motor heat = 887 MBh.

Supply air dry bulb temperature difference =

$$\frac{\text{Sensible Btu}}{1.085 \times \text{Supply CFM}} =$$

Sensible Btu = 887 MBh /(1.085 x 36,000 CFM) = 23.0

Supply air dry bulb = 79.5 DB - 23.0 = 56.5 leaving evaporator coil

$$\frac{\text{Total Btu}}{4.5 \times \text{Supply CFM}} =$$

Unit enthalpy difference = 1,251 MBh ÷ (4.5 x 36,000 CFM) = 7.72 Btu/lb.

Leaving enthalpy = h (ent WB) - h (diff). From Table 6, p. 64 h (ent WB) = 30.9 Btu/lb.

Leaving enthalpy = 30.9 Btu/lb. - 7.72 Btu/lb. = 23.18 Btu/lb.

Supply air wet bulb = 54.9 leaving evaporator coil.

Leaving air temperature = 56.5 DB/54.9 WB

Heating Capacity Selection

Step 1 - Determine Air Temperature Entering Heating Module

Mixed air temperature = RADB + % OA (OADB - RADB) = 70 + (0.10) (0 - 70) = 63°F

Supply air fan motor heat temperature rise = 109000 Btu ÷ (1.085 x 36000 CFM) = 2.8°F

Air temperature entering heating module = 63.0 + 2.8 = 65.8°F

Step 2 - Determine Total Winter Heating Load

Total winter heating load =
peak heating load + ventilation load - supply fan motor heat = 720 + 288.6 - 109.0 = 899.6 MBh

Electric Heating System

Unit operating on 460/60/3 power supply.

From Table 58, p. 151, kW may be selected for a nominal 105 ton unit operating 460-volt power. The 265 kW heat module (904.4 MBh) will satisfy the winter heating load of 899.6 MBh.

Table 42, p. 137 shows an air temperature rise of 23.2°F for 36,000 CFM through the 265 kW heat module.

Unit supply temperature at design heating conditions = mixed air temperature +
air temperature rise = 65.8°F + 23.2°F = 89.0°F.

Gas Heating System (Natural Gas)

From Table 42, p. 137 select the high heat module (1,440 MBh output) to satisfy winter heating load of 899.6 MBh at unit CFM.

Table Table 42, p. 137 also shows an air temperature rise of 37.0°F for 36,000 CFM through the heating module.

Unit supply temperature at design heating conditions =
mixed air temperature + air temperature rise = 65.8°F + 37.0°F = 102.8°F.

Hot Water Heating System

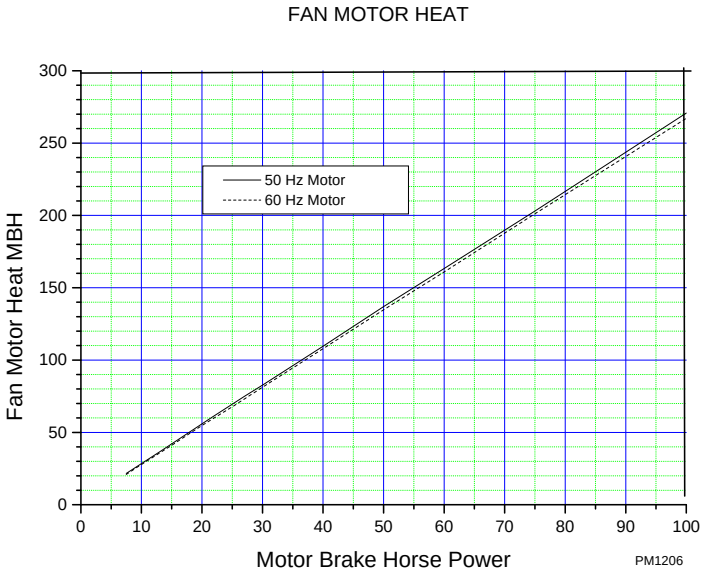
Assume a hot water supply temperature of 190°F and an entering coil temperature of 65.8°F.

Subtract the mixed air temperature from the hot water temperature to determine the ITD (initial temperature difference).

ITD = 190°F - 65.0°F = 125°F. Divide the winter heating load by ITD = 1008.6 MBh ÷ 125°F = 8.0 Q/ITD.

From Table 45, p. 138, select the low heat module. By interpolation, a Q/ITD of 8.0 can be obtained at a gpm of 40.0. Water pressure drop at 40.0 gpm is 0.33 ft. of water.

Figure 25. Fan motor heat



Heat module temperature rise is determined by:

$$\frac{\text{Total Btu}}{1.085 \times \text{Supply CFM}} = \Delta T$$

$$\frac{1008600}{1.085 \times 36000} = 25.8$$

Unit supply air temperature = mixed air temperature + air temperature rise = 65.4 + 25.8 = 91.2°F.

Steam Heating System

Assume a 15 psig steam supply.

From Table 46, p. 139, the saturated temperature steam is 250°F. Subtract mixed air temperature from the steam temperature to determine ITD.

ITD = 250°F - 65.0°F = 185°F.

Divide winter heating load by ITD = 1008.6 MBh ÷ 185°F = 5.45 Q/ITD.

From Table 46, p. 139, select the low heat module. The low heat module at 36,000 CFM has a Q/ITD = 7.45.

Heat module capacity, Q = ITD x Q/ITD = 185°F x 7.45 Q/ITD = 1378 MBh

Heat module air temperature rise is determined by:

$$\frac{\text{Total Btu}}{1.085 \times \text{Supply CFM}} = \Delta T$$

$$\frac{1378000}{1.085 \times 36000} = 35.3$$

Unit supply temperature at design conditions =
mixed air temperature + air temperature rise = 65.4°F + 35.3°F = 100.7°F.

Air Delivery Procedure

Supply fan performance tables include internal resistance of rooftop. For total static pressure determination, system external static must be added to appropriate component static pressure drop (evaporator coil, filters, optional economizer, optional exhaust fan, optional heating system, optional cooling only extended casing).

Supply Fan Motor Sizing

The supply fan motor selected in the cooling capacity determination was 40.4 bhp and 1,097 rpm. Thus, a 40 hp supply fan motor is selected.

Enter Table 53, p. 147 to select the proper drive. For a 105 ton rooftop with 40 hp motor, a drive letter A - 1,100 rpm is selected.

Exhaust Fan Motor Sizing

The exhaust/return fan is selected based on total return system negative static pressure and exhaust fan CFM. Return system negative static includes return duct static, and any other job site applicable static pressure drop.

Return duct static pressure = 0.30 inches.

Total return system negative static pressure = 0.30 inches.

Exhaust fan CFM = 36,000 CFM

From Table 38, p. 129 the required bhp is 21.44 bhp at 400 rpm. Thus, the exhaust fan motor selected is 25 hp.

To select a drive, enter Table 54, p. 148 for a 25 hp motor for a 105 ton unit. Drive selection number 4 - 400 rpm.

Return Fan Motor Sizing

Return fan drive selection is shown on Table 55, p. 148. The same static pressure and CFM considerations must be taken for return fan size, horsepower, and drive selection as are required for exhaust fan sizing. However, since the return fan runs continuously the sensible heat generated by the return fan motor must be included in the entering evaporator coil mixed air temperature equation.

In this selection, if the return motor bhp is equal to the exhaust motor bhp, 21.44 bhp = 58.1 MBh ÷ (1.085 x 36,000 Return CFM) = 1.5°F added to the return air temperature.

Where altitudes are significantly above sea level, use Table 7, p. 65 Table 8, p. 65 and Figure 26, p. 64 for applicable correction factors.

Unit Electrical Requirements

Selection procedures for electrical requirements for wire sizing amps, maximum fuse sizing, and dual element fuses are given in the electrical service section of this catalog.

Altitude Corrections

The rooftop performance tables and curves of this catalog are based on standard air (.075 lbs/ft). If the rooftop airflow requirements are at other than standard conditions (sea level), an air density correction is needed to project accurate unit performance.

Figure 26, p. 64 shows the air density ratio at various temperatures and elevations. Trane rooftops are designed to operate between 40° and 90°F leaving air temperature.

The procedure to use when selecting a supply or exhaust/return fan on a rooftop for elevations and temperatures other than standard is as follows:

1. First, determine the air density ratio using Figure 26, p. 64.

2. Divide the static pressure at the nonstandard condition by the air density ratio to obtain the corrected static pressure.

3. Use the actual CFM and the corrected static pressure to determine the fan rpm and bhp from the rooftop performance tables or curves.

4. The fan rpm is correct as selected.

5. bhp must be multiplied by the air density ratio to obtain the actual operating bhp.

In order to better illustrate this procedure, the following example is used:

Consider a 90 ton rooftop unit that is to deliver 32,000 actual CFM at 3-inches total static pressure (tsp), 55°F leaving air temperature, at an elevation of 5,000 ft.

1. From Figure 26, p. 64, the air density ratio is 0.86.

2. Tsp = 3.0-inches / 0.86 = 3.49 inches tsp.

3. From fan performance table Table 33, p. 114 a 90 ton rooftop will deliver 32,000 CFM at 3.49 inches TSP at 997 rpm and 30.27 bhp.

4. The rpm is correct as selected - 997 rpm.

5. bhp = 30.27 x 0.86 = 26.3 bhp actual.

Compressor MBh, SHR, and kW should be calculated at standard and then converted to actual using the correction factors in Table 7, p. 65. Apply these factors to the capacities selected at standard CFM so as to correct for the reduced mass flow rate across the condenser.

Heat selections other than gas heat will not be affected by altitude. Nominal gas capacity (output) should be multiplied by the factors given in Table 8, p. 65 before calculating the heating supply air temperature.

Evaporative Condensing Rooftop

For unit selection, air-cooled or evaporative condensers can be selected using the same calculations, however evaporative condenser capacities should be calculated based on Wet Bulb (WB) temperatures. For specific model selection, utilize TOPSS or contact the local Trane Sales Office.

Total Energy Recovery Wheel

Utilize TOPSS or contact the local Trane sales office to calculate required return air preheat temperature for the given minimum outdoor air temperature and return air relative humidity.

To calculate the supply and exhaust air conditions leaving the wheel, you must know the wheel effectiveness. Refer to Table 52, p. 146 for total effectiveness measurements.

Note: *The effectiveness numbers shown assume equal supply and exhaust airflows. If the airflows are unbalanced, the effectiveness changes. Use TOPSS to determine effectiveness values for these conditions.*

Calculate Wheel Performance

Use the following equations to calculate supply air conditions. Use TOPSS to calculate exhaust air conditions and to obtain actual dry bulb temperature and enthalpy values for coil and equipment sizing.

Dry Bulb Temperature:

Cooling: Tsa = Toa - (E x (Toa-Tra))

Heating: Tsa = Toa + (E x (Tra-Toa))

where:

Tsa = Dry bulb temperature of supply air (°F)

Toa = Dry bulb temperature of outside air (°F)

Tra = Dry bulb temperature of return air (°F)

E = Sensible Effectiveness

Enthalpy:

Cooling: Hsa = Hoa - (E x (Hoa-Hra))

Heating: Hsa = Hoa + (E x (Hra-Hoa))

where:

Hsa = Enthalpy of supply air (Btu/ lb)

Hoa = Enthalpy of outside air (Btu/ lb)

Hra = Enthalpy of return air (Btu/lb)

E = Total Effectiveness

After calculating these two points, use a psychrometric chart to obtain the supply air wet bulb temperature and/or grains moisture.

Energy Wheel Application Example

In this example, a wheel sized for nominal 10,500 CFM will be used for the initial evaluation. The air pressure drop is 1.07 in. wg and the total effectiveness is 73% (see Table 52, p. 146). The total and latent effectiveness values are close to equal for Trane energy wheels. For this example, total effectiveness is assumed to be 73% in cooling mode and 75% in heating mode. TOPSS could be used to obtain the exact values.

Supply Air Conditions, Cooling Mode:

Tsa = Toa - (E x (Toa - Tra)) = 95°F - (.73 x (95°F - 75°F))= 81°F

Hsa = Hoa - (E x (Hoa - Hra)) = 38.4 Btu/lb - (.73 x (38.4 Btu/ lb - 26.0 Btu/lb) = 29.3 Btu/lb

According to a psychrometric chart, the supply air wet bulb temperature is 64.4°F, 64 grains/lbm.

Tsa = Toa + (E x (Tra - Toa)) = 10°F + (.75 x (70°F - 10°F)) = 55°F

Hsa = Hoa + (E x (Hra - Hoa)) = 3.2 Btu/lb + (.75 x (22.7 Btu/lb -3.2 Btu/lb)) = 17.8 Btu/lb

According to a psychrometric chart, the supply air wet bulb temperature is 45.5°F, 30 grains/lbm.

When designing the remainder of the air-handling system, remember to account for the air pressure drop imposed by the energy wheel.

Hot Gas Reheat Dehumidification Selection

This option allows for increased outdoor air ventilation. It reduces humidity levels while increasing comfort level in the air space. Cooling can operate without a demand for dehumidification. The hot gas reheat coil is designed to deliver maximum reheat temperatures.

Contact the local Trane Sales Office or refer to the IntelliPak II TOPSS selection program to determine leaving air temperature, latent capacity, reheat sensible capacity, leaving unit dew point, and moisture removal when the unit is in reheat operation. Please note that reheat operation will not be allowed when there is a call for cooling or heating.

Model Number Descriptions

S	X	H	J	105	4	0	A	A	7	1	5	M	F	D	E	8	1	D	1	1	0	0	A	1	B	A	1	0	0	0	A	A	1	A	1
1	2	3	4	567	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38

DIGIT 1 — UNIT TYPE

S Self-Contained (Packaged Rooftop)

DIGIT 2 — UNIT FUNCTION

E DX Cooling, Electric Heat
F DX Cooling, Natural Gas Heat
L DX Cooling, Hot Water Heat
S DX Cooling, Steam Heat
X DX Cooling, No Heat, Extended Casing

DIGIT 3 — SYSTEM TYPE

H Single Zone

DIGIT 4 — DEVELOPMENT SEQUENCE

J Ninth

DIGIT 5, 6, 7 — NOMINAL CAPACITY

090 90 Ton Air-Cooled
105 105 Ton Air-Cooled
120 120 Ton Air-Cooled
130 130 Ton Air-Cooled
150 150 Ton Air-Cooled
100 100 Ton Evap Condenser
118 118 Ton Evap Condenser
128 128 Ton Evap Condenser
140 140 Ton Evap Condenser
162 162 Ton Evap Condenser

DIGIT 8 — VOLTAGE SELECTION

4 460/60/3 XL
5 575/60/3 XL
C 380/50/3 XL

DIGIT 9 — HEATING CAPACITY SELECTION

0 No Heat
1 Electric heat 90/56 kW 60/50 Hz
2 Electric heat 140/88 kW 60/50 Hz
3 Electric heat 265/166 kW 60/50 Hz
4 Electric Heat 300/188 kW 60/50 Hz
A Low Gas Heat — 2-stage
B Medium Gas Heat — 2-stage
C High Gas Heat — 2-stage
D Low Gas Heat — Modulating
E Medium Gas Heat — Modulating
F High Gas Heat — Modulating

Steam or Hot Water Heat:

G Low Heat - 1.0" (25mm) Valve
H Low Heat - 1.25" (32mm) Valve
J Low Heat - 1.5" (38mm) Valve
K Low Heat - 2.0" (50mm) Valve
L Low Heat - 2.50" (64mm) Valve
M Low Heat - 3.0" (76mm) Valve
N High Heat - 1.0" (25mm) Valve
P High Heat - 1.25" (32mm) Valve
Q High Heat - 1.5" (38mm) Valve
R High Heat - 2.0" (50mm) Valve
T High Heat - 2.50" (64mm) Valve
U High Heat - 3.0" (76mm) Valve

DIGIT 10, 11 — DESIGN SEQUENCE

A-ZZ (Factory Assigned) Sequence may be any letter A to Z, or any digit 1 to 9.

DIGIT 12 — UNIT CONFIGURATION SELECTION

1 One-Piece Unit w/o Blank Section
2 One-Piece Unit w/4' Blank Section
3 One-Piece Unit w/8' Blank Section
4 Two-Piece Unit w/o Blank Section
5 Two-Piece Unit w/4' Blank Section
6 Two-Piece Unit w/8' Blank Section
7 Three-Piece unit w/o Blank Section
8 Three-Piece Unit w/4' Blank Section
9 Three-Piece Unit w/8' Blank Section

DIGIT 13 — AIRFLOW DIRECTION

1 Downflow Supply /Upflow Return
2 Downflow Supply / Horiz End Return
3 Downflow Supply / Horiz Right Return
4 Right Side Horiz Supply/Upflow Return
5 Right Side Horiz Supply / Horizontal End Return
6 Right Side Horiz Supply / Horizontal Right Return

DIGIT 14 — SUPPLY FAN OPTIONS

1 Standard CFM
3 Standard CFM -TEFC Motor(s)
4 Low CFM
6 Low CFM -TEFC Motor(s)
7 = Standard CFM - w/ Motor Shaft Grounding
9 = Standard CFM -TEFC Motor(s) w/ Shaft Grounding
A = Low CFM - w/ Motor Shaft Grounding
C = Low CFM -TEFC Motor(s) w/ Shaft Grounding

DIGIT 15 — SUPPLY FAN MOTOR SELECTION

F 15 hp
G 20 Hp
H 25 Hp
J 30 Hp
K 40 Hp
L 50 Hp
M 60 Hp
N 75 Hp
P 100 Hp

DIGIT 16 — SUPPLY FAN RPM SELECTION

7 700
8 800
9 900
A 1000
B 1100
C 1200
D 1300
E 1400
F 1500
G 1600
H 1700
J 1800
K 1900
L 2000

DIGIT 17 — EXHAUST/RETURN FAN OPTIONS

0 None
1 Std CFM Exhaust Fan w/o Statitrac CV Only
2 Low CFM Exhaust Fan w/o Statitrac CV Only
3 Std CFM Exhaust w/o VFD w/ Statitrac
4 Low CFM Exhaust w/o VFD w/ Statitrac
5 Std CFM Exhaust w/ VFD w/ Bypass w/ Statitrac
6 Low CFM Exhaust w/ VFD w/ Bypass w/ Statitrac
7 Std CFM Exhaust w/ VFD w/o Bypass w/ Statitrac
8 Low CFM Exhaust w/ VFD w/o Bypass w/ Statitrac
A Std CFM Return w/o Statitrac CV Only
B Low CFM Return w/o Statitrac CV Only
C Std CFM Return w/ VFD w/ Bypass w/ Statitrac
D Low CFM Return w/ VFD w/ Bypass w/ Statitrac
E Std CFM Return w/ VFD w/o Bypass w/ Statitrac
F Low CFM Return w/ VFD w/o Bypass w/ Statitrac

DIGIT 18 — EXHAUST/RETURN FAN MOTOR SELECTION

0 None
D 7.5 Hp
E 10 Hp
F 15 Hp
G 20 Hp
H 25 Hp
J 30 Hp
K 40 Hp
L 50 Hp
M 60 Hp

DIGIT 19 — EXHAUST/RETURN RPM SELECTION

0 None
3 300
4 400
5 500
6 600
7 700
8 800
9 900
A 1000
B 1100
C 1200
D 1300
E 1400

DIGIT 20 — SYSTEM CONTROL SELECTION

1 Constant Volume (CV) (Zone Temperature Control)
2 CV w/ Discharge Temp Control
4 VAV w/ VFD Supply w/o Bypass (Discharge Temp Control)
5 VAV w/ VFD Supply w/ Bypass (Discharge Temp Control)
6 VAV – Single Zone VAV w/VFD w/o Bypass (Zone Temperature Control)
7 VAV – Single Zone VAV w/VFD w/ Bypass (Zone Temperature Control)

DIGIT 21 — OUTSIDE AIR and ECONOMIZER OPTION/ CONTROLS

A 0-25% Motorized Damper
B Economizer w/Dry Bulb
C Economizer w/Reference Enthalpy
D Economizer w/Comparative Enthalpy
E Econ w/Outside Air Measure/Dry Bulb
F Econ w/Outside Air Measure/Ref Enthalpy
G Econ w/Outside Air Measure/Comp Enthalpy
H Econ w/DCV/Dry Bulb[1]
J Econ w/DCV/Ref Enthalpy[1]
K Econ w/DCV/Comp Enthalpy[1]

DIGIT 22 — DAMPER OPTION

0 Standard
1 Low Leak
2 Ultra Low Leak
U Ultra Low Leak, AMCA 1A, w/ FDD (Design Special)

DIGIT 23— PRE-EVAPORATOR COIL FILTER SELECTION

0 Two Inch High Efficiency Throwaway
1 Two Inch Throwaway Rack/Less Filters
2 90-95% Bag Filters w/Prefilters
3 Bag Filter Rack/Less Filters
4 90-95% Cartridge Filters w/ Prefilters
5 Cartridge Rack/Less Filters
6 90-95% Low Pressure Drop Cartridge Filters w/ Prefilters
7 Low Pressure Drop Cartridge Rack/Less Filters

DIGIT 24 — BLANK SECTION APPLICATION OPTIONS

0 None
A 90-95% Bag w/Prefilters
B 90-95% Low Pressure Drop Cartridge w/ Prefilters
C 90-95%, Cartridge Filters w/ Prefilters
D 90-95% High Temp Cartridge w/ Prefilters
E HEPA w/Prefilters
F High Temp HEPA w/Prefilters

DIGIT 25 — ENERGY RECOVERY WHEEL

0 None
1 Low CFM ERW w/ Bypass Defrost
2 Standard CFM ERW w/ Bypass Defrost

DIGIT 26 — UNIT MOUNTED POWER CONNECTION SELECTION

A Terminal Block
B Non-Fused Disconnect
C Non-Fused Disconnect w/ Powered Convenience Outlet
D Circuit Breaker w/ high fault SCCR
E Circuit Breaker w/ high fault SCCR/ Powered Convenience Outlet

DIGIT 27 — CONDENSER COIL SELECTION

0 Air-Cooled Aluminum
A Evap Condenser
B Evap Condenser w/ Sump Heater
C Evap Condenser w/ Dolphin WaterCare System
D Evap Condenser w/ Dolphin WaterCare System & Sump Heater
E Evap Condenser w/ Conductivity Controller
F Evap Condenser w/ Conductivity Controller and Sump Heater
J Corrosion Protected Condenser Coil

DIGIT 28 — EVAPORATOR COIL AND DRAIN PAN

0 Standard Evap Coil w/Galvanized Drain Pan
A Standard Evap Coil w/ Stainless Steel Drain Pan
B High Cap Evap Coil w/Galvanized Drain Pan
C High Cap Evap Coil w/Stainless Steel Drain Pan

DIGIT 29 — REFRIGERATION SYSTEM SELECTION A

0 Standard
A Suction Service Valves
B Replaceable Core Liquid Filter Driers
C Suction Service Valves & Replaceable Core Liquid Filter Driers

DIGIT 30 — REFRIGERATION SYSTEM SELECTION B

0 Standard
1 Hot Gas Reheat[2]
2 Hot Gas By-Pass
3 Hot Gas Reheat[2]/Hot Gas By-Pass

DIGIT 31 — AMBIENT CONTROL OPTION

0 Standard Ambient
1 Low Ambient

DIGIT 32 — HIGH DUCT TEMP THERMOSTAT

0 None
1 High Duct Temp Thermostat

DIGIT 33 — CONTROLS OPTION

0 None
1 Remote Human Interface (RHI) & Inter-Processor Communication Bridge (IPCB)
2 IPCB
3 Rapid Restart

[1] Requires CO_2 Zone Sensor(s)

[2] Humidity sensor required

DIGIT 34 — MODULE OPTIONS

0 None
A 0-5 volt Generic Building Automation System (GBAS)
B 0-10 volt GBAS
C 0-5 volt GBAS and 0-10 volt GBAS
F LonTalk® Communication Interface (LCI)
D Ventilation Override
G 0-5 volt GBAS volt & Ventilation Override
H 0-10 volt GBAS & Ventilation Override
J 0-5 volt GBAS and 0-10 volt GBAS & Ventilation Override
L LCI & Ventilation Override
M BACnet Communication Interface (BCI)
N BCI & Ventilation Override

DIGIT 35 — ZONE SENSOR OPTION

0 None
A Dual Setpoint w/Man/Auto Changeover — BAYSENS108
B Dual Setpoint w/Man/Auto Chgovr & Sys Lights — BAYSENS110
C Room Sensor w/timed Override & Cancel — BAYSENS073
D Room Sensor w/TO (Timed Override) & Cancel & Local Stpt Adj — BAYSENS074
G VAV w/System Lights — BAYSENS021
L Programmable Night Setback — BAYSENS119

DIGIT 36 — AGENCY APPROVAL OPTION

0 None
1 cULus

DIGIT 37 — SERVICE ENHANCEMENTS

0 Single Side Access Door
A Dual Side Access Door
B Single Side Access Doors/ Marine Lights
C Dual Side Access Doors/ Marine Lights

DIGIT 38 — MISCELLANEOUS OPTIONS

0 None
1 Belt Guards
2 Burglar Bars
3 Belt Guards/Burglar Bars

Tip: ***EXAMPLE***

Model number SXHJ10540AA715MFDE81D1100A 1BA1000AA1A1 describes a unit with the following characteristics:

DX Cooling, No Heat, Extended Casing, 105 Ton nominal capacity, with 460/3/60 power supply, 3 piece construction with downflow supply and upflow return, low CFM fans, a 60 hp supply fan w/ a 1500 rpm drive, a 10 Hp return fan with VFD, bypass and statitrac, with CV control, and economizer w/ comparative enthalpy, low leak dampers, 2" throwaway rack less filters, terminal blank connection, Air Cooled Copper Condenser coil, high cap evap with galvanized drain pan, suction service valves, hot gas reheat, 0-5V GBAS, dual setpoint with Manual/Auto Changeover, cULus approval, Dual side access, and belt guards.

The service digit for each model number contains 38 digits; all 38 digits must be referenced.

General Data

Table 3. General data (All dimensions in inches)

	90/100 Tons[a]	105/118 Tons[a]	120/128 Tons[a]	130/140 Tons[a]	150/162 Tons[a]
Compressor Data					
Number/Size (Nominal)	4/20 Ton	2/20 Ton 2/25 Ton	4/25 Ton	2/25 Ton 2/32 Ton	4/32 Ton
Type	Scroll	Scroll	Scroll	Scroll	Scroll
Unit Capacity Steps	100/75/50/25	100/72/44/22	100/75/50/25	100/72/44/22	100/75/50/25
rpm	3450	3450	3450	3450	3450
No. of Circuits	2	2	2	2	2
Evaporator Coil Std.					
Dimensions	118 x 90	118 x 90	170 x 90	170 x 90	170 x 90
Size (Ft^2)	73.75	73.75	106.25	106.25	106.25
Rows/Fin Series	3/168	4/168	3/168	4/168	6/168
Tube Diameter	1/2	1/2	1/2	1/2	1/2
Surface	Enhanced	Enhanced	Enhanced	Enhanced	Enhanced
Evaporator Coil Hi Cap.					
Dimensions	118 x 90	118 x 90	170 x 90	170 x 90	
Size (Ft^2)	73.75	73.75	106.25	106.25	N/A
Rows/Fin Series	5/168	6/168	6/168	6/168	
Tube Diameter	1/2	1/2	1/2	1/2	
Surface	Enhanced	Enhanced	Enhanced	Enhanced	
Air-Cooled Condenser Fans					
Number/Size/Type	6/30/Prop	6/30/Prop	8/30/Prop	8 /30/Prop	8/30/Prop
Hp (each)	1.5	1.5	1.5	1.5	1.5
CFM	58500	58500	87750	87750	87750
Air-Cooled Condenser Coil					
Size (Ft^2)	134	161	161	161	161
Rows/Fin Series	1/240	1/240	2/276	2/276	2/276
Type	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel
Evaporative Condenser - Condenser Fans					
Number/Type	2/Prop	2/Prop	2/Prop	2/Prop	2/Prop
hp (each)	5.4	5.4	5.4	5.4	5.4
rpm/CFM	1365/26000	1365/26000	1365/26000	1365/26000	1365/26000
Cycle/Phase	60/3	60/3	60/3	60/3	60/3
Evaporative Condenser - Condenser Coil					
Size (Ft^2)	36	36	36	36	36
Rows	212	212	212	212	212
Tube Diameter	5/16	5/16	5/16	5/16	5/16
Evaporative Condensing Sump Pump					
Number/Type	1 / Sump, Drainage	1 / Sump, Drainage	1 / Sump, Drainage	1 / Sump, Drainage	1 / Sump, Drainage
hp	1.5	1.5	1.5	1.5	1.5
rpm	3600	3600	3600	3600	3600
Cycle/Phase	60/3	60/3	60/3	60/3	60/3
Sump Pump GPM	80	80	80	80	80
Supply Fans Std CFM					
Number/Size/Type	1 /36 DW AF	1 / 36 DW AF	1 /40 DW AF	1 /40 DW AF	1 /40 DW AF
Number of Motors	1	1	1	1	1
hp Range	15 - 60	20 - 75	20 - 75	20 - 100	20 - 100
CFM Range	20000 - 40000	23000 - 45000	27000 - 54000	29000 - 58000	29000 - 58000
Total SP Range-(In. WG)	7.5	7.5	7.5	7.5	7.5
Supply Fans Low CFM					
Number/Size/Type	1/25 DW AF	1/32/ DW AF	1/32/ DW AF	1/32/ DW AF	1/32/ DW AF
Number of Motors	1	1	1	1	1
hp Range	15 - 50	15 - 60	15 - 60	20 - 60	20 - 60
CFM Range	16000 - 31000	19000 - 36000	21000 - 42000	23000 - 45000	23000 - 45000
ESP Range-(In. WG)	7.5	7.5	7.5	7.5	7.5
Exhaust Fans Std CFM					
Number/Size/Type	1/28 DW FC	1/32 DW FC	1/32 DW FC	1/32 DW FC	1/32/ DW FC
Number of Motors	1	1	1	1	1
hp Range	10 - 50 hp	15 - 50 hp	15 - 60 hp	15 - 60 hp	15 - 60 hp
CFM Range	20000 - 36000	23000 - 40000	27000 - 48000	29000 - 52000	29000 - 52000
ESP Range-(In. WG)	2.5	2.5	2.5	2.5	2.5
Exhaust Fans Low CFM					
Number/Size/Type	1/25/ DW FC	1/28/ DW FC	1/28/ DW FC	1/28/ DW FC	1/28 DW FC
Number of Motors	1	1	1	1	1
hp Range	7.5 - 25 hp	7.5 - 25 hp	7.5 - 30 hp	7.5 - 50 hp	7.5 - 50 hp
CFM Range	10000 - 28000	12000 - 33000	14000-37000	15000 - 41000	15000 - 41000
ESP Range-(In. WG)	2.5	2.5	2.5	2.5	2.5

Continued on next page

Table 3. General data (All dimensions in inches) (continued)

	90/100 Tons[a]	105/118 Tons[a]	120/128 Tons[a]	130/140 Tons[a]	150/162 Tons[a]
Return Fans Std CFM					
Number/Size/Type	1 /40 Plenum AF	1 / 40 Plenum AF	1 /44 Plenum AF	1 /44 Plenum AF	1 /44 Plenum AF
Number of Motors	1	1	1	1	1
hp Range	10 - 30 hp	15 - 40 hp	15 - 40 hp	20 - 50 hp	20 - 50 hp
CFM Range	20000 - 40000	24000 - 44000	27000 - 51000	29000 - 54000	29000 - 54000
ESP Range-(In. WG)	2.5	2.5	2.5	2.5	2.5
Return Fans Low CFM					
Number/Size/Type	1/36.5/ Plenum	1/36.5/ Plenum	1/36.5/ Plenum	1/36.5/ Plenum	1/36.5/ Plenum
Number of Motors	1	1	1	1	1
hp Range	7.5 - 20 hp	10 - 25 hp	10 - 40 hp	15 - 40 hp	15 - 40 hp
CFM Range	16000 - 28000	19000 - 33000	21000 - 36000	23000 - 36000	23000 - 36000
ESP Range-(In. WG)	2.5	2.5	2.5	2.5	2.5
Energy Recovery Std CFM					
Cassette Dimensions (LxWxH)	104 x 104 x 10	108 x 108 x 14	115 x 115 x 14	115 x 115 x 14	115 x 115 x 14
Wheel Segments	16	16	16	16	16
Motor (V/ph/Hz)	460/3/60 575/3/60	460/3/60 575/3/60	460/3/60 575/3/60	460/3/60 575/3/60	460/3/60 575/3/60
hp	0.33	0.33	0.33	0.33	0.33
Galv. Steel RA Filters Number/Size	10/24 x 24 x1	10/24 x 24 x 1	10/24 x 24 x 1	10/24 x 24 x 1	10/24 x 24 x 1
Galv. Steel FA Filters Number/Size	8/24 x 24 x 1	8/24 x 24 x 1	8/24 x 24 x 1	8/24 x 24 x 1	8/24 x 24 x 1
CFM Range	8500 - 18000	9000 - 21000	10000 - 24000	13000 - 29000	13000 - 29000
Energy Recovery Low CFM					
Cassette Dimensions (LxWxH)	85 x 85 x 7.07	85 x 85 x 7.07	91 x 91 x 10	96 x 96 x 10	96 x 96 x 10
Wheel Segments	8	8	8	16	16
Motor Information (V/ph/Hz)	460/3/60 575/3/60	460/3/60 575/3/60	460/3/60 575/3/60	460/3/60 575/3/60	460/3/60 575/3/60
hp	0.25	0.25	0.25	0.33	0.33
Galv. Steel RA Filters Number/Size	10/24 x 24 x 1	10/24 x 24 x 1	10/24 x 24 x 1	10/24 x 24 x 1	10/24 x 24 x 1
Galv. Steel FA Filters			6/24 x 24 x 1	6/24 x 24 x 1	6/24 x 24 x 1
Number/Size	8/24 x 24 x 1	8/24 x 24 x 1	2/12 x 24 x 1	2/12 x 24 x 1	2/12 x 24 x 1
CFM Range	8500 - 14000	9000 - 14000	9000 - 15000	9000 - 16000	9000 - 16000
Electric Heat (60 Hz)					
KW	90-265	90-265	140-300	140-300	140-300
Circuit Capacity Steps	30 - 37.5 KW	30 - 37.5 KW	35 - 37.5 KW	35 - 37.5 KW	35 - 37.5 KW
Electric Heat (50 Hz)					
KW	56-166	56-166	88-188	88-188	88-188
Circuit Capacity Steps	18.8 - 23.5 KW	18.8 - 23.5 KW	21.9 - 23.5 KW	21.9 - 23.5 KW	21.9 - 23.5 KW
Natural Gas Heat					
2-Stage Gas Heat					
Low Heat Input (mbh)	850	850	1100	1100	1100
Mid Heat Input (mbh)	1100	1100	1800	1800	1800
High Heat Input (mbh)	1800	1800	2500	2500	2500
Fully Modulating Steps					
Low Heat Input (mbh)	10:1	10:1	20:1	20:1	20:1
Mid Heat Input (mbh)	20:1	20:1	20:1	20:1	20:1
High Heat Input (mbh)	20:1	20:1	20:1	20:1	20:1
Heat Exchanger Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Hot Water Coil					
Size	33 x 88 x 2 rows	33 x 88 x 2 rows	33 x 110 x 2 rows	33 x 110 x 2 rows	33 x 110 x 2 rows
Quantity	2	2	2	2	2
Type	5W, PrimaFlo	5W, PrimaFlo	5W, PrimaFlo	5W, PrimaFlo	5W, PrimaFlo
High Heat (fins/ft)	122	122	122	122	122
Low Heat (fins/ft)	80	80	80	80	80
Steam Coil					
Size	33 x 88 x 1 row	33 x 88 x 1 row	33 x 110 x 1 row	33 x 110 x 1 row	33 x 110 x 1 row
Quantity	2	2	2	2	2
Type	NS, SigmaFlo	NS, SigmaFlo	NS, SigmaFlo	NS, SigmaFlo	NS, SigmaFlo
High Heat (fins/ft)	112	112	112	112	112
Low Heat (fins/ft)	62	62	62	62	62
Filters					
Standard 2" High Efficiency Throwaway Filters Number/Size	21-20 x 24 x 2 5-12 x 24 x 2	21-20 x 24 x 2 5-12 x 24 x 2	28-20 x 24 x 2	28-20 x 24 x 2	28-20 x 24 x 2
Face area (Ft^2)	80	80	93	93	93

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Table 3. General data (All dimensions in inches) (continued)

	90/100 Tons[a]	105/118 Tons[a]	120/128 Tons[a]	130/140 Tons[a]	150/162 Tons[a]
90-95% Bag Filters w/Prefilters					
Number/Size	21-20 x 24 x 19 5-12 x 24 x 19	21-20 x 24 x 19 5-12 x 24 x 19	21-20 x 24 x 19 5-12 x 24 x 19	21-20 x 24 x 19 5-12 x 24 x 19	21-20 x 24 x 19 5-12 x 24 x 19
Face area (Ft^2)	80	80	80	80	80
Prefilters	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 2
Number/Size	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 2
90-95% Cartridge Filters w/Prefilters	21-20 x 24 x 12	21-20 x 24 x 12	21-20 x 24 x 12	21-20 x 24 x 12	21-20 x 24 x 12
Number/Size	5-12 x 24 x 12	5-12 x 24 x 12	5-12 x 24 x 12	5-12 x 24 x 12	5-12 x 24 x 12
Face area (Ft^2)	80	80	80	80	80
Prefilters	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 2
Number/Size	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 2
90-95% Low Pressure Drop Cartridge Filters w/Prefilters	21-20 x 24 x 12	21-20 x 24 x 12	21-20 x 24 x 12	21-20 x 24 x 12	21-20 x 24 x 12
Number/Size	5-12 x 24 x 12	5-12 x 24 x 12	5-12 x 24 x 12	5-12 x 24 x 12	5-12 x 24 x 12
Face area (Ft^2)	80	80	80	80	80
Prefilters	21-20 x 24 x 2	21-20 x 24 x 2	21-20 x 24 x 4	21-20 x 24 x 4	21-20 x 24 x 4
Number/Size	5-12 x 24 x 2	5-12 x 24 x 2	5-12 x 24 x 4	5-12 x 24 x 4	5-12 x 24 x 4
Final Filters					
90-95% Low Pressure Drop Cartridge Filters w/Prefilters[b]	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12
Number/Size	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12
Face area (Ft^2)	74	74	74	74	74
Prefilters	15-24 x 24 x 4	15-24 x 24 x 4	15-24 x 24 x 4	15-24 x 24 x 4	15-24 x 24 x 4
Number/Size	7-12 x 24 x 4	7-12 x 24 x 4	7-12 x 24 x 4	7-12 x 24 x 4	7-12 x 24 x 4
90-95% Bag Filters w/Prefilters[c]	15-24 x 24 x 19	15-24 x 24 x 19	15-24 x 24 x 19	15-24 x 24 x 19	15-24 x 24 x 19
Number/Size	7-12 x 24 x 19	7-12 x 24 x 19	7-12 x 24 x 19	7-12 x 24 x 19	7-12 x 24 x 19
Face area (Ft^2)	74	74	74	74	74
Prefilters	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2
Number/Size	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2
Final Filters					
90-95% Cartridge Filters(c)	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12
Number/Size	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12
Face area (Ft^2)	74	74	74	74	74
Prefilters	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2
Number/Size	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2
90-95% High Temp Cartridge Filters[d]	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12
Number/Size	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12
Face area (Ft^2)	74	74	74	74	74
Prefilters	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2
Number/Size	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2
HEPA Filters (c) w/Prefilters	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12
Number/Size	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12
Face area (Ft^2)	74	74	74	74	74
Prefilters	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2
Number/Size	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2
High Temp HEPA Cartridge Filters w/Prefilters(d)	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12	15-24 x 24 x 12
Number/Size	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12	7-12 x 24 x 12
Face area (Ft^2)	74	74	74	74	74
Prefilters	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2	15-24 x 24 x 2
Number/Size	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2	7-12 x 24 x 2
Standard Unit Minimum Outside Air Temperature for Mechanical Cooling					
Without Hot Gas Bypass	40	40	40	40	40
With Hot Gas Bypass	55	55	55	55	55
Low Unit Minimum Outside Air Temperature for Mechanical Cooling					
Without Hot Gas Bypass	0	0	0	0	0
With Hot Gas Bypass	10	10	10	10	10
Evaporative Condenser Minimum Outside Temperature for Mechanical Cooling					
Without Sump Heater	40	40	40	40	40
With Sump Heater	10	10	10	10	10

(a)Air-Cooled/Evaporative Condensers; Not all data applies to both.
(b)Standard airflow applications of cooling only units require High Efficiency Throwaway Prefilters with the 90-95% Low PD Cartridge Filter Option.
(c)Standard airflow applications of cooling only units include 2" High Efficiency Throwaway Prefilters with the 90-95% Bag and HEPA Filter Options.
(d)Gas/Electric Units require 2" High Efficiency High Temperature Rated Throwaway Prefilters with High Temperature Rated 90-95% Cartridge and HEPA filter options.

Table 4. Gas heat inputs/input ranges/inlet sizes

TWO-STAGE GAS HEAT				
Standard Gas Heat Input (mbh)	**Low Gas Heat Inputs (mbh)**	**High Fire Heat Input (mbh)**	**Modulating Gas Heat Range (mbh)**	**Gas Heat Inlet Sizes (in.)**
850	425	850	85-850	1
1100	550	1100	55-1100	1 1/4
1800	900	1800	90-1800	1 1/2
2500	1250	2500	125-2500	1 1/2

Table 5. Economizer outdoor air damper leakage (at rated airflow)[(a)]

Standard Damper	20
Optional “Low Leak" Damper	10 (Class 2 AMCA 511-99)
Optional “Ultra Low Leak” Damper	4 (Class 1 AMCA 511-99)

(a) Leakage/ft^2 at 1.0 in WC pressure difference

Performance Adjustment Factors

Table 6. Enthalpy of saturated air

Wet Bulb Temperature	Btu per Pound
41	15.70
43	16.66
42	16.17
43	16.66
44	17.15
45	17.65
46	18.16
47	18.68
48	19.21
49	19.75
50	20.30
51	20.86
52	21.44
53	22.02
54	22.62
55	23.22
56	23.84
57	24.48
58	25.12
59	25.78
60	26.46
61	27.15
62	27.85
63	28.57
64	29.31
65	30.06
66	30.83
67	31.62
68	32.42
69	33.25
70	34.09
71	34.95
72	35.83
73	36.74
74	37.66

Figure 26. Air density ratios

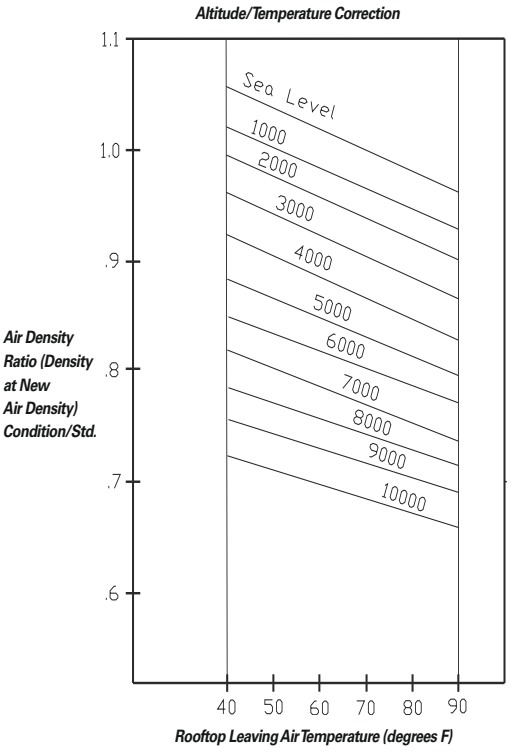

Table 7. Cooling capacity altitude correction factors

	Altitude (Ft.)							
	Sea Level	1000	2000	3000	4000	5000	6000	7000
Cooling Capacity Multiplier	1.00	0.99	0.99	0.98	0.97	0.96	0.95	0.94
KW Correction Multiplier (Compressors)	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07
Sensible Heat Ratio Correction Multiplier	1.00	.98	.95	.93	.91	.89	.87	.85
Maximum Condenser Ambient	115°F	114°F	113°F	112°F	111°F	110°F	109°F	108°F

Table 8. Gas heating capacity altitude correction factors

	Sea Level to 2000	2001 to 2500	2501 to 3500	3501 to 4500	4501 to 5500	5501 to 6500	6501 to 7500
Capacity Multiplier	1.00	.92	.88	.84	.80	.76	.72

Performance Data

Air-Cooled 60 Hz Gross Cooling Capacities—Standard Capacity Evaporator Coils

Table 9. Gross cooling capacities—90 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature 85 Entering Wet Bulb 61 CAP	85 61 SHC	85 67 CAP	85 67 SHC	85 73 CAP	85 73 SHC	95 61 CAP	95 61 SHC	95 67 CAP	95 67 SHC	95 73 CAP	95 73 SHC	105 61 CAP	105 61 SHC	105 67 CAP	105 67 SHC	105 73 CAP	105 73 SHC
16000	75	898	648	997	532	1096	407	864	630	959	514	1054	390	830	611	918	495	1009	371
	80	905	747	996	624	1097	502	871	727	957	606	1055	484	834	707	916	586	1010	466
	85	913	841	1003	717	1097	594	879	822	962	698	1055	576	844	801	922	677	1009	557
	90	923	923	1004	815	1101	686	894	894	966	795	1060	668	864	864	926	775	1015	648
20000	75	956	718	1051	575	1148	421	918	698	1009	556	1103	404	877	676	964	536	1054	385
	80	963	841	1049	688	1150	538	926	821	1006	669	1105	519	886	799	965	649	1057	501
	85	976	960	1056	797	1153	651	932	932	1015	777	1108	633	898	898	971	755	1060	614
	90	1010	1010	1060	921	1154	763	977	977	1021	902	1108	743	942	942	979	880	1061	723
25000	75	1003	794	1096	623	1192	435	961	773	1051	603	1143	418	917	750	1003	582	1092	399
	80	1015	952	1099	758	1194	577	975	931	1054	738	1146	559	932	908	1006	715	1096	540
	85	1041	1041	1103	889	1197	717	1005	1005	1059	868	1149	698	966	966	1011	845	1099	680
	90	1090	1090	1117	1051	1199	846	1053	1053	1074	1030	1151	826	1013	1013	1028	1007	1102	805
30000	75	1035	864	1128	666	1221	448	992	842	1081	647	1170	430	945	818	1030	626	1117	412
	80	1046	1046	1131	821	1224	614	1008	1008	1085	800	1174	596	967	967	1034	777	1122	577
	85	1098	1098	1135	976	1227	779	1059	1059	1089	954	1178	761	1017	1017	1039	931	1126	739
	90	1149	1149	1149	1149	1229	925	1110	1110	1109	1109	1180	905	1067	1067	1067	1067	1128	883
33000	75	1050	904	1142	692	1234	455	1006	882	1094	672	1183	437	958	858	1043	651	1129	419
	80	1072	1072	1146	857	1238	635	1033	1033	1098	835	1188	617	991	991	1048	812	1134	599
	85	1126	1126	1150	1026	1241	812	1086	1086	1102	1004	1191	794	1043	1043	1052	981	1137	775
	90	1178	1178	1178	1178	1243	970	1137	1137	1136	1136	1193	950	1093	1093	1093	1093	1140	928
36000	75	1063	943	1155	716	1246	462	1018	920	1105	696	1194	444	969	896	1053	676	1139	426
	80	1096	1095	1159	892	1250	656	1055	1055	1110	870	1199	638	1011	1011	1059	847	1144	619
	85	1150	1150	1162	1074	1252	847	1108	1108	1114	1052	1201	829	1064	1064	1063	1029	1147	810
	90	1203	1203	1202	1202	1254	1015	1160	1160	1160	1160	1204	994	1115	1115	1115	1115	1150	972
40000	75	1077	993	1168	748	1259	471	1031	970	1118	728	1206	453	981	945	1065	708	1150	435
	80	1122	1122	1172	937	1263	683	1080	1080	1123	914	1211	665	1035	1035	1071	891	1156	646
	85	1177	1177	1175	1137	1265	893	1134	1134	1126	1115	1213	875	1089	1089	1075	1075	1158	856
	90	1230	1230	1230	1230	1267	1073	1187	1187	1186	1186	1215	1052	1140	1140	1139	1139	1160	1030

Table 9. Gross cooling capacities—90 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
16000	75	793	590	875	475	964	353
	80	797	686	873	566	965	448
	85	807	781	879	656	964	539
	90	831	831	883	753	971	630
20000	75	835	654	918	516	1005	367
	80	844	776	919	627	1008	482
	85	862	862	925	733	1011	595
	90	904	904	935	859	1013	702
25000	75	872	726	955	562	1039	380
	80	885	875	958	693	1043	521
	85	926	926	964	823	1047	660
	90	973	973	973	973	1050	783
30000	75	897	793	980	606	1062	393
	80	926	926	985	754	1067	558
	85	976	976	989	908	1070	719
	90	1024	1024	1023	1023	1073	861
33000	75	909	833	992	631	1072	400
	80	948	948	997	789	1078	579
	85	999	999	1001	957	1081	755
	90	1047	1047	1047	1047	1084	905
36000	75	919	871	1002	656	1081	407
	80	968	968	1007	823	1087	600
	85	1019	1019	1011	1005	1090	790
	90	1067	1067	1067	1067	1092	949
40000	75	931	920	1012	687	1091	416
	80	990	990	1018	867	1097	627
	85	1041	1041	1021	1021	1100	810
	90	1090	1090	1089	1089	1102	1006

Table 10. Gross cooling capacities—105 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
19000	75	1058	770	1166	625	1278	475	1021	746	1125	605	1232	456	978	726	1079	584	1184	436
	80	1117	908	1179	739	1280	588	1022	859	1136	718	1234	569	980	836	1072	694	1186	549
	85	1124	1020	1172	850	1281	701	1069	989	1129	828	1232	680	1040	971	1084	806	1181	659
	90	1094	1093	1177	960	1286	811	1061	1060	1134	938	1238	795	1025	1025	1090	916	1189	773
23000	75	1110	838	1218	669	1327	488	1067	816	1171	648	1278	469	1022	792	1124	627	1226	449
	80	1119	975	1220	805	1330	623	1075	951	1172	783	1281	604	1090	950	1125	760	1229	584
	85	1135	1111	1225	930	1334	757	1093	1088	1178	908	1284	737	1050	1050	1131	885	1229	715
	90	1178	1177	1236	1068	1335	890	1141	1141	1188	1045	1286	867	1103	1103	1142	1022	1234	845
28000	75	1156	916	1262	718	1370	502	1110	893	1214	697	1318	483	1062	868	1163	676	1262	462
	80	1171	1084	1265	874	1373	665	1123	1058	1217	852	1322	645	1077	1034	1166	828	1266	625
	85	1202	1201	1270	1025	1372	826	1162	1162	1222	1003	1322	806	1122	1122	1172	979	1267	785
	90	1258	1257	1288	1195	1378	976	1218	1218	1240	1171	1326	953	1176	1176	1187	1146	1271	929
33000	75	1189	990	1294	764	1400	514	1142	966	1246	744	1346	495	1092	941	1196	724	1288	475
	80	1213	1191	1298	939	1403	703	1161	1160	1249	917	1350	684	1118	1118	1196	893	1294	664
	85	1261	1260	1302	1116	1399	886	1219	1219	1252	1093	1351	870	1175	1175	1199	1069	1294	849
	90	1320	1320	1320	1319	1406	1057	1276	1276	1276	1275	1353	1034	1230	1230	1230	1229	1296	1010
38000	75	1214	1060	1316	808	1423	526	1164	1035	1268	789	1367	507	1114	1010	1217	767	1307	487
	80	1247	1246	1323	1001	1426	740	1204	1203	1272	979	1371	721	1159	1159	1218	955	1311	700
	85	1308	1307	1325	1203	1424	952	1264	1264	1275	1180	1372	933	1217	1217	1220	1156	1313	912
	90	1367	1366	1367	1366	1429	1137	1321	1321	1320	1320	1372	1114	1272	1272	1272	1271	1314	1089
43000	75	1233	1127	1336	850	1441	538	1182	1102	1284	830	1384	519	1131	1077	1227	808	1323	498
	80	1283	1282	1341	1063	1441	776	1239	1238	1289	1039	1386	757	1191	1191	1234	1015	1323	735
	85	1345	1345	1343	1289	1443	1012	1299	1299	1291	1265	1388	974	1249	1249	1235	1235	1328	951
	90	1403	1403	1403	1402	1446	1215	1356	1355	1355	1354	1386	1191	1306	1306	1302	1302	1327	1166
45000	75	1239	1153	1343	867	1447	542	1189	1129	1289	846	1389	523	1137	1103	1233	825	1328	503
	80	1296	1294	1347	1086	1448	790	1251	1251	1330	1068	1391	771	1202	1202	1306	1059	1328	750
	85	1358	1358	1350	1323	1480	1038	1311	1311	1296	1296	1447	1027	1261	1261	1240	1240	1412	1017
	90	1417	1417	1416	1416	1452	1246	1351	1254	1366	1366	1390	1221	1323	1188	1315	1315	1332	1197

Table 10. Gross cooling capacities—105 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
19000	75	933	702	1031	562	1130	415
	80	936	811	1023	672	1134	528
	85	949	923	1038	782	1127	637
	90	989	989	1037	890	1137	750
23000	75	975	767	1072	604	1168	427
	80	983	902	1076	736	1172	562
	85	1011	1011	1080	861	1170	692
	90	1061	1061	1092	996	1178	820
28000	75	1013	843	1109	653	1201	441
	80	1030	1009	1113	804	1206	603
	85	1077	1077	1117	954	1207	762
	90	1129	1129	1134	1120	1211	904
33000	75	1041	915	1134	699	1224	453
	80	1072	1072	1139	867	1230	641
	85	1127	1127	1142	1043	1231	826
	90	1180	1180	1179	1178	1229	984
38000	75	1060	983	1152	742	1242	465
	80	1109	1109	1157	928	1246	678
	85	1166	1166	1160	1129	1248	890
	90	1219	1219	1217	1217	1245	1062
43000	75	1076	1049	1166	784	1256	477
	80	1139	1139	1173	988	1256	713
	85	1195	1195	1174	1174	1262	924
	90	1248	1248	1247	1247	1257	1139
45000	75	1081	1075	1171	801	1261	481
	80	1149	1149	1254	1041	1261	727
	85	1205	1205	1280	1280	1266	945
	90	1258	1258	1257	1257	1261	1169

Table 11. Gross cooling capacities—120 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1156	837	1288	688	1426	527	1113	813	1241	665	1374	506	1064	788	1188	641	1317	483
	80	1161	978	1291	810	1426	654	1119	954	1244	787	1375	632	1072	928	1192	762	1318	608
	85	1173	1106	1294	930	1428	772	1132	1082	1247	907	1377	750	1086	1057	1196	883	1320	726
	90	1189	1189	1294	1072	1431	893	1154	1154	1249	1049	1380	871	1116	1116	1198	1024	1323	847
26000	75	1225	928	1358	742	1495	547	1178	903	1306	719	1439	525	1126	875	1249	693	1377	502
	80	1236	1102	1362	891	1496	698	1189	1077	1305	867	1440	676	1139	1050	1247	841	1378	651
	85	1239	1239	1362	1035	1499	843	1200	1200	1311	1010	1443	820	1157	1157	1255	983	1382	796
	90	1301	1301	1366	1212	1501	990	1261	1261	1323	1190	1446	968	1217	1217	1268	1164	1385	943
31000	75	1276	1007	1408	791	1543	563	1225	981	1353	767	1483	541	1170	952	1292	741	1418	517
	80	1293	1221	1406	966	1544	738	1245	1195	1354	942	1485	716	1192	1167	1294	914	1420	691
	85	1322	1322	1414	1130	1547	909	1280	1280	1360	1104	1488	886	1232	1232	1300	1076	1424	861
	90	1389	1389	1434	1352	1548	1081	1345	1345	1381	1327	1489	1056	1297	1297	1324	1299	1425	1029
36000	75	1313	1081	1445	836	1578	576	1261	1054	1388	812	1516	554	1203	1025	1325	786	1448	530
	80	1318	1318	1447	1033	1580	776	1274	1274	1390	1007	1518	753	1225	1225	1327	979	1451	729
	85	1389	1389	1452	1220	1583	971	1343	1343	1396	1194	1522	948	1292	1292	1334	1166	1455	923
	90	1458	1458	1457	1457	1585	1163	1411	1411	1410	1410	1523	1138	1359	1359	1358	1358	1457	1110
41000	75	1343	1151	1474	879	1606	589	1288	1123	1414	855	1541	567	1228	1093	1349	829	1471	543
	80	1370	1370	1476	1096	1608	812	1323	1323	1418	1070	1544	789	1271	1271	1353	1041	1474	764
	85	1443	1443	1482	1307	1612	1032	1395	1395	1423	1280	1547	1008	1341	1341	1359	1251	1478	983
	90	1514	1514	1513	1513	1614	1242	1464	1464	1463	1463	1549	1216	1409	1409	1409	1409	1480	1188
46000	75	1366	1217	1497	920	1627	602	1310	1190	1436	896	1561	579	1248	1159	1369	869	1489	555
	80	1413	1413	1500	1156	1630	847	1364	1364	1439	1130	1563	824	1309	1309	1373	1100	1493	799
	85	1488	1488	1504	1389	1634	1090	1437	1437	1444	1363	1566	1066	1381	1381	1378	1333	1496	1041
	90	1560	1560	1560	1560	1637	1319	1508	1508	1507	1507	1569	1292	1450	1450	1449	1449	1498	1264
51000	75	1385	1281	1515	959	1645	614	1328	1253	1453	935	1577	591	1265	1222	1385	909	1504	566
	80	1449	1449	1518	1214	1648	881	1398	1398	1457	1187	1577	857	1342	1342	1390	1158	1504	832
	85	1525	1525	1522	1469	1652	1147	1472	1472	1461	1442	1582	1122	1414	1414	1394	1394	1510	1097
	90	1600	1600	1599	1599	1655	1393	1543	1543	1543	1543	1585	1365	1483	1483	1483	1483	1512	1337
54000	75	1395	1318	1524	982	1654	620	1337	1290	1462	958	1585	596	1273	1259	1393	931	1511	572
	80	1468	1468	1528	1247	1654	900	1416	1416	1466	1220	1585	877	1358	1358	1398	1191	1511	852
	85	1544	1544	1531	1516	1662	1180	1491	1491	1470	1470	1591	1155	1432	1432	1402	1402	1518	1130
	90	1621	1621	1620	1620	1665	1436	1562	1562	1561	1561	1593	1408	1501	1501	1500	1500	1519	1379

Table 11. Gross cooling capacities—120 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
21000	75	1016	765	1133	615	1255	459
	80	1024	902	1137	737	1256	582
	85	1021	1021	1137	855	1259	701
	90	1074	1074	1144	997	1262	821
26000	75	1072	847	1188	667	1309	476
	80	1086	1022	1186	814	1311	625
	85	1111	1111	1195	954	1315	770
	90	1170	1170	1210	1135	1314	916
31000	75	1112	922	1228	714	1346	491
	80	1119	1119	1230	885	1349	665
	85	1182	1182	1236	1047	1353	834
	90	1244	1244	1243	1243	1355	1000
36000	75	1141	994	1257	758	1373	504
	80	1172	1172	1260	949	1377	702
	85	1238	1238	1266	1135	1381	896
	90	1302	1302	1301	1301	1383	1081
41000	75	1165	1062	1280	801	1394	517
	80	1215	1215	1284	1010	1398	738
	85	1283	1283	1289	1220	1402	956
	90	1348	1348	1348	1348	1405	1158
46000	75	1183	1127	1297	841	1410	529
	80	1251	1251	1302	1069	1415	772
	85	1320	1320	1307	1302	1418	1014
	90	1386	1386	1385	1385	1421	1233
51000	75	1198	1190	1312	880	1423	539
	80	1280	1280	1317	1126	1424	805
	85	1350	1350	1321	1321	1431	1070
	90	1417	1417	1416	1416	1434	1306
54000	75	1206	1206	1319	903	1430	545
	80	1296	1296	1324	1159	1431	825
	85	1366	1366	1329	1329	1438	1103
	90	1432	1432	1432	1432	1440	1348

Table 12. Gross cooling capacities—130 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature 85 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	95 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	105 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1335	964	1485	792	1634	607	1283	936	1429	766	1575	583	1226	906	1368	737	1510	556
	80	1342	1110	1488	930	1634	747	1291	1082	1433	904	1576	723	1236	1051	1372	875	1511	696
	85	1354	1251	1491	1068	1635	885	1305	1222	1437	1041	1579	860	1251	1191	1376	1012	1514	833
	90	1373	1373	1493	1213	1640	1021	1331	1331	1439	1185	1582	995	1285	1285	1379	1155	1517	968
26000	75	1379	1021	1531	827	1678	618	1324	992	1473	800	1616	594	1270	964	1409	771	1548	567
	80	1389	1184	1534	981	1679	776	1339	1156	1477	955	1618	751	1281	1125	1406	924	1550	724
	85	1408	1345	1538	1135	1682	929	1356	1316	1481	1108	1621	904	1300	1284	1414	1077	1553	876
	90	1446	1446	1543	1298	1684	1081	1402	1402	1487	1270	1624	1056	1352	1352	1425	1239	1557	1028
30000	75	1433	1094	1579	869	1724	631	1376	1064	1518	842	1659	606	1314	1031	1451	812	1588	580
	80	1446	1282	1577	1045	1726	811	1390	1252	1515	1018	1661	785	1330	1220	1447	988	1590	758
	85	1458	1458	1584	1218	1729	986	1411	1411	1525	1189	1664	960	1359	1359	1459	1158	1594	932
	90	1529	1529	1597	1408	1732	1160	1481	1481	1539	1379	1666	1133	1428	1428	1475	1348	1597	1105
35000	75	1481	1175	1625	918	1769	646	1421	1144	1562	891	1699	620	1356	1111	1492	861	1625	593
	80	1501	1398	1622	1122	1771	852	1444	1368	1563	1095	1701	826	1381	1335	1494	1063	1628	798
	85	1538	1538	1631	1316	1775	1053	1488	1488	1569	1287	1704	1026	1432	1432	1500	1254	1631	998
	90	1611	1611	1652	1541	1776	1254	1560	1560	1592	1512	1705	1224	1504	1504	1526	1481	1632	1194
40000	75	1518	1252	1660	965	1803	659	1456	1221	1595	938	1729	633	1388	1186	1523	908	1653	606
	80	1547	1511	1662	1192	1806	892	1474	1474	1597	1162	1732	864	1416	1416	1526	1130	1656	837
	85	1603	1603	1666	1409	1810	1119	1550	1550	1602	1380	1735	1091	1491	1491	1531	1347	1659	1063
	90	1678	1678	1690	1664	1812	1340	1624	1624	1623	1623	1737	1309	1564	1564	1563	1563	1660	1278
45000	75	1546	1326	1687	1010	1830	672	1483	1294	1620	982	1753	645	1414	1259	1547	953	1675	618
	80	1578	1578	1689	1257	1834	930	1523	1523	1623	1228	1756	902	1463	1463	1550	1195	1678	875
	85	1656	1656	1693	1500	1838	1183	1601	1601	1627	1470	1759	1155	1539	1539	1555	1437	1680	1126
	90	1734	1734	1733	1733	1840	1424	1674	1674	1674	1674	1761	1392	1612	1612	1611	1611	1682	1371
50000	75	1570	1397	1709	1053	1852	684	1505	1365	1641	1026	1773	657	1434	1329	1566	996	1693	630
	80	1621	1621	1712	1321	1857	968	1564	1564	1644	1291	1776	939	1502	1502	1570	1258	1696	911
	85	1701	1701	1715	1589	1860	1246	1642	1642	1647	1558	1779	1217	1579	1579	1573	1525	1697	1188
	90	1782	1782	1781	1781	1862	1505	1718	1718	1717	1717	1781	1473	1651	1651	1650	1650	1699	1440
55000	75	1589	1465	1727	1095	1871	696	1523	1433	1658	1068	1789	669	1451	1398	1582	1039	1708	642
	80	1657	1657	1730	1383	1875	1004	1599	1599	1661	1352	1793	975	1535	1535	1586	1319	1710	947
	85	1739	1739	1733	1675	1878	1307	1677	1677	1663	1644	1796	1279	1612	1612	1588	1588	1712	1249
	90	1823	1823	1822	1822	1880	1585	1755	1755	1754	1754	1798	1553	1685	1685	1684	1684	1713	1519
58000	75	1598	1506	1737	1120	1880	703	1532	1473	1666	1093	1798	676	1460	1438	1590	1063	1716	649
	80	1676	1676	1740	1419	1885	1025	1617	1617	1669	1388	1801	997	1552	1552	1594	1355	1718	968
	85	1760	1760	1743	1727	1887	1344	1696	1696	1671	1671	1804	1315	1629	1629	1596	1596	1719	1285
	90	1845	1845	1844	1844	1889	1632	1775	1775	1774	1774	1806	1599	1702	1702	1702	1702	1720	1566

Table 12. Gross cooling capacities—130 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1167	875	1304	708	1439	528
	80	1178	1019	1309	845	1440	667
	85	1195	1160	1313	982	1444	803
	90	1237	1237	1317	1123	1447	938
26000	75	1210	932	1341	741	1474	538
	80	1216	1090	1338	893	1476	695
	85	1237	1237	1348	1044	1480	847
	90	1301	1301	1359	1206	1483	998
30000	75	1250	998	1381	782	1510	551
	80	1267	1186	1375	957	1513	728
	85	1304	1304	1388	1124	1517	903
	90	1371	1371	1406	1314	1518	1074
35000	75	1288	1076	1418	830	1544	564
	80	1315	1300	1420	1029	1548	768
	85	1373	1373	1426	1220	1551	968
	90	1442	1442	1441	1441	1553	1161
40000	75	1318	1151	1446	876	1569	577
	80	1355	1355	1449	1095	1574	807
	85	1428	1428	1454	1312	1576	1033
	90	1498	1498	1497	1497	1578	1244
45000	75	1341	1223	1468	921	1589	589
	80	1398	1398	1472	1159	1594	845
	85	1472	1472	1476	1402	1596	1096
	90	1542	1542	1542	1542	1597	1326
50000	75	1360	1292	1485	965	1606	601
	80	1435	1435	1489	1222	1610	882
	85	1509	1509	1493	1489	1611	1158
	90	1578	1578	1578	1578	1611	1405
55000	75	1375	1360	1500	1007	1620	613
	80	1465	1465	1504	1283	1623	917
	85	1539	1539	1507	1507	1623	1219
	90	1608	1608	1608	1608	1624	1484
58000	75	1383	1383	1507	1032	1627	620
	80	1481	1481	1511	1318	1630	939
	85	1555	1555	1513	1513	1630	1255
	90	1624	1624	1624	1624	1630	1530

Table 13. Gross cooling capacities—150 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
23000	75	1471	1041	1627	860	1782	668	1407	1007	1569	831	1723	643	1345	974	1504	800	1656	615
	80	1474	1185	1626	1002	1783	810	1418	1154	1567	972	1724	785	1358	1121	1502	941	1658	756
	85	1479	1327	1633	1145	1783	951	1423	1294	1575	1116	1725	925	1364	1260	1511	1084	1658	896
	90	1494	1471	1636	1287	1787	1091	1443	1441	1579	1258	1729	1065	1392	1392	1515	1241	1663	1037
26000	75	1517	1100	1679	895	1831	679	1456	1068	1619	867	1769	654	1390	1034	1551	836	1699	626
	80	1529	1265	1678	1055	1833	838	1471	1234	1622	1027	1771	813	1405	1196	1555	996	1702	784
	85	1537	1423	1685	1215	1833	997	1480	1390	1626	1187	1771	971	1419	1355	1559	1155	1705	942
	90	1569	1569	1689	1375	1838	1154	1521	1521	1629	1346	1775	1128	1469	1469	1563	1312	1707	1099
30000	75	1571	1177	1732	939	1883	692	1507	1145	1670	911	1815	666	1438	1110	1600	880	1744	638
	80	1583	1360	1731	1122	1886	875	1522	1327	1667	1094	1817	847	1461	1293	1596	1061	1747	820
	85	1604	1546	1738	1305	1889	1056	1546	1514	1677	1277	1820	1028	1484	1480	1605	1245	1750	1000
	90	1660	1660	1744	1485	1891	1237	1610	1610	1685	1455	1822	1208	1555	1555	1617	1422	1751	1180
35000	75	1631	1269	1782	990	1933	707	1568	1236	1719	963	1859	679	1497	1199	1646	932	1786	652
	80	1646	1479	1780	1203	1936	918	1585	1447	1715	1175	1862	889	1517	1410	1640	1143	1789	861
	85	1676	1676	1786	1411	1939	1127	1624	1624	1723	1381	1864	1099	1565	1565	1652	1348	1790	1070
	90	1750	1750	1801	1619	1940	1336	1699	1699	1740	1589	1866	1307	1640	1640	1671	1556	1791	1278
40000	75	1672	1352	1820	1040	1971	720	1607	1318	1755	1012	1894	692	1535	1282	1681	981	1818	665
	80	1695	1593	1818	1282	1974	959	1633	1561	1756	1253	1896	930	1565	1525	1683	1220	1819	902
	85	1747	1747	1824	1511	1976	1197	1693	1693	1759	1480	1898	1168	1632	1632	1686	1447	1820	1139
	90	1824	1824	1851	1751	1976	1433	1768	1768	1784	1720	1899	1402	1707	1707	1717	1687	1820	1369
45000	75	1704	1430	1850	1088	2001	733	1638	1397	1782	1060	1922	705	1564	1360	1708	1030	1844	678
	80	1736	1705	1852	1353	2003	1000	1670	1670	1784	1323	1923	971	1607	1607	1710	1289	1843	942
	85	1806	1806	1855	1608	2004	1266	1749	1749	1785	1577	1925	1237	1686	1686	1712	1543	1843	1208
	90	1887	1887	1893	1875	2005	1522	1824	1824	1824	1824	1926	1490	1760	1760	1760	1760	1844	1457
50000	75	1728	1507	1875	1136	2026	745	1662	1474	1805	1107	1945	717	1587	1437	1729	1077	1865	690
	80	1772	1772	1877	1422	2027	1040	1716	1716	1806	1390	1946	1011	1651	1651	1731	1357	1863	982
	85	1856	1856	1879	1705	2026	1333	1794	1794	1806	1672	1946	1304	1730	1730	1732	1639	1862	1274
	90	1939	1939	1939	1939	2026	1610	1873	1873	1872	1872	1946	1578	1804	1804	1803	1803	1861	1544
55000	75	1748	1582	1895	1183	2047	758	1682	1549	1823	1154	1964	730	1606	1512	1746	1124	1883	703
	80	1813	1813	1897	1490	2046	1080	1754	1754	1823	1457	1964	1051	1688	1688	1748	1424	1879	1022
	85	1900	1900	1898	1800	2044	1416	1834	1834	1823	1766	1963	1371	1767	1767	1747	1733	1877	1341
	90	1983	1983	1982	1982	2045	1697	1914	1914	1913	1913	1962	1664	1841	1841	1841	1841	1876	1630
58000	75	1759	1626	1906	1211	2058	765	1691	1593	1832	1182	1975	737	1615	1556	1755	1152	1893	710
	80	1835	1835	1908	1530	2056	1104	1774	1774	1832	1497	1973	1075	1707	1707	1756	1463	1888	1046
	85	1923	1923	1908	1856	2054	1440	1854	1854	1832	1822	1972	1411	1786	1786	1755	1755	1885	1381
	90	2006	2006	2005	2005	2055	1749	1936	1936	1935	1935	1970	1716	1861	1861	1861	1861	1884	1682

Table 13. Gross cooling capacities—150 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1286	943	1438	769	1583	585
	80	1300	1090	1436	910	1586	726
	85	1307	1227	1446	1053	1585	866
	90	1344	1344	1450	1194	1592	1006
26000	75	1328	1002	1482	804	1624	596
	80	1341	1161	1486	964	1627	754
	85	1359	1322	1490	1122	1630	911
	90	1416	1416	1494	1278	1633	1068
30000	75	1382	1079	1527	848	1665	608
	80	1395	1258	1522	1029	1669	789
	85	1425	1425	1533	1210	1672	969
	90	1497	1497	1545	1387	1674	1148
35000	75	1427	1163	1569	899	1704	622
	80	1448	1374	1563	1110	1708	831
	85	1504	1504	1576	1312	1709	1039
	90	1577	1577	1597	1520	1710	1247
40000	75	1462	1244	1601	949	1734	636
	80	1495	1488	1604	1183	1737	872
	85	1567	1567	1607	1410	1737	1109
	90	1640	1640	1640	1640	1737	1335
45000	75	1488	1322	1626	997	1758	649
	80	1540	1540	1629	1253	1759	913
	85	1618	1618	1631	1507	1758	1177
	90	1690	1690	1690	1690	1757	1422
50000	75	1509	1398	1646	1045	1778	661
	80	1581	1581	1648	1320	1777	953
	85	1659	1659	1650	1602	1775	1244
	90	1730	1730	1730	1730	1773	1508
55000	75	1526	1473	1662	1092	1795	674
	80	1616	1616	1664	1386	1792	993
	85	1693	1693	1664	1664	1788	1310
	90	1764	1764	1763	1763	1785	1594
58000	75	1535	1517	1671	1120	1804	682
	80	1634	1634	1672	1426	1800	1017
	85	1711	1711	1671	1671	1795	1350
	90	1782	1782	1781	1781	1792	1645

Table 14. Gross cooling capacities—90 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature 85 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	95 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	105 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
16000	75	950	680	1052	558	1153	430	911	659	1011	538	1112	413	874	640	969	518	1067	394
	80	958	779	1052	654	1155	525	919	756	1012	634	1114	508	882	735	969	614	1069	489
	85	960	871	1058	750	1157	620	927	852	1019	731	1113	603	890	830	977	711	1068	584
	90	972	961	1061	846	1158	715	943	943	1021	826	1118	697	911	911	980	804	1075	679
20000	75	1010	757	1110	602	1206	443	970	735	1067	583	1162	426	928	713	1021	563	1115	408
	80	1014	871	1107	721	1208	561	975	850	1063	701	1165	544	933	827	1017	680	1119	525
	85	1029	992	1113	838	1210	678	991	970	1072	818	1167	661	951	948	1026	796	1122	642
	90	1065	1065	1116	951	1211	795	1031	1031	1075	931	1169	777	995	995	1030	908	1123	759
25000	75	1059	839	1156	652	1249	457	1017	816	1112	633	1204	440	971	793	1064	613	1154	422
	80	1072	984	1157	798	1251	601	1030	962	1113	778	1207	585	986	939	1066	756	1158	567
	85	1099	1099	1160	937	1250	748	1063	1063	1117	916	1205	731	1023	1023	1070	894	1160	711
	90	1148	1148	1173	1081	1252	888	1112	1112	1131	1060	1209	869	1073	1073	1086	1039	1161	849
30000	75	1093	915	1188	700	1279	469	1048	893	1142	681	1232	453	1000	868	1093	661	1181	435
	80	1113	1092	1189	866	1280	641	1069	1069	1144	846	1235	625	1027	1027	1096	824	1185	607
	85	1159	1159	1191	1030	1280	813	1121	1121	1146	1010	1235	797	1080	1080	1098	988	1185	779
	90	1209	1209	1213	1205	1280	972	1171	1171	1171	1171	1235	953	1130	1130	1130	1130	1186	933
33000	75	1108	960	1202	728	1294	477	1063	937	1155	709	1245	460	1014	912	1106	689	1193	442
	80	1135	1135	1203	905	1293	664	1096	1096	1157	885	1247	648	1053	1053	1109	863	1197	631
	85	1187	1187	1204	1085	1293	847	1148	1148	1159	1065	1247	829	1107	1107	1111	1043	1197	819
	90	1237	1237	1236	1236	1293	1022	1198	1198	1198	1198	1246	1003	1156	1156	1156	1156	1196	983
36000	75	1120	1003	1214	755	1306	484	1075	980	1166	737	1257	467	1025	955	1117	717	1204	450
	80	1159	1159	1215	944	1304	688	1119	1119	1169	923	1258	672	1076	1076	1120	901	1207	654
	85	1211	1211	1215	1140	1304	882	1172	1172	1170	1119	1257	863	1129	1129	1121	1097	1207	843
	90	1261	1261	1261	1261	1303	1072	1221	1221	1221	1221	1254	1052	1178	1178	1178	1178	1204	1032
40000	75	1134	1060	1227	792	1320	494	1088	1037	1179	774	1270	477	1037	1011	1129	754	1216	460
	80	1186	1186	1227	994	1317	719	1145	1145	1181	974	1270	703	1102	1102	1132	951	1218	686
	85	1238	1238	1227	1211	1316	925	1199	1199	1181	1181	1268	906	1155	1155	1132	1132	1217	885
	90	1290	1290	1289	1289	1314	1138	1246	1246	1246	1246	1264	1118	1202	1202	1202	1202	1213	1097

Table 14. Gross cooling capacities—90 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
16000	75	843	623	932	501	1024	377
	80	849	717	929	595	1026	472
	85	856	811	937	692	1025	566
	90	881	881	940	784	1031	660
20000	75	890	692	979	544	1068	390
	80	893	805	974	662	1071	507
	85	914	914	984	775	1074	624
	90	960	960	992	889	1075	740
25000	75	928	771	1018	594	1103	404
	80	944	916	1020	735	1107	548
	85	986	986	1023	872	1109	692
	90	1034	1034	1040	1017	1110	828
30000	75	956	846	1044	642	1128	417
	80	987	987	1047	801	1132	588
	85	1038	1038	1049	965	1132	760
	90	1086	1086	1086	1086	1133	912
33000	75	968	889	1056	670	1140	425
	80	1012	1012	1059	840	1143	612
	85	1063	1063	1061	1020	1143	786
	90	1111	1111	1110	1110	1142	961
36000	75	979	932	1066	698	1150	432
	80	1033	1033	1069	878	1152	636
	85	1084	1084	1070	1070	1152	820
	90	1131	1131	1131	1131	1150	1010
40000	75	990	988	1077	735	1161	442
	80	1057	1057	1079	928	1163	667
	85	1108	1108	1080	1080	1161	863
	90	1154	1154	1153	1153	1158	1075

Table 15. Gross cooling capacities—105 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
19000	75	1104	793	1207	644	1320	491	1055	769	1162	623	1279	474	1010	745	1119	602	1230	454
	80	1125	916	1212	759	1326	605	1091	897	1166	738	1283	586	1060	879	1118	715	1237	567
	85	1144	1033	1216	872	1327	718	1098	1008	1172	850	1277	698	1056	984	1127	829	1234	678
	90	1130	1129	1220	985	1329	830	1097	1096	1191	970	1283	810	1061	1061	1131	940	1234	789
23000	75	1153	865	1262	688	1370	504	1109	842	1218	668	1327	487	1064	818	1171	647	1274	467
	80	1156	997	1262	825	1375	639	1111	973	1215	804	1329	621	1065	948	1164	781	1279	601
	85	1216	1154	1267	957	1377	771	1131	1112	1224	936	1325	756	1090	1089	1177	914	1272	735
	90	1217	1216	1270	1088	1377	908	1180	1180	1271	1082	1330	889	1143	1143	1184	1045	1277	867
28000	75	1200	946	1307	739	1414	518	1155	922	1261	719	1367	501	1108	898	1211	697	1313	482
	80	1214	1110	1311	900	1413	679	1258	1117	1265	879	1370	663	1121	1061	1216	856	1321	645
	85	1244	1243	1314	1055	1411	843	1205	1205	1268	1034	1369	824	1165	1165	1218	1011	1310	806
	90	1300	1300	1575	1303	1418	1001	1261	1261	1280	1194	1369	980	1220	1220	1232	1171	1315	957
33000	75	1234	1022	1339	784	1448	532	1187	999	1295	766	1397	514	1139	975	1247	746	1342	495
	80	1255	1216	1344	968	1448	720	1210	1192	1297	946	1399	703	1164	1164	1245	924	1349	685
	85	1305	1304	1345	1150	1450	915	1265	1265	1298	1129	1397	887	1222	1222	1247	1106	1341	873
	90	1361	1360	1367	1341	1448	1087	1321	1320	1320	1319	1394	1064	1276	1276	1276	1275	1339	1042
38000	75	1259	1097	1363	831	1473	545	1211	1073	1318	812	1420	527	1162	1049	1268	793	1364	508
	80	1293	1292	1368	1034	1470	759	1252	1252	1319	1012	1418	741	1208	1208	1267	989	1362	721
	85	1353	1352	1368	1244	1469	971	1311	1311	1319	1222	1421	953	1265	1265	1267	1198	1370	934
	90	1409	1409	1409	1409	1469	1171	1365	1365	1364	1363	1411	1148	1319	1319	1316	1316	1355	1125
43000	75	1278	1170	1382	877	1493	557	1230	1146	1336	859	1439	540	1179	1121	1286	839	1381	521
	80	1331	1330	1386	1100	1485	797	1289	1288	1336	1077	1434	780	1242	1242	1282	1054	1375	760
	85	1389	1388	1381	1333	1487	1032	1347	1347	1335	1312	1438	1013	1299	1299	1281	1281	1385	994
	90	1449	1448	1448	1448	1484	1254	1399	1399	1398	1397	1426	1231	1352	1352	1351	1351	1367	1207
45000	75	1284	1198	1389	895	1500	562	1236	1175	1342	877	1446	545	1185	1149	1292	858	1387	526
	80	1344	1343	1392	1125	1494	814	1301	1301	1342	1103	1439	795	1254	1254	1288	1079	1381	775
	85	1403	1402	1389	1370	1494	1050	1359	1359	1340	1340	1549	1069	1311	1311	1286	1286	1502	1055
	90	1437	1402	1462	1462	1490	1287	1412	1412	1410	1410	1431	1174	1363	1363	1362	1362	1369	1239

Table 15. Gross cooling capacities—105 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
19000	75	979	726	1078	582	1178	434
	80	1004	848	1071	693	1185	546
	85	992	950	1082	809	1175	656
	90	1026	1026	1115	928	1183	767
23000	75	1020	795	1121	625	1219	446
	80	1021	924	1113	759	1224	580
	85	1051	1051	1127	890	1220	712
	90	1103	1103	1135	1021	1222	847
28000	75	1060	874	1158	675	1255	461
	80	1073	1035	1162	832	1264	624
	85	1122	1122	1165	986	1254	781
	90	1174	1174	1178	1145	1256	933
33000	75	1088	949	1192	725	1281	474
	80	1119	1119	1189	898	1292	665
	85	1174	1174	1191	1080	1284	844
	90	1227	1227	1227	1226	1278	1017
38000	75	1109	1022	1212	771	1301	487
	80	1159	1159	1209	963	1299	700
	85	1215	1215	1209	1172	1301	902
	90	1267	1267	1263	1263	1293	1100
43000	75	1124	1094	1229	818	1314	499
	80	1191	1191	1224	1027	1312	738
	85	1246	1246	1222	1222	1324	970
	90	1298	1298	1293	1293	1304	1182
45000	75	1130	1122	1225	833	1319	504
	80	1202	1202	1228	1053	1317	754
	85	1257	1257	1227	1227	1417	1028
	90	1351	1148	1303	1303	1307	1214

Table 16. Gross cooling capacities—120 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature 85 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	95 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	105 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
21000	75	1225	879	1366	723	1500	559	1176	852	1316	700	1450	538	1123	824	1260	673	1392	514
	80	1235	1007	1366	848	1501	683	1187	981	1314	823	1452	662	1133	951	1264	798	1394	638
	85	1240	1130	1371	973	1502	806	1193	1103	1322	949	1451	785	1142	1074	1267	923	1394	760
	90	1256	1256	1374	1098	1505	929	1217	1217	1326	1074	1456	908	1175	1175	1271	1047	1400	884
26000	75	1296	974	1439	780	1567	575	1243	947	1386	756	1514	555	1194	920	1326	729	1453	531
	80	1308	1126	1436	932	1570	727	1257	1099	1382	908	1516	706	1201	1068	1321	880	1457	683
	85	1324	1281	1444	1085	1573	879	1276	1255	1393	1062	1518	857	1224	1224	1332	1033	1460	833
	90	1375	1375	1449	1234	1575	1029	1333	1333	1399	1209	1519	1007	1287	1287	1341	1181	1462	983
31000	75	1357	1062	1489	830	1616	590	1303	1034	1435	807	1558	569	1243	1003	1373	781	1495	546
	80	1370	1242	1486	1012	1619	770	1318	1214	1429	987	1560	747	1259	1183	1364	959	1499	724
	85	1422	1358	1493	1187	1622	948	1356	1356	1440	1162	1560	925	1306	1306	1380	1134	1501	902
	90	1465	1465	1504	1363	1623	1126	1422	1422	1453	1339	1562	1102	1372	1372	1395	1311	1501	1079
36000	75	1396	1143	1526	878	1652	604	1341	1114	1470	855	1591	582	1279	1083	1407	829	1525	559
	80	1416	1352	1527	1086	1655	810	1364	1325	1472	1060	1591	786	1306	1294	1409	1032	1529	764
	85	1468	1468	1528	1283	1656	1016	1423	1423	1475	1258	1593	992	1372	1372	1413	1230	1530	969
	90	1534	1534	1550	1491	1657	1217	1488	1488	1496	1465	1594	1191	1437	1437	1437	1437	1530	1165
41000	75	1426	1219	1553	925	1680	617	1370	1191	1497	902	1617	595	1306	1159	1432	876	1549	572
	80	1454	1454	1554	1153	1683	850	1407	1407	1498	1128	1617	826	1353	1353	1435	1100	1552	803
	85	1522	1522	1556	1378	1683	1083	1476	1476	1499	1352	1617	1059	1423	1423	1438	1324	1551	1035
	90	1592	1592	1592	1592	1684	1303	1539	1539	1539	1539	1618	1276	1488	1488	1487	1487	1550	1249
46000	75	1449	1293	1574	971	1703	629	1393	1265	1517	948	1639	608	1328	1233	1452	923	1568	584
	80	1497	1497	1576	1219	1704	889	1449	1449	1518	1193	1637	865	1394	1394	1455	1165	1570	842
	85	1569	1569	1578	1471	1704	1149	1518	1518	1518	1444	1636	1125	1464	1464	1456	1416	1567	1101
	90	1640	1640	1639	1639	1704	1388	1584	1584	1584	1584	1636	1361	1527	1527	1526	1526	1565	1333
51000	75	1468	1366	1593	1017	1721	641	1411	1338	1534	994	1657	620	1345	1306	1468	968	1584	597
	80	1533	1533	1594	1285	1721	927	1484	1484	1534	1258	1653	904	1428	1428	1470	1229	1585	881
	85	1608	1608	1595	1562	1721	1214	1552	1552	1532	1531	1652	1191	1497	1497	1470	1470	1580	1167
	90	1680	1680	1680	1680	1721	1473	1621	1621	1620	1620	1649	1444	1560	1560	1559	1559	1578	1416
54000	75	1477	1409	1602	1044	1731	649	1420	1381	1542	1021	1666	628	1354	1349	1476	996	1591	604
	80	1553	1553	1603	1323	1731	951	1502	1502	1542	1296	1662	927	1446	1446	1478	1268	1592	904
	85	1628	1628	1603	1603	1730	1252	1571	1571	1539	1539	1660	1230	1514	1514	1477	1477	1587	1207
	90	1701	1701	1701	1701	1730	1523	1640	1640	1639	1639	1656	1494	1578	1578	1577	1577	1585	1466

Table 16. Gross cooling capacities—120 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
21000	75	1070	797	1202	646	1328	488
	80	1082	923	1206	771	1332	612
	85	1091	1046	1210	895	1330	734
	90	1132	1132	1211	1017	1338	857
26000	75	1137	890	1263	702	1385	505
	80	1148	1040	1256	852	1390	657
	85	1175	1175	1270	1003	1394	807
	90	1237	1237	1280	1151	1396	957
31000	75	1182	972	1307	753	1424	520
	80	1200	1152	1308	931	1430	698
	85	1254	1254	1314	1103	1433	876
	90	1318	1318	1332	1281	1434	1050
36000	75	1215	1050	1338	801	1452	533
	80	1246	1246	1341	1001	1459	739
	85	1315	1315	1345	1199	1460	943
	90	1380	1380	1380	1380	1461	1136
41000	75	1240	1126	1361	848	1473	546
	80	1294	1294	1365	1068	1481	778
	85	1364	1364	1368	1293	1480	1010
	90	1428	1428	1428	1428	1480	1221
46000	75	1260	1199	1380	894	1490	559
	80	1333	1333	1384	1133	1498	817
	85	1403	1403	1386	1384	1496	1076
	90	1466	1466	1465	1465	1494	1304
51000	75	1276	1271	1395	940	1504	571
	80	1366	1366	1398	1197	1512	856
	85	1435	1435	1399	1399	1509	1141
	90	1496	1496	1495	1495	1504	1387
54000	75	1284	1284	1402	968	1511	578
	80	1382	1382	1406	1235	1519	880
	85	1451	1451	1406	1406	1516	1149
	90	1511	1511	1511	1511	1509	1436

Table 17. Gross cooling capacities—130 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
23000	75	1396	1000	1553	823	1701	634	1340	970	1496	796	1644	610	1280	938	1433	766	1579	584
	80	1406	1146	1552	964	1702	775	1352	1116	1494	936	1645	751	1293	1084	1437	908	1581	724
	85	1412	1285	1559	1106	1702	915	1359	1255	1503	1079	1645	890	1301	1222	1441	1048	1580	863
	90	1431	1431	1562	1247	1706	1054	1386	1386	1507	1220	1650	1029	1338	1338	1445	1189	1587	1002
26000	75	1443	1060	1601	858	1746	645	1384	1029	1542	831	1686	621	1321	997	1477	801	1619	594
	80	1457	1223	1604	1017	1748	803	1399	1191	1546	990	1688	778	1335	1156	1472	958	1622	752
	85	1467	1380	1607	1176	1748	960	1413	1349	1550	1149	1690	935	1353	1316	1485	1118	1625	908
	90	1508	1508	1610	1333	1753	1116	1462	1462	1554	1305	1692	1091	1411	1411	1490	1273	1628	1064
30000	75	1493	1136	1650	901	1793	657	1441	1108	1590	875	1729	633	1376	1073	1522	845	1660	607
	80	1506	1316	1648	1083	1796	838	1454	1287	1586	1056	1731	813	1390	1253	1516	1025	1664	787
	85	1531	1503	1655	1265	1799	1018	1477	1473	1595	1237	1733	992	1420	1420	1528	1205	1666	966
	90	1593	1593	1663	1441	1801	1198	1546	1546	1606	1413	1735	1171	1492	1492	1541	1382	1668	1144
35000	75	1551	1225	1696	952	1839	672	1490	1193	1635	926	1770	646	1422	1158	1565	896	1699	621
	80	1568	1435	1694	1164	1842	881	1509	1403	1630	1136	1772	854	1443	1369	1557	1105	1702	828
	85	1606	1606	1700	1367	1845	1089	1556	1556	1640	1339	1774	1062	1499	1499	1571	1307	1704	1035
	90	1678	1678	1716	1574	1846	1297	1628	1628	1657	1546	1775	1269	1572	1572	1592	1514	1704	1241
40000	75	1589	1307	1731	1001	1874	685	1527	1275	1668	975	1801	659	1456	1239	1597	945	1729	634
	80	1614	1547	1732	1239	1877	922	1555	1517	1669	1211	1803	895	1490	1482	1599	1178	1731	869
	85	1672	1672	1735	1465	1878	1159	1621	1621	1672	1437	1805	1131	1562	1562	1603	1405	1731	1104
	90	1747	1747	1763	1706	1879	1389	1692	1692	1701	1676	1806	1359	1635	1635	1634	1634	1731	1329
45000	75	1618	1384	1759	1049	1902	698	1555	1352	1694	1022	1827	672	1483	1317	1622	993	1752	647
	80	1650	1650	1760	1309	1904	963	1596	1596	1695	1279	1828	936	1535	1535	1624	1247	1753	909
	85	1727	1727	1762	1562	1904	1227	1673	1673	1696	1532	1829	1200	1613	1613	1626	1501	1752	1172
	90	1806	1806	1805	1805	1905	1477	1745	1745	1745	1745	1829	1447	1684	1684	1683	1683	1752	1416
50000	75	1641	1460	1781	1096	1925	711	1577	1428	1714	1070	1849	685	1505	1393	1641	1041	1772	659
	80	1693	1693	1782	1377	1926	1003	1639	1639	1715	1347	1848	976	1577	1577	1644	1315	1771	949
	85	1774	1774	1784	1658	1925	1294	1715	1715	1715	1627	1848	1267	1654	1654	1645	1596	1769	1239
	90	1854	1854	1853	1853	1925	1565	1790	1790	1790	1790	1848	1534	1724	1724	1724	1724	1768	1502
55000	75	1659	1535	1799	1143	1944	723	1595	1503	1731	1116	1868	698	1522	1467	1657	1088	1789	672
	80	1731	1731	1801	1444	1944	1043	1674	1674	1731	1413	1865	1016	1611	1611	1659	1381	1786	989
	85	1815	1815	1802	1752	1942	1360	1751	1751	1730	1721	1864	1333	1687	1687	1659	1659	1783	1305
	90	1895	1895	1907	1859	1942	1652	1828	1828	1828	1828	1862	1620	1759	1759	1758	1758	1781	1588
58000	75	1669	1579	1809	1171	1954	730	1604	1547	1740	1144	1878	705	1531	1511	1666	1116	1798	679
	80	1751	1751	1811	1484	1953	1067	1693	1693	1739	1452	1874	1040	1629	1629	1667	1420	1794	1013
	85	1836	1836	1811	1808	1951	1400	1770	1770	1738	1738	1872	1373	1705	1705	1666	1666	1791	1345
	90	1916	1916	1916	1916	1952	1704	1848	1848	1847	1847	1869	1671	1777	1777	1777	1777	1788	1639

Table 17. Gross cooling capacities—130 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1221	908	1369	736	1508	555
	80	1234	1051	1373	878	1511	695
	85	1245	1190	1377	1018	1510	834
	90	1291	1291	1379	1156	1517	973
26000	75	1259	966	1409	771	1545	566
	80	1275	1123	1404	927	1549	723
	85	1296	1284	1417	1087	1553	879
	90	1359	1359	1423	1239	1555	1034
30000	75	1312	1040	1451	814	1584	578
	80	1326	1219	1444	993	1588	758
	85	1365	1365	1457	1171	1591	936
	90	1435	1435	1471	1348	1593	1114
35000	75	1353	1123	1490	865	1620	592
	80	1377	1334	1492	1073	1624	800
	85	1439	1439	1497	1272	1626	1006
	90	1510	1510	1521	1480	1627	1209
40000	75	1385	1203	1520	914	1647	606
	80	1423	1423	1523	1144	1652	840
	85	1498	1498	1527	1370	1652	1075
	90	1569	1569	1569	1569	1652	1297
45000	75	1410	1280	1543	962	1670	619
	80	1470	1470	1546	1212	1673	881
	85	1546	1546	1549	1466	1672	1144
	90	1616	1616	1616	1616	1671	1383
50000	75	1429	1355	1561	1010	1688	631
	80	1509	1509	1564	1279	1690	921
	85	1585	1585	1566	1561	1687	1210
	90	1654	1654	1654	1654	1685	1469
55000	75	1445	1429	1577	1057	1703	644
	80	1542	1542	1579	1345	1704	961
	85	1617	1617	1579	1579	1700	1277
	90	1685	1685	1684	1684	1696	1554
58000	75	1453	1453	1584	1085	1711	652
	80	1559	1559	1586	1384	1711	985
	85	1634	1634	1586	1586	1707	1317
	90	1702	1702	1701	1701	1701	1605

Air-Cooled 50 Hz Gross Cooling Capacities—Standard Capacity Evaporator Coils

Table 18. Gross cooling capacities—90 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	792	589	875	475	959	352	760	572	840	459	921	337	727	554	804	443	881	321
	80	797	686	873	566	960	446	766	669	838	550	923	430	734	651	801	533	883	415
	85	807	781	879	655	963	537	776	764	845	638	926	522	739	739	809	620	886	506
	90	831	831	883	753	965	627	805	805	849	736	926	612	777	777	813	718	887	594
20000	75	835	653	917	515	997	364	801	635	879	499	957	349	764	616	840	483	914	333
	80	842	776	918	625	1000	478	810	759	881	608	960	463	775	740	842	590	918	447
	85	861	861	923	731	1002	591	832	832	886	713	963	576	801	801	847	695	921	560
	90	903	903	931	857	1004	697	873	873	895	840	965	680	841	841	857	821	923	662
25000	75	871	726	951	560	1029	377	834	707	911	544	986	362	796	687	869	527	941	346
	80	879	879	954	690	1032	517	848	848	915	672	991	501	814	814	873	653	946	485
	85	924	924	957	820	1034	655	892	892	918	802	993	640	857	857	877	783	949	624
	90	967	967	967	967	1036	777	934	934	934	934	995	760	899	899	898	898	951	742
30000	75	896	794	974	603	1051	389	857	774	933	587	1006	374	817	754	889	570	959	358
	80	923	923	977	750	1054	553	889	889	937	732	1011	538	853	853	894	712	965	522
	85	969	969	980	905	1056	716	935	935	940	886	1013	699	898	898	897	867	968	683
	90	1014	1014	1013	1013	1058	854	978	978	978	978	1015	837	940	940	940	940	970	818
33000	75	907	833	985	628	1061	396	868	813	943	612	1016	381	827	792	899	595	967	365
	80	944	944	988	785	1064	574	909	909	947	767	1021	559	872	872	903	747	974	543
	85	991	991	991	954	1066	750	955	955	950	935	1023	735	917	917	906	906	977	698
	90	1035	1035	1035	1035	1067	899	999	999	998	998	1024	882	959	959	959	959	978	863
36000	75	917	871	994	652	1070	403	877	851	951	636	1023	388	835	830	906	619	974	372
	80	962	962	997	819	1073	595	926	926	955	801	1029	580	888	888	911	780	982	564
	85	1009	1009	999	999	1074	764	973	973	958	958	1031	747	933	933	914	914	984	728
	90	1054	1054	1053	1053	1075	943	1016	1016	1016	1016	1031	925	976	976	976	976	985	907
40000	75	927	920	1004	684	1079	412	887	887	961	667	1032	397	844	844	915	627	982	381
	80	983	982	1007	863	1079	623	946	946	965	844	1032	608	906	906	920	824	982	591
	85	1030	1029	1009	1009	1083	803	992	992	967	967	1039	786	951	951	922	922	993	767
	90	1074	1074	1074	1074	1084	1000	1036	1036	1035	1035	1039	982	994	994	994	994	993	963

Table 18. Gross cooling capacities—90 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
16000	75	694	536	766	426	839	305
	80	701	633	767	517	842	398
	85	711	711	772	602	845	489
	90	747	747	776	699	846	577
20000	75	728	597	799	465	869	317
	80	739	721	802	571	874	431
	85	769	769	806	676	877	543
	90	808	808	818	802	880	644
25000	75	756	667	826	510	894	330
	80	779	779	830	633	901	469
	85	821	821	834	763	904	608
	90	861	861	861	861	907	723
30000	75	776	733	844	552	911	342
	80	816	816	849	692	919	506
	85	858	858	852	846	922	667
	90	901	901	900	900	924	799
33000	75	785	771	852	577	919	349
	80	833	833	857	726	927	527
	85	877	877	860	860	930	679
	90	919	919	919	919	931	844
36000	75	792	792	859	601	926	356
	80	848	848	865	759	930	548
	85	892	892	868	868	937	709
	90	934	934	934	934	938	887
40000	75	800	800	868	606	933	365
	80	864	864	873	803	934	576
	85	910	910	875	875	944	747
	90	951	951	951	951	944	943

Table 19. Gross cooling capacities—105 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
19000	75	941	813	1022	671	1123	523	906	794	980	652	1081	507	868	774	936	633	1035	489
	80	953	926	1033	780	1123	633	919	907	994	761	1075	616	879	879	951	740	1035	599
	85	987	987	1039	890	1124	742	956	956	1001	871	1082	726	922	922	957	850	1038	707
	90	1028	561	1121	412	897	683	986	542	1078	395	0	0	942	523	1031	377	816	639
23000	75	985	902	1066	732	1160	557	946	881	1024	712	1115	540	906	860	980	691	1065	522
	80	1009	1009	1072	857	1154	689	975	975	1031	838	1117	699	939	939	985	816	1071	655
	85	1056	1056	1082	993	1160	814	1022	1022	1043	973	1119	796	984	984	999	952	1071	776
	90	1066	601	1157	423	936	747	1024	584	1111	406	894	725	978	564	1061	388	848	701
28000	75	1028	1010	1101	798	1191	597	985	985	1056	777	1145	580	945	945	1009	756	1094	562
	80	1070	1070	1104	949	1192	755	1035	1035	1062	929	1147	738	994	994	1015	908	1096	720
	85	1119	1119	1121	1109	1190	896	1082	1082	1082	1082	1148	879	1042	1042	1040	1040	1098	859
	90	1099	649	1188	436	967	820	1055	631	1140	419	924	798	1007	611	1088	401	877	774
33000	75	1065	1065	1126	861	1213	635	1027	1027	1079	840	1166	618	985	985	1031	819	1113	600
	80	1116	1116	1127	1037	1213	819	1077	1077	1084	1018	1168	803	1036	1036	1036	996	1117	786
	85	1164	1164	1164	1164	1211	977	1126	1126	1127	1127	1165	958	1083	1083	1084	1084	1116	939
	90	1123	694	1210	448	990	891	1077	675	1161	431	946	868	1028	656	1108	414	896	843
38000	75	1100	1100	1144	923	1230	672	1061	1061	1095	901	1183	656	1016	1016	1047	879	1129	638
	80	1153	1153	1145	1124	1227	859	1112	1112	1100	1100	1183	842	1067	1067	1051	1051	1128	820
	85	1199	1199	1198	1198	1227	1056	1157	1157	1158	1158	1177	1036	1113	1113	1115	1115	1128	1017
	90	1141	737	1229	460	1007	959	1093	719	1179	444	958	934	1042	699	1125	426	911	910
43000	75	1129	1129	1159	983	1241	707	1087	1087	1108	960	1195	692	1041	1041	1059	938	1142	674
	80	1181	1181	1158	1158	1239	912	1139	1139	1112	1112	1194	894	1094	1094	1062	1062	1138	871
	85	1229	1229	1229	1229	1238	1133	1184	1184	1188	1188	1186	1112	1141	1141	1138	1138	1138	1093
	90	1154	780	1242	472	1021	1021	1106	761	1191	455	973	973	1055	719	1136	438	923	923
45000	75	1136	1136	1163	987	1244	721	1096	1096	1112	964	1199	706	1050	1050	1063	942	1146	689
	80	1189	1189	1162	1162	1246	934	1149	1149	1116	1116	1198	915	1103	1103	1065	1065	1143	892
	85	1234	1246	1229	1232	1242	1163	1188	1183	1192	1192	1190	1116	1145	1153	1146	1146	1141	1123
	90	1159	796	1242	475	1024	1051	1110	761	1195	460	977	977	1060	731	1140	442	926	926

Table 19. Gross cooling capacities—105 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
19000	75	826	750	900	614	985	470
	80	842	842	903	717	985	581
	85	883	883	914	828	990	686
	90	898	503	979	358	974	766
23000	75	861	836	932	669	1014	503
	80	898	898	937	793	1018	635
	85	942	942	952	930	1018	753
	90	931	544	1008	369	1008	841
28000	75	902	902	964	735	1038	542
	80	952	952	964	884	1041	700
	85	999	999	996	996	1042	835
	90	956	590	1032	382	1032	912
33000	75	941	941	981	796	1056	580
	80	991	991	983	972	1057	743
	85	1037	1037	1038	1038	1058	915
	90	975	635	1050	394	1050	980
38000	75	970	970	997	857	1070	618
	80	1018	1018	995	995	1070	795
	85	1068	1068	1068	1068	1069	992
	90	990	679	1064	406	1064	1046
43000	75	993	993	1010	916	1082	655
	80	1046	1046	1005	1005	1080	847
	85	1096	1096	1088	1088	1077	1068
	90	1000	692	1075	418	932	691
45000	75	1001	1001	1013	938	1085	669
	80	1054	1054	1008	1008	1083	866
	85	1099	1108	1021	1678	1080	1080
	90	1004	704	1008	1008	935	703

Table 20. Gross cooling capacities—120 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1035	773	1150	623	1271	465	994	751	1107	603	1224	447	951	728	1059	582	1172	427
	80	1041	911	1149	743	1272	589	1002	890	1105	723	1225	570	959	867	1057	702	1174	549
	85	1047	1031	1154	861	1274	707	1002	1002	1111	840	1228	688	967	967	1064	817	1177	667
	90	1087	1087	1158	1003	1277	827	1054	1054	1118	983	1231	808	1018	1018	1072	960	1180	787
26000	75	1090	855	1206	674	1325	482	1047	832	1159	654	1275	464	1000	808	1108	632	1219	443
	80	1102	1030	1206	822	1327	631	1060	1008	1160	801	1277	612	1015	984	1109	777	1222	591
	85	1125	1125	1212	960	1330	775	1089	1089	1166	939	1280	756	1049	1049	1116	915	1226	735
	90	1183	1183	1225	1142	1330	920	1146	1146	1180	1121	1281	899	1106	1106	1131	1097	1227	876
31000	75	1130	930	1245	721	1362	497	1085	907	1196	701	1310	478	1035	882	1142	678	1252	458
	80	1133	1133	1248	890	1365	670	1095	1095	1199	868	1313	651	1053	1053	1146	844	1256	630
	85	1195	1195	1253	1053	1368	840	1156	1156	1205	1031	1316	820	1113	1113	1151	1006	1260	799
	90	1257	1257	1256	1256	1369	1004	1217	1217	1216	1216	1318	983	1173	1173	1172	1172	1262	960
36000	75	1160	1002	1275	766	1390	510	1113	978	1224	745	1335	491	1061	952	1168	722	1275	471
	80	1187	1187	1278	955	1393	707	1146	1146	1228	932	1339	688	1101	1101	1172	907	1280	667
	85	1251	1251	1283	1141	1396	902	1210	1210	1233	1119	1342	882	1164	1164	1178	1094	1284	861
	90	1314	1314	1314	1314	1399	1085	1272	1272	1271	1271	1344	1063	1225	1225	1224	1224	1286	1039
41000	75	1183	1070	1297	808	1411	522	1134	1046	1245	787	1355	504	1081	1020	1188	764	1293	483
	80	1230	1230	1301	1016	1415	743	1187	1187	1249	993	1359	724	1140	1140	1193	968	1299	703
	85	1296	1296	1305	1226	1418	962	1252	1252	1254	1203	1362	942	1204	1204	1197	1178	1302	921
	90	1360	1360	1359	1359	1421	1163	1315	1315	1315	1315	1364	1140	1266	1266	1266	1266	1305	1116
46000	75	1202	1135	1315	848	1427	534	1152	1111	1262	827	1370	516	1097	1084	1203	805	1307	495
	80	1265	1265	1319	1075	1432	778	1221	1221	1266	1051	1375	758	1172	1172	1209	1026	1307	737
	85	1333	1333	1323	1308	1436	1020	1287	1287	1270	1270	1377	999	1237	1237	1213	1213	1316	978
	90	1399	1399	1398	1398	1439	1239	1350	1350	1350	1350	1379	1215	1299	1299	1299	1299	1318	1191
51000	75	1216	1198	1330	887	1441	545	1166	1166	1275	866	1383	526	1110	1110	1216	843	1319	505
	80	1295	1295	1334	1131	1441	811	1249	1249	1280	1108	1383	792	1198	1198	1221	1082	1319	771
	85	1363	1363	1337	1337	1450	1076	1316	1316	1283	1283	1390	1055	1264	1264	1225	1225	1328	1034
	90	1432	1432	1431	1431	1453	1312	1380	1380	1379	1379	1392	1288	1326	1326	1325	1325	1329	1263
54000	75	1224	1224	1337	910	1448	551	1173	1173	1282	889	1390	532	1117	1117	1223	866	1325	511
	80	1310	1310	1341	1165	1449	831	1263	1263	1287	1141	1390	811	1212	1212	1228	1115	1325	790
	85	1379	1379	1344	1344	1457	1109	1331	1331	1290	1290	1396	1088	1278	1278	1231	1231	1333	1067
	90	1449	1449	1448	1448	1460	1355	1395	1395	1395	1395	1398	1331	1340	1340	1339	1339	1335	1306

Table 20. Gross cooling capacities—120 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
21000	75	905	703	1008	559	1116	406
	80	913	842	1005	679	1118	527
	85	929	929	1014	793	1122	645
	90	979	979	1022	936	1121	764
26000	75	950	782	1053	609	1159	422
	80	966	959	1055	752	1162	569
	85	1007	1007	1061	889	1167	713
	90	1062	1062	1061	1061	1168	852
31000	75	982	855	1084	655	1188	436
	80	1008	1008	1088	818	1193	608
	85	1067	1067	1094	980	1198	777
	90	1125	1125	1124	1124	1200	934
36000	75	1006	925	1108	698	1209	448
	80	1053	1053	1113	881	1216	645
	85	1114	1114	1118	1067	1220	838
	90	1173	1173	1173	1173	1223	1014
41000	75	1024	991	1126	740	1225	461
	80	1089	1089	1131	941	1233	680
	85	1152	1152	1136	1136	1237	898
	90	1212	1212	1211	1211	1239	1091
46000	75	1039	1039	1140	780	1238	472
	80	1119	1119	1146	998	1239	714
	85	1182	1182	1150	1150	1250	956
	90	1243	1243	1242	1242	1252	1165
51000	75	1051	1051	1152	819	1248	482
	80	1143	1143	1158	1054	1249	748
	85	1208	1208	1162	1162	1260	1012
	90	1268	1268	1267	1267	1262	1237
54000	75	1057	1057	1158	842	1254	488
	80	1156	1156	1164	1087	1254	767
	85	1221	1221	1167	1167	1266	1015
	90	1280	1280	1280	1280	1267	1267

Table 21. Gross cooling capacities—130 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
23000	75	1176	880	1307	709	1429	525	1133	857	1255	686	1375	503	1081	829	1199	660	1314	480
	80	1187	1023	1305	845	1431	663	1139	997	1253	821	1376	642	1090	971	1195	795	1316	618
	85	1202	1164	1311	981	1433	799	1157	1139	1260	956	1379	777	1102	1102	1204	928	1319	753
	90	1242	1242	1318	1123	1435	933	1202	1202	1264	1097	1382	911	1158	1158	1213	1071	1322	887
26000	75	1218	935	1342	741	1461	534	1168	908	1288	717	1404	512	1113	879	1229	691	1342	489
	80	1228	1096	1339	893	1463	689	1179	1070	1284	869	1407	667	1125	1041	1224	843	1345	643
	85	1241	1241	1346	1042	1465	841	1200	1200	1294	1017	1409	819	1154	1154	1236	989	1348	795
	90	1301	1301	1356	1204	1467	991	1259	1259	1304	1179	1411	969	1212	1212	1247	1151	1348	944
30000	75	1256	1000	1377	780	1494	545	1204	973	1322	756	1435	523	1146	943	1260	730	1370	500
	80	1271	1188	1379	955	1496	722	1221	1162	1323	929	1438	700	1165	1132	1263	901	1374	676
	85	1305	1305	1383	1120	1498	895	1261	1261	1328	1095	1440	873	1212	1212	1268	1066	1376	849
	90	1367	1367	1397	1310	1499	1064	1322	1322	1345	1285	1441	1040	1272	1272	1287	1257	1377	1013
35000	75	1292	1077	1411	827	1525	558	1238	1050	1353	804	1464	536	1178	1019	1290	778	1397	513
	80	1315	1301	1413	1023	1527	761	1257	1257	1356	997	1466	739	1206	1206	1293	969	1401	715
	85	1368	1368	1416	1214	1529	962	1321	1321	1360	1188	1467	939	1269	1269	1297	1160	1402	915
	90	1430	1430	1430	1430	1531	1150	1383	1383	1382	1382	1468	1124	1329	1329	1329	1329	1403	1097
40000	75	1319	1151	1436	873	1549	570	1263	1123	1377	849	1486	549	1202	1092	1312	823	1417	526
	80	1352	1352	1438	1089	1552	799	1304	1304	1380	1062	1488	777	1250	1250	1316	1033	1421	753
	85	1418	1418	1440	1306	1554	1027	1369	1369	1382	1279	1488	1004	1314	1314	1319	1251	1421	980
	90	1480	1480	1480	1480	1556	1234	1429	1429	1429	1429	1489	1207	1374	1374	1373	1373	1422	1179
45000	75	1340	1222	1456	917	1568	582	1283	1194	1396	893	1504	561	1220	1163	1329	867	1434	538
	80	1392	1392	1458	1152	1571	837	1342	1342	1398	1125	1505	814	1286	1286	1333	1096	1437	790
	85	1458	1458	1458	1394	1573	1088	1406	1406	1400	1368	1505	1064	1350	1350	1335	1335	1436	1040
	90	1523	1523	1522	1522	1575	1316	1467	1467	1466	1466	1505	1288	1409	1409	1408	1408	1435	1260
50000	75	1357	1291	1472	959	1584	595	1299	1263	1411	936	1519	573	1235	1231	1343	910	1447	550
	80	1424	1424	1473	1214	1587	874	1373	1373	1413	1187	1518	850	1315	1315	1346	1158	1449	827
	85	1491	1491	1473	1473	1589	1151	1437	1437	1413	1413	1518	1126	1379	1379	1348	1348	1448	1102
	90	1559	1559	1559	1559	1590	1396	1498	1498	1498	1498	1518	1368	1436	1436	1436	1436	1446	1339
55000	75	1370	1359	1485	1001	1598	606	1312	1312	1423	977	1532	585	1247	1247	1355	952	1458	562
	80	1452	1452	1485	1274	1601	910	1398	1398	1424	1247	1530	886	1339	1339	1357	1217	1460	863
	85	1520	1520	1485	1485	1601	1211	1462	1462	1424	1424	1529	1187	1403	1403	1358	1358	1458	1130
	90	1589	1589	1589	1589	1601	1475	1526	1526	1526	1526	1529	1446	1461	1461	1460	1460	1455	1417
58000	75	1377	1377	1492	1026	1605	613	1318	1318	1429	1002	1539	592	1253	1253	1361	976	1464	569
	80	1466	1466	1491	1309	1607	931	1412	1412	1430	1282	1539	913	1352	1352	1363	1253	1464	889
	85	1535	1535	1492	1492	1608	1247	1476	1476	1430	1430	1535	1190	1415	1415	1363	1363	1462	1161
	90	1605	1605	1604	1604	1607	1521	1541	1541	1540	1540	1535	1493	1473	1473	1473	1473	1459	1459

Table 21. Gross cooling capacities—130 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1027	800	1139	634	1248	455
	80	1037	942	1134	768	1251	592
	85	1057	1057	1145	899	1254	727
	90	1112	1112	1154	1042	1257	860
26000	75	1056	850	1166	664	1273	463
	80	1070	1011	1168	816	1277	618
	85	1106	1106	1174	959	1280	769
	90	1162	1162	1187	1122	1281	915
30000	75	1087	913	1195	703	1298	475
	80	1108	1102	1198	871	1303	650
	85	1159	1159	1203	1036	1306	823
	90	1217	1217	1217	1217	1307	984
35000	75	1115	988	1222	750	1323	488
	80	1151	1151	1225	938	1328	689
	85	1212	1212	1229	1129	1330	889
	90	1270	1270	1270	1270	1331	1068
40000	75	1137	1060	1242	795	1341	500
	80	1192	1192	1246	1002	1346	727
	85	1254	1254	1249	1219	1347	951
	90	1311	1311	1311	1311	1347	1150
45000	75	1154	1130	1258	839	1356	513
	80	1225	1225	1262	1065	1361	765
	85	1287	1287	1264	1264	1361	1014
	90	1343	1343	1343	1343	1360	1230
50000	75	1167	1167	1270	882	1368	525
	80	1252	1252	1274	1125	1373	801
	85	1314	1314	1275	1275	1372	1047
	90	1369	1369	1369	1369	1369	1309
55000	75	1178	1178	1281	924	1378	536
	80	1275	1275	1284	1185	1382	837
	85	1336	1336	1285	1285	1380	1099
	90	1390	1390	1390	1390	1377	1377
58000	75	1184	1184	1286	949	1383	543
	80	1286	1286	1289	1220	1384	863
	85	1347	1347	1289	1289	1385	1130
	90	1402	1402	1401	1401	1380	1380

Table 22. Gross cooling capacities—150 tons—standard evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
23000	75	1296	946	1427	764	1552	573	1246	920	1375	739	1500	552	1193	892	1320	714	1441	528
	80	1359	1117	1427	905	1551	711	1304	1087	1374	881	1502	691	1213	1040	1314	853	1444	668
	85	1306	1226	1431	1045	1554	853	1265	1204	1381	1021	1501	831	1210	1173	1323	994	1441	806
	90	1341	1340	1433	1185	1555	990	1302	1301	1422	1176	1504	969	1258	1258	1328	1132	1445	944
26000	75	1334	1003	1465	796	1586	581	1281	977	1411	772	1533	561	1227	948	1351	746	1473	538
	80	1337	1159	1464	955	1587	738	1284	1131	1410	932	1535	717	1227	1100	1347	904	1476	694
	85	1353	1319	1467	1113	1589	895	1300	1291	1416	1088	1535	873	1259	1258	1357	1060	1476	850
	90	1406	1406	1474	1267	1588	1049	1365	1365	1423	1241	1535	1028	1318	1318	1366	1214	1474	1003
30000	75	1375	1073	1504	838	1624	593	1323	1046	1449	814	1567	572	1265	1017	1387	787	1505	549
	80	1389	1255	1504	1021	1625	772	1338	1228	1446	996	1568	751	1277	1196	1381	968	1505	727
	85	1414	1414	1506	1195	1627	952	1370	1370	1453	1170	1568	929	1321	1321	1394	1142	1507	906
	90	1477	1476	1516	1372	1627	1130	1433	1433	1465	1347	1566	1107	1384	1384	1407	1320	1507	1082
35000	75	1415	1155	1540	887	1659	606	1361	1128	1484	863	1600	585	1301	1098	1420	837	1534	562
	80	1433	1366	1540	1094	1662	814	1381	1339	1486	1070	1600	791	1318	1309	1425	1042	1534	768
	85	1483	1482	1540	1293	1662	1022	1437	1437	1487	1269	1598	998	1385	1385	1426	1241	1535	974
	90	1544	1543	1557	1501	1661	1224	1499	1499	1507	1477	1595	1195	1447	1447	1447	1446	1533	1171
40000	75	1444	1235	1567	935	1686	619	1390	1208	1510	911	1627	599	1328	1177	1445	885	1561	577
	80	1471	1469	1565	1163	1690	855	1424	1423	1511	1139	1622	831	1370	1370	1449	1112	1556	808
	85	1536	1535	1566	1390	1688	1091	1489	1489	1511	1366	1621	1066	1435	1435	1449	1338	1555	1043
	90	1601	1601	1600	1598	1686	1311	1549	1549	1548	1547	1618	1283	1495	1495	1495	1494	1550	1257
45000	75	1467	1311	1588	982	1709	632	1411	1284	1530	959	1650	613	1349	1253	1464	933	1582	590
	80	1513	1512	1585	1231	1710	895	1465	1465	1530	1207	1640	871	1411	1411	1468	1179	1574	848
	85	1580	1579	1585	1486	1708	1159	1530	1530	1528	1461	1639	1135	1474	1474	1466	1433	1571	1111
	90	1649	1649	1647	1646	1705	1400	1591	1591	1589	1589	1635	1371	1532	1532	1532	1532	1564	1343
50000	75	1485	1386	1605	1029	1730	646	1429	1358	1546	1006	1669	626	1365	1328	1480	980	1599	603
	80	1547	1546	1601	1297	1727	935	1499	1499	1545	1273	1653	910	1443	1443	1480	1244	1588	888
	85	1618	1618	1602	1581	1723	1226	1563	1563	1542	1542	1654	1202	1506	1506	1478	1478	1584	1178
	90	1686	1686	1685	1685	1720	1487	1627	1627	1625	1625	1649	1458	1566	1566	1562	1562	1576	1430
55000	75	1499	1460	1619	1075	1747	659	1442	1432	1560	1053	1686	639	1376	1376	1493	1027	1614	615
	80	1577	1576	1616	1364	1739	975	1527	1527	1557	1338	1666	950	1470	1470	1491	1309	1600	928
	85	1651	1651	1617	1617	1736	1293	1592	1592	1552	1552	1666	1269	1532	1532	1488	1488	1596	1221
	90	1718	1718	1718	1718	1734	1573	1656	1656	1656	1656	1660	1544	1594	1594	1589	1589	1584	1514
58000	75	1507	1504	1627	1103	1757	667	1449	1449	1567	1081	1694	646	1385	1385	1500	1056	1616	623
	80	1593	1593	1624	1404	1747	999	1541	1541	1562	1377	1673	975	1484	1484	1497	1348	1619	965
	85	1667	1667	1624	1624	1743	1311	1608	1608	1557	1557	1674	1308	1545	1545	1493	1493	1601	1256
	90	1737	1737	1736	1736	1740	1625	1671	1671	1670	1670	1665	1595	1604	1604	1603	1603	1588	1566

Table 22. Gross cooling capacities—150 tons—standard evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1121	859	1259	687	1375	503
	80	1135	998	1250	824	1379	642
	85	1153	1142	1261	967	1380	780
	90	1211	1211	1291	1110	1379	917
26000	75	1168	917	1291	719	1404	512
	80	1175	1071	1280	874	1408	668
	85	1208	1208	1294	1030	1409	823
	90	1269	1268	1304	1183	1409	981
30000	75	1203	985	1320	759	1435	524
	80	1242	1175	1325	940	1438	702
	85	1267	1267	1327	1112	1438	879
	90	1329	1329	1343	1289	1438	1053
35000	75	1236	1065	1354	810	1464	538
	80	1264	1264	1356	1011	1462	742
	85	1328	1328	1357	1210	1464	949
	90	1389	1389	1388	1388	1462	1142
40000	75	1261	1143	1374	857	1487	552
	80	1311	1311	1379	1080	1483	782
	85	1375	1375	1379	1306	1482	1017
	90	1434	1434	1433	1433	1479	1228
45000	75	1280	1219	1392	905	1506	565
	80	1349	1349	1396	1147	1500	823
	85	1412	1412	1394	1394	1498	1086
	90	1469	1469	1468	1468	1491	1314
50000	75	1296	1294	1406	952	1522	578
	80	1380	1380	1410	1213	1514	863
	85	1442	1442	1407	1407	1510	1153
	90	1496	1496	1497	1497	1499	1399
55000	75	1308	1308	1419	1000	1530	590
	80	1405	1405	1420	1279	1529	914
	85	1466	1466	1416	1416	1520	1192
	90	1520	1520	1521	1521	1507	1484
58000	75	1314	1314	1426	1004	1537	598
	80	1419	1419	1426	1317	1536	939
	85	1479	1479	1421	1421	1525	1219
	90	1533	1533	1534	1534	1510	1510

Table 23. Gross cooling capacities—90 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	829	616	918	494	1000	367	800	600	884	479	965	353	767	582	848	462	926	338
	80	837	710	916	589	1002	462	804	692	881	573	967	448	771	674	844	556	929	432
	85	847	806	921	685	1004	556	815	788	887	668	969	542	783	770	851	650	931	526
	90	873	873	924	775	1005	649	846	846	890	759	971	635	817	817	854	741	933	620
20000	75	877	685	960	536	1039	379	842	667	924	520	1002	365	806	648	885	504	961	350
	80	886	802	961	654	1041	495	852	783	925	637	1005	482	816	764	886	619	965	466
	85	904	904	963	765	1040	613	875	875	928	748	1003	599	844	844	890	730	962	584
	90	946	946	971	879	1042	726	917	917	937	863	1007	711	885	885	900	845	967	694
25000	75	913	763	994	584	1073	393	877	745	956	569	1033	379	838	725	915	552	989	364
	80	929	910	995	722	1072	535	893	893	958	706	1035	522	859	859	918	687	994	507
	85	968	968	996	860	1072	677	937	937	960	843	1036	662	903	903	920	825	995	646
	90	1010	1010	1012	1004	1072	811	979	979	979	979	1035	796	945	945	945	945	995	780
30000	75	937	837	1017	631	1096	406	900	819	978	615	1054	392	859	799	936	599	1009	377
	80	969	969	1017	788	1094	575	936	936	980	771	1056	562	901	901	939	753	1014	547
	85	1013	1013	1017	952	1093	735	981	981	980	936	1055	720	945	945	940	917	1014	703
	90	1054	1054	1054	1054	1092	895	1022	1022	1022	1022	1052	879	987	987	987	987	1012	863
33000	75	948	881	1027	658	1108	414	910	862	988	643	1064	399	869	841	945	627	1018	385
	80	990	990	1027	826	1104	599	957	957	989	809	1066	585	920	920	948	791	1024	571
	85	1034	1034	1026	1007	1103	769	1001	1001	989	989	1064	754	965	965	948	948	1023	737
	90	1077	1077	1076	1076	1101	945	1042	1042	1042	1042	1060	929	1007	1007	1007	1007	1020	913
36000	75	957	923	1036	686	1118	421	919	904	997	671	1073	407	877	877	954	635	1026	392
	80	1008	1008	1035	864	1113	622	975	975	997	847	1074	609	937	937	955	828	1032	595
	85	1052	1052	1034	1034	1110	804	1019	1019	996	996	1071	787	982	982	955	955	1030	771
	90	1096	1096	1096	1096	1110	995	1059	1059	1059	1059	1066	978	1023	1023	1023	1023	1025	962
40000	75	966	966	1047	702	1129	431	928	928	1007	683	1082	417	886	886	963	663	1035	402
	80	1028	1028	1044	914	1123	654	994	994	1006	897	1084	641	956	956	964	878	1041	627
	85	1073	1073	1042	1042	1119	846	1038	1038	1004	1004	1078	832	1002	1002	963	963	1037	813
	90	1120	1120	1120	1120	1119	1061	1079	1079	1079	1079	1073	1043	1041	1041	1041	1041	1031	1026

Table 23. Gross cooling capacities—90 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
16000	75	738	566	812	447	886	323
	80	741	657	809	541	890	417
	85	753	753	816	633	888	511
	90	789	789	818	723	894	604
20000	75	772	630	846	487	920	336
	80	782	746	848	601	924	452
	85	813	813	851	712	921	568
	90	852	852	861	826	928	677
25000	75	801	706	874	535	948	350
	80	825	825	876	668	953	493
	85	868	868	879	806	954	629
	90	910	910	910	910	954	763
30000	75	820	779	894	583	968	364
	80	864	864	897	733	972	533
	85	909	909	898	898	972	686
	90	951	951	950	950	970	846
33000	75	829	821	903	611	977	371
	80	883	883	906	771	981	557
	85	928	928	906	906	980	719
	90	969	969	969	969	977	895
36000	75	836	836	911	615	986	379
	80	899	899	913	809	987	586
	85	945	945	913	913	986	753
	90	985	985	985	985	982	944
40000	75	844	844	920	643	996	390
	80	918	918	921	858	997	613
	85	963	963	920	920	993	797
	90	1002	1002	1002	1002	988	988

Table 24. Gross cooling capacities—105 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
19000	75	967	723	1061	575	1151	423	927	701	1021	556	1111	407	886	679	977	537	1066	390
	80	973	832	1062	686	1151	534	938	813	1016	669	1113	519	898	791	973	649	1071	502
	85	982	945	1064	799	1152	647	947	925	1026	781	1108	629	909	904	984	760	1064	612
	90	1016	1016	1072	930	1153	755	987	987	1036	912	1113	739	952	952	992	869	1071	722
23000	75	1007	788	1098	614	1188	435	969	768	1060	598	1146	419	927	747	1014	579	1100	402
	80	1018	922	1099	750	1189	568	980	902	1058	731	1148	552	938	880	1014	711	1105	536
	85	1039	1039	1103	878	1190	704	1007	1007	1064	860	1143	686	970	970	1019	839	1097	669
	90	1084	1084	1110	1008	1186	830	1052	1052	1073	991	1148	814	1015	1015	1031	970	1106	796
28000	75	1041	864	1131	662	1222	449	1002	844	1091	646	1178	434	958	823	1044	627	1131	417
	80	1059	1029	1132	818	1219	607	1022	1009	1090	799	1177	592	978	978	1046	779	1133	576
	85	1102	1102	1133	972	1218	766	1067	1067	1094	955	1178	750	1027	1027	1050	934	1132	731
	90	1146	1146	1150	1132	1216	916	1113	1113	1113	1113	1183	878	1074	1074	1075	1075	1130	880
33000	75	1065	939	1156	709	1247	462	1025	919	1112	692	1201	447	979	896	1066	674	1152	430
	80	1098	1098	1155	883	1242	647	1062	1062	1112	864	1195	630	1021	1021	1068	844	1154	616
	85	1147	1147	1154	1065	1240	805	1111	1111	1115	1048	1195	788	1071	1071	1070	1027	1153	790
	90	1191	1191	1190	1190	1239	955	1158	1158	1155	1155	1191	982	1118	1118	1117	1117	1149	965
38000	75	1083	1011	1172	755	1264	474	1042	991	1130	739	1219	460	995	968	1083	721	1169	443
	80	1134	1134	1171	947	1259	686	1096	1096	1128	928	1218	672	1054	1054	1084	909	1170	656
	85	1180	1180	1169	1157	1257	881	1146	1146	1130	1130	1214	864	1103	1103	1084	1084	1167	846
	90	1228	1228	1228	1228	1255	1031	1187	1187	1186	1186	1203	1065	1149	1149	1147	1147	1157	1047
43000	75	1097	1083	1188	787	1280	487	1054	1054	1144	764	1235	473	1008	1008	1096	741	1184	456
	80	1162	1162	1183	1011	1271	725	1123	1123	1141	992	1231	711	1080	1080	1096	972	1183	695
	85	1209	1209	1179	1179	1268	937	1173	1173	1138	1138	1222	918	1129	1129	1094	1094	1177	900
	90	1260	1260	1260	1260	1266	1087	1217	1217	1214	1214	1212	1147	1170	1170	1170	1170	1163	1128
45000	75	1129	1116	1220	819	1285	492	1083	1083	1149	777	1240	477	1012	1012	1101	755	1188	461
	80	1170	1170	1216	1043	1276	729	1133	1133	1145	1006	1236	727	1061	1061	1100	986	1187	711
	85	1217	1217	1182	1182	1270	958	1183	1183	1145	1145	1223	939	1138	1138	1098	1098	1179	921
	90	1272	1272	1271	1271	1268	1108	1225	1225	1220	1220	1214	1168	1178	1178	1178	1178	1166	1160

Table 24. Gross cooling capacities—105 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
19000	75	849	659	935	519	1018	372
	80	857	769	928	629	1026	484
	85	871	871	939	739	1024	596
	90	916	916	949	848	1026	704
23000	75	882	723	969	560	1048	384
	80	894	856	970	690	1055	517
	85	931	931	972	817	1054	649
	90	977	977	987	949	1055	775
28000	75	912	799	997	607	1077	399
	80	938	938	1002	759	1080	557
	85	985	985	1000	911	1084	712
	90	1033	1033	1031	1031	1079	860
33000	75	934	873	1016	655	1098	413
	80	978	978	1023	824	1103	598
	85	1026	1026	1019	1004	1102	768
	90	1077	1077	1074	1074	1095	943
38000	75	949	945	1032	681	1115	426
	80	1009	1009	1033	886	1117	638
	85	1056	1056	1032	1032	1116	825
	90	1103	1103	1105	1105	1105	1026
43000	75	961	961	1043	714	1130	439
	80	1034	1034	1047	950	1128	678
	85	1080	1080	1040	1040	1120	876
	90	1126	1126	1128	1128	1112	1107
45000	75	963	963	1048	728	1134	444
	80	1041	1041	1050	975	1134	694
	85	1088	1088	1043	1043	1123	897
	90	1138	1138	1132	1132	1114	1114

Table 25. Gross cooling capacities—120 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1083	802	1198	645	1310	481	1043	781	1155	625	1268	464	984	754	1111	605	1221	446
	80	1101	933	1197	768	1312	604	1061	910	1155	749	1271	587	998	876	1102	725	1225	569
	85	1094	1047	1204	892	1313	727	1083	1038	1162	873	1270	710	1009	1002	1117	851	1221	690
	90	1133	1132	1205	1013	1315	848	1101	1100	1167	994	1274	831	1067	1066	1156	984	1228	812
26000	75	1137	888	1253	697	1361	496	1095	867	1209	678	1317	480	1048	843	1159	657	1268	462
	80	1147	1040	1252	850	1361	645	1106	1018	1204	829	1320	630	1057	993	1162	809	1271	611
	85	1173	1172	1256	996	1364	795	1138	1137	1214	976	1321	779	1101	1101	1166	953	1273	761
	90	1229	1229	1266	1144	1363	944	1195	1194	1224	1124	1321	928	1158	1158	1178	1102	1275	908
31000	75	1178	969	1291	746	1397	510	1134	947	1245	727	1352	495	1085	923	1194	706	1300	476
	80	1195	1150	1291	921	1398	686	1153	1128	1248	901	1353	670	1105	1104	1199	880	1303	652
	85	1243	1243	1293	1093	1400	864	1207	1207	1250	1073	1353	846	1165	1165	1202	1051	1304	828
	90	1299	1298	1308	1270	1398	1034	1263	1263	1268	1251	1350	1014	1224	1224	1224	1223	1304	995
36000	75	1207	1046	1318	793	1425	524	1162	1024	1272	774	1379	509	1112	1000	1219	753	1324	490
	80	1237	1236	1318	989	1424	726	1199	1198	1274	969	1377	709	1156	1156	1225	948	1327	692
	85	1296	1296	1317	1186	1424	931	1259	1259	1275	1167	1375	913	1218	1218	1227	1146	1326	895
	90	1352	1351	1352	1351	1424	1121	1314	1314	1314	1313	1370	1098	1274	1274	1274	1273	1324	1080
41000	75	1229	1121	1339	839	1448	538	1183	1099	1292	821	1400	522	1133	1074	1239	800	1342	503
	80	1279	1278	1336	1055	1444	765	1240	1240	1293	1036	1396	749	1197	1197	1244	1014	1345	731
	85	1337	1337	1335	1279	1445	998	1299	1299	1292	1260	1392	979	1257	1257	1244	1239	1342	962
	90	1397	1397	1397	1395	1442	1205	1354	1354	1352	1351	1388	1184	1312	1312	1311	1311	1338	1164
46000	75	1246	1194	1356	885	1468	552	1200	1172	1308	867	1418	534	1149	1147	1254	846	1351	514
	80	1312	1311	1351	1119	1461	805	1273	1273	1308	1100	1410	788	1229	1229	1258	1078	1360	771
	85	1373	1373	1350	1350	1460	1064	1332	1332	1306	1306	1406	1028	1288	1288	1257	1257	1357	1009
	90	1434	1434	1433	1433	1456	1290	1387	1387	1387	1387	1400	1267	1342	1342	1341	1341	1347	1246
51000	75	1259	1259	1369	931	1484	565	1213	1213	1322	913	1427	547	1162	1162	1266	872	1362	526
	80	1339	1338	1364	1183	1474	844	1300	1300	1320	1164	1428	832	1256	1256	1268	1141	1362	816
	85	1404	1404	1362	1362	1472	1102	1359	1359	1316	1316	1420	1083	1314	1314	1268	1268	1365	1060
	90	1465	1465	1464	1464	1468	1374	1416	1416	1415	1415	1411	1351	1367	1367	1366	1366	1355	1329
54000	75	1266	1266	1377	958	1492	573	1220	1220	1329	919	1433	554	1168	1168	1274	889	1369	533
	80	1354	1353	1370	1221	1482	867	1314	1314	1325	1202	1430	850	1269	1269	1274	1179	1367	839
	85	1419	1419	1369	1369	1477	1136	1373	1373	1321	1321	1424	1115	1327	1327	1271	1271	1370	1094
	90	1482	1482	1481	1481	1474	1424	1430	1430	1430	1430	1416	1401	1381	1381	1377	1377	1360	1360

Table 25. Gross cooling capacities—120 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
21000	75	947	732	1061	583	1168	426
	80	952	852	1051	703	1173	548
	85	972	972	1068	827	1175	670
	90	1026	1026	1089	954	1176	791
26000	75	999	818	1110	635	1211	442
	80	1011	968	1110	785	1216	591
	85	1059	1059	1117	929	1220	740
	90	1116	1116	1127	1078	1222	885
31000	75	1033	896	1141	684	1241	456
	80	1066	1064	1144	855	1247	632
	85	1123	1123	1147	1026	1249	809
	90	1178	1178	1179	1178	1250	972
36000	75	1063	974	1162	731	1262	470
	80	1109	1109	1169	923	1269	672
	85	1169	1169	1170	1121	1270	876
	90	1226	1226	1227	1226	1270	1057
41000	75	1077	1047	1180	778	1279	482
	80	1148	1148	1187	989	1287	712
	85	1208	1208	1187	1187	1287	943
	90	1264	1264	1264	1264	1283	1141
46000	75	1092	1092	1195	824	1287	494
	80	1179	1179	1201	1053	1294	755
	85	1239	1239	1200	1200	1300	982
	90	1293	1293	1291	1291	1292	1225
51000	75	1104	1104	1207	840	1298	506
	80	1204	1204	1212	1116	1299	782
	85	1264	1264	1210	1210	1309	1037
	90	1315	1315	1315	1315	1299	1299
54000	75	1111	1111	1213	863	1301	513
	80	1218	1218	1218	1154	1322	815
	85	1277	1277	1215	1215	1314	1070
	90	1327	1327	1326	1326	1303	1303

Table 26. Gross cooling capacities—130 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature																	
		85						95						105					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
23000	75	1230	911	1356	730	1475	542	1182	886	1306	708	1425	522	1133	860	1253	683	1369	500
	80	1249	1058	1357	872	1475	680	1182	1023	1303	847	1428	661	1130	994	1245	821	1372	639
	85	1244	1189	1361	1010	1477	820	1235	1180	1312	987	1427	800	1143	1136	1255	962	1374	777
	90	1286	1285	1364	1147	1479	956	1249	1247	1314	1122	1430	936	1208	1206	1287	1107	1374	913
26000	75	1265	966	1391	763	1507	551	1215	940	1340	740	1456	531	1163	913	1282	715	1398	510
	80	1269	1120	1390	921	1509	707	1219	1093	1337	898	1458	687	1170	1066	1275	871	1399	664
	85	1286	1280	1394	1075	1510	862	1246	1246	1344	1052	1459	842	1204	1204	1288	1025	1402	819
	90	1347	1346	1402	1228	1509	1016	1307	1307	1353	1204	1458	995	1261	1261	1298	1178	1403	975
30000	75	1303	1034	1427	803	1541	562	1253	1008	1374	781	1488	543	1197	980	1314	756	1428	521
	80	1318	1215	1427	985	1543	740	1268	1189	1376	961	1489	720	1250	1174	1320	935	1429	698
	85	1352	1352	1429	1156	1545	918	1310	1310	1378	1133	1488	897	1262	1262	1321	1106	1431	875
	90	1412	1412	1440	1333	1544	1095	1370	1370	1391	1309	1487	1071	1323	1323	1337	1283	1430	1048
35000	75	1340	1115	1460	852	1574	576	1288	1089	1406	830	1519	557	1230	1060	1345	805	1457	535
	80	1362	1326	1460	1055	1577	782	1307	1300	1408	1032	1516	760	1259	1259	1350	1006	1456	739
	85	1416	1415	1459	1254	1577	988	1372	1372	1409	1231	1516	966	1322	1322	1351	1204	1456	944
	90	1473	1473	1480	1461	1575	1185	1431	1431	1431	1431	1511	1158	1382	1382	1382	1381	1454	1136
40000	75	1367	1194	1485	900	1600	589	1314	1168	1430	878	1545	571	1255	1138	1368	853	1480	549
	80	1402	1401	1482	1123	1602	823	1357	1356	1432	1101	1538	800	1306	1306	1372	1075	1477	779
	85	1464	1464	1483	1350	1600	1057	1420	1420	1431	1327	1537	1034	1369	1369	1372	1300	1474	1012
	90	1529	1529	1527	1526	1596	1272	1477	1477	1476	1475	1533	1246	1427	1427	1426	1426	1469	1220
45000	75	1388	1269	1505	947	1621	603	1334	1243	1449	925	1566	585	1274	1214	1386	901	1498	563
	80	1441	1440	1502	1191	1620	863	1395	1395	1449	1168	1554	840	1343	1343	1389	1142	1493	819
	85	1506	1506	1501	1445	1618	1125	1458	1458	1447	1421	1553	1102	1405	1405	1388	1388	1490	1081
	90	1572	1572	1570	1570	1615	1360	1517	1517	1515	1514	1549	1333	1461	1461	1460	1460	1482	1307
50000	75	1404	1344	1521	994	1639	616	1350	1317	1464	972	1583	598	1289	1288	1400	948	1515	574
	80	1473	1472	1516	1257	1635	903	1427	1427	1463	1234	1568	880	1374	1374	1401	1207	1507	859
	85	1542	1542	1517	1517	1633	1193	1489	1489	1459	1459	1567	1171	1434	1434	1399	1399	1502	1128
	90	1606	1606	1606	1606	1630	1447	1550	1550	1548	1548	1561	1420	1489	1489	1488	1488	1493	1393
55000	75	1417	1417	1534	1041	1660	631	1362	1362	1477	1019	1597	611	1302	1302	1413	995	1520	587
	80	1500	1500	1529	1323	1649	943	1453	1453	1474	1299	1582	920	1399	1399	1411	1271	1518	900
	85	1571	1571	1529	1529	1644	1229	1515	1515	1469	1469	1579	1211	1458	1458	1409	1409	1510	1176
	90	1638	1638	1638	1638	1642	1534	1576	1576	1576	1576	1571	1505	1517	1517	1514	1514	1499	1478
58000	75	1423	1423	1541	1069	1668	637	1369	1369	1484	1047	1602	618	1307	1307	1420	999	1526	594
	80	1516	1515	1536	1362	1656	967	1466	1466	1479	1338	1588	944	1412	1412	1417	1310	1524	907
	85	1587	1587	1535	1535	1650	1264	1530	1530	1474	1474	1586	1241	1470	1470	1413	1413	1515	1210
	90	1655	1655	1655	1655	1648	1585	1590	1590	1590	1590	1576	1556	1528	1528	1526	1526	1503	1503

Table 26. Gross cooling capacities—130 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature 115 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
23000	75	1074	831	1193	657	1305	476
	80	1076	964	1183	793	1310	614
	85	1104	1103	1201	934	1311	752
	90	1162	1160	1204	1068	1310	888
26000	75	1105	883	1224	689	1332	486
	80	1114	1037	1228	845	1337	641
	85	1156	1156	1231	996	1338	795
	90	1215	1215	1234	1149	1339	948
30000	75	1137	949	1253	730	1360	498
	80	1193	1142	1255	906	1362	673
	85	1214	1214	1257	1077	1364	850
	90	1270	1270	1274	1253	1365	1020
35000	75	1168	1029	1281	779	1386	511
	80	1204	1204	1284	976	1387	714
	85	1267	1267	1285	1175	1388	920
	90	1326	1326	1325	1325	1388	1108
40000	75	1191	1106	1299	826	1407	525
	80	1249	1249	1305	1045	1407	755
	85	1311	1311	1305	1271	1406	988
	90	1368	1368	1368	1368	1402	1194
45000	75	1208	1181	1316	874	1424	538
	80	1284	1284	1321	1112	1423	795
	85	1345	1345	1320	1320	1420	1057
	90	1401	1401	1401	1401	1414	1280
50000	75	1222	1222	1330	921	1432	550
	80	1313	1313	1334	1177	1433	840
	85	1373	1373	1331	1331	1433	1099
	90	1426	1426	1425	1425	1422	1365
55000	75	1233	1233	1341	944	1444	562
	80	1337	1337	1344	1242	1447	876
	85	1396	1396	1340	1340	1441	1150
	90	1448	1448	1446	1446	1429	1429
58000	75	1239	1239	1348	961	1449	570
	80	1349	1349	1349	1280	1454	901
	85	1408	1408	1344	1344	1445	1184
	90	1460	1460	1458	1458	1432	1432

Evaporative Condensing 60 Hz Gross Cooling Capacities

Table 27. Gross cooling capacities—100 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB 60 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	65 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC	70 Entering Wet Bulb 61 CAP	61 SHC	67 CAP	67 SHC	73 CAP	73 SHC
16000	75	1042	733	1153	640	1277	531	1030	744	1140	634	1262	522	1017	736	1125	627	1246	514
	80	1046	845	1157	734	---	---	1034	838	1144	727	1263	613	1021	830	1130	720	1250	607
	85	1049	934	1161	827	1284	715	1037	927	1148	820	1270	708	1025	919	1134	812	1254	701
	90	1053	1024	1165	919	1288	807	1041	1017	1152	912	1274	800	1028	1008	1138	905	1258	792
20000	75	1111	831	1227	692	1350	549	1098	823	1212	685	1333	542	1084	815	1196	677	1314	534
	80	1116	942	1233	808	1351	662	1102	934	1218	800	1342	660	1088	926	1202	792	1323	650
	85	1128	1056	1238	922	1364	781	1115	1048	1224	915	1348	773	1100	1040	1208	907	1331	765
	90	1139	1139	1242	1032	1370	895	1127	1127	1228	1024	1354	888	1113	1113	1212	1016	1336	880
25000	75	1170	915	1291	748	1408	567	1155	907	1275	741	1389	559	1139	898	1257	732	1368	550
	80	1184	1055	1299	891	1410	707	1170	1047	1283	883	1406	706	1154	1038	1265	875	1382	695
	85	1206	1200	1303	1026	1433	856	1192	1192	1288	1018	1416	849	1178	1178	1270	1009	1396	840
	90	1228	1228	1317	1164	1440	997	1255	1255	1302	1156	1423	990	1201	1201	1285	1147	1403	981
30000	75	1217	994	1336	798	1444	580	1202	985	1318	791	1423	572	1185	976	1299	782	1400	563
	80	1237	1163	1340	961	1449	753	1222	1154	1323	952	1426	739	1205	1144	1304	943	1430	741
	85	1282	1282	1356	1124	1481	927	1268	1268	1339	1116	1462	919	1253	1253	1321	1106	1442	911
	90	1349	1349	1376	1291	1486	1085	1315	1315	1359	1282	1468	1077	1302	1302	1341	1273	1447	1067
33000	75	1240	1039	1344	824	1458	587	1224	1030	1325	814	1437	578	1207	1021	1306	805	1413	569
	80	1264	1226	1363	1001	1491	782	1249	1217	1346	992	1472	774	1232	1207	1327	982	1424	757
	85	1322	1322	1382	1181	1494	962	1308	1308	1365	1173	1475	953	1292	1292	1345	1163	1454	944
	90	1380	1380	1406	1366	1512	1138	1367	1367	1389	1357	1493	1129	1353	1353	1371	1347	1472	1119
36000	75	1260	1081	1362	849	1469	593	1244	1072	1344	840	1447	584	1226	1062	1323	830	1422	575
	80	1290	1288	1384	1039	1510	808	1274	1274	1366	1030	1489	799	1257	1257	1346	1020	1438	779
	85	1358	1358	1404	1238	1514	996	1343	1343	1387	1228	1495	987	1327	1326	1367	1218	1473	977
	90	1426	1428	1435	1435	1534	1189	1411	1411	1418	1418	1514	1180	1396	1396	1398	1398	1493	1170
40000	75	1284	1137	1383	879	1479	600	1267	1128	1364	869	1456	591	1248	1117	1343	859	1431	582
	80	1323	1323	1406	1090	1529	839	1308	1308	1388	1080	1508	831	1292	1291	1368	1070	1485	822
	85	1399	1399	1431	1311	1538	1041	1383	1383	1412	1302	1518	1032	1366	1366	1393	1292	1495	1021
	90	1475	1475	1475	1475	1559	1256	1458	1458	1458	1458	1539	1247	1441	1441	1441	1441	1517	1237

Table 27. Gross cooling capacities—100 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB											
		75						80					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
16000	75	1003	728	1110	619	1228	506	988	720	1093	609	1210	498
	80	1007	822	1115	712	1232	601	993	813	1099	703	1215	590
	85	1011	911	1119	804	1237	693	997	902	1103	796	1219	683
	90	1015	1000	1123	897	1241	784	1001	990	1107	888	1224	775
20000	75	1068	807	1179	669	1295	525	1052	798	1160	658	1274	516
	80	1073	917	1185	784	1296	638	1057	907	1168	775	1285	635
	85	1086	1031	1191	898	1312	757	1070	1021	1172	889	1293	749
	90	1098	1098	1195	1007	1318	871	1083	1083	1178	997	1298	862
25000	75	1123	888	1238	723	1346	541	1105	878	1218	713	1323	532
	80	1138	1028	1246	866	1361	686	1120	1018	1227	857	1345	682
	85	1162	1162	1252	999	1376	832	1147	1147	1233	989	1355	823
	90	1187	1187	1266	1137	1383	972	1174	1174	1248	1127	1361	963
30000	75	1167	966	1279	773	1376	553	1148	955	1243	756	1351	543
	80	1188	1134	1284	932	1409	734	1169	1124	1264	922	1386	724
	85	1238	1238	1301	1096	1420	902	1221	1221	1281	1086	1387	888
	90	1288	1288	1322	1263	1426	1057	1287	1287	1302	1253	1401	1046
33000	75	1188	1010	1285	796	1388	559	1169	999	1264	786	1362	549
	80	1214	1197	1306	972	1428	757	1196	1186	1286	961	1405	749
	85	1276	1275	1325	1152	1432	933	1259	1259	1305	1142	1408	923
	90	1344	1344	1352	1337	1450	1109	1321	1321	1332	1326	1427	1099
36000	75	1207	1051	1302	819	1396	565	1187	1040	1280	808	1370	554
	80	1238	1238	1325	1010	1424	766	1221	1221	1304	999	1412	769
	85	1309	1309	1346	1208	1451	967	1291	1291	1326	1197	1427	956
	90	1380	1380	1380	1380	1471	1160	1362	1362	1361	1361	1447	1149
40000	75	1229	1106	1321	847	1404	572	1209	1095	1298	836	1378	571
	80	1274	1274	1346	1059	1461	813	1256	1256	1324	1048	1436	803
	85	1348	1348	1372	1281	1472	1011	1329	1329	1350	1270	1448	1000
	90	1422	1421	1422	1422	1494	1226	1402	1402	1402	1402	1470	1216

Table 28. Gross cooling capacities—118 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB																	
		60						65						70					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
19000	75	1229	874	1360	778	1502	648	1214	895	1343	769	1483	642	1197	885	1324	758	1461	627
	80	1235	1016	1365	889	1508	761	1220	1007	1349	880	1489	749	1202	996	1330	868	1467	738
	85	1240	1122	1370	999	1513	869	1226	1113	1354	989	1496	860	1209	1101	1335	979	1475	850
	90	1246	1228	1376	1109	1519	978	1232	1218	1360	1100	1501	970	1215	1207	1341	1088	1481	959
23000	75	1297	985	1430	830	1570	668	1281	976	1413	821	1549	659	1262	964	1391	807	1525	647
	80	1303	1112	1438	962	1583	806	1287	1103	1420	953	1561	794	1268	1091	1400	942	1540	785
	85	1317	1244	1445	1095	1591	937	1301	1234	1427	1085	1572	927	1283	1222	1407	1074	1549	916
	90	1332	1332	1450	1221	1598	1068	1316	1316	1433	1211	1578	1058	1298	1298	1413	1199	1556	1047
28000	75	1355	1069	1495	887	1626	687	1338	1059	1475	876	1603	676	1318	1046	1452	865	1577	664
	80	1372	1227	1504	1047	1650	856	1355	1216	1485	1037	1628	843	1335	1204	1462	1026	1604	834
	85	1397	1390	1510	1199	1661	1014	1381	1380	1492	1188	1640	1004	1362	1362	1469	1176	1615	992
	90	1422	1422	1527	1354	1670	1172	1407	1407	1508	1344	1649	1162	1390	1390	1486	1331	1624	1151
33000	75	1405	1149	1522	928	1661	700	1386	1138	1501	920	1637	689	1365	1125	1480	914	1608	685
	80	1427	1336	1546	1117	1697	898	1409	1325	1526	1107	1676	888	1388	1312	1502	1093	1649	879
	85	1478	1478	1565	1298	1711	1086	1461	1461	1545	1287	1689	1076	1442	1442	1522	1274	1663	1064
	90	1555	1555	1587	1483	1717	1261	1514	1514	1568	1472	1696	1250	1497	1497	1545	1459	1670	1237
38000	75	1443	1225	1560	980	1683	710	1424	1214	1538	970	1657	699	1402	1200	1513	956	1626	696
	80	1473	1441	1586	1186	1733	941	1455	1430	1565	1174	1710	931	1433	1417	1540	1161	1682	919
	85	1546	1546	1609	1394	1739	1145	1529	1529	1588	1383	1716	1134	1509	1508	1564	1369	1689	1120
	90	1629	1629	1640	1608	1761	1349	1603	1603	1620	1597	1739	1338	1584	1584	1596	1583	1712	1324
43000	75	1475	1298	1588	1019	1696	719	1456	1287	1566	1008	1669	708	1432	1273	1541	993	1638	706
	80	1517	1517	1618	1251	1737	972	1499	1499	1596	1240	1713	962	1478	1478	1571	1226	1685	950
	85	1604	1604	1645	1488	1771	1203	1586	1586	1624	1476	1748	1192	1564	1564	1599	1462	1720	1178
	90	1692	1692	1691	1691	1796	1434	1673	1673	1673	1673	1773	1423	1650	1649	1650	1650	1746	1409
45000	75	1487	1327	1598	1034	1700	723	1467	1316	1576	1022	1673	712	1443	1301	1550	1008	1641	698
	80	1536	1536	1629	1277	1748	990	1518	1518	1607	1265	1723	978	1496	1496	1582	1251	1694	964
	85	1624	1624	1659	1525	1783	1226	1606	1606	1637	1513	1759	1215	1584	1584	1612	1499	1731	1201
	90	1714	1714	1714	1714	1809	1468	1695	1695	1694	1694	1785	1457	1671	1671	1672	1672	1758	1443

Table 28. Gross cooling capacities—118 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB											
		75						80					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
19000	75	1180	874	1305	748	1440	620	1163	864	1286	738	1418	610
	80	1185	986	1311	858	1447	728	1168	976	1293	849	1427	721
	85	1192	1090	1316	968	1454	838	1175	1080	1298	958	1434	830
	90	1198	1195	1322	1078	1460	948	1182	1182	1304	1068	1440	938
23000	75	1243	953	1371	798	1501	636	1224	943	1351	788	1477	625
	80	1250	1079	1379	931	1517	774	1231	1068	1359	921	1494	761
	85	1265	1211	1386	1063	1526	905	1247	1200	1364	1052	1503	894
	90	1280	1280	1392	1187	1533	1036	1262	1262	1373	1176	1511	1025
28000	75	1297	1034	1430	853	1550	652	1277	1023	1408	844	1523	641
	80	1315	1192	1440	1014	1579	823	1295	1181	1418	1004	1554	809
	85	1345	1345	1448	1164	1591	981	1328	1328	1426	1152	1566	970
	90	1374	1374	1464	1319	1600	1139	1330	1330	1443	1308	1574	1127
33000	75	1343	1113	1456	901	1579	673	1323	1101	1430	885	1550	652
	80	1367	1299	1479	1081	1623	865	1346	1287	1456	1069	1596	854
	85	1424	1424	1499	1262	1637	1053	1405	1405	1476	1250	1598	1036
	90	1500	1500	1522	1446	1645	1225	1464	1464	1500	1434	1616	1211
38000	75	1380	1187	1489	943	1597	684	1358	1175	1464	930	1566	661
	80	1412	1404	1516	1148	1656	909	1391	1391	1492	1135	1627	895
	85	1489	1488	1540	1356	1663	1107	1468	1468	1516	1344	1636	1094
	90	1565	1565	1574	1571	1686	1311	1549	1549	1551	1551	1659	1298
43000	75	1410	1259	1515	979	1607	694	1387	1246	1489	966	1575	669
	80	1458	1457	1546	1212	1657	938	1437	1437	1521	1199	1628	924
	85	1543	1542	1575	1449	1693	1164	1521	1521	1550	1436	1665	1150
	90	1628	1627	1628	1628	1718	1395	1606	1606	1606	1606	1691	1382
45000	75	1420	1288	1524	994	1610	685	1398	1274	1498	980	1578	673
	80	1475	1475	1557	1237	1666	950	1454	1454	1531	1224	1637	936
	85	1562	1562	1587	1486	1703	1187	1540	1540	1562	1472	1675	1173
	90	1649	1649	1649	1649	1730	1429	1627	1627	1626	1626	1702	1415

Table 29. Gross cooling capacities—128 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB																	
		60						65						70					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1372	971	1516	862	1677	719	1355	993	1498	853	1657	709	1335	981	1477	840	1632	697
	80	1376	1126	1523	985	1679	840	1360	1116	1505	975	1662	831	1340	1104	1483	963	1637	818
	85	1378	1244	1528	1106	1688	963	1362	1233	1510	1096	1668	953	1343	1221	1488	1084	1644	940
	90	1381	1362	1532	1227	1682	1078	1365	1351	1514	1217	2749	2247	1345	1337	1493	1205	1650	1061
26000	75	1458	1105	1607	927	1764	745	1440	1094	1587	917	1741	734	1418	1081	1563	904	1713	721
	80	1516	1278	1616	1078	1776	897	1448	1240	1596	1067	1754	888	1474	1251	1572	1055	1726	872
	85	1475	1397	1622	1227	1786	1047	1457	1386	1603	1216	1764	1037	1436	1373	1579	1203	1738	1024
	90	1433	1433	1625	1370	1793	1195	1465	1465	1605	1359	1771	1184	1398	1398	1582	1345	1745	1171
31000	75	1514	1191	1674	985	1821	763	1495	1179	1652	975	1795	752	1472	1165	1626	961	1765	738
	80	1530	1365	1684	1163	1843	947	1511	1353	1663	1152	1821	938	1488	1339	1637	1139	1792	922
	85	1555	1545	1686	1333	1857	1125	1536	1533	1665	1321	1833	1114	1515	1515	1639	1307	1805	1100
	90	1579	1579	1701	1505	1865	1299	1562	1562	1680	1493	1841	1288	1542	1542	1655	1479	1814	1275
36000	75	1566	1273	1723	1039	1857	776	1545	1260	1701	1028	1829	764	1521	1246	1674	1014	1797	750
	80	1587	1476	1735	1244	1883	987	1567	1464	1701	1225	1870	983	1542	1449	1674	1210	1840	968
	85	1636	1636	1742	1434	1910	1197	1619	1619	1720	1422	1885	1186	1597	1597	1694	1407	1856	1172
	90	1686	1686	1763	1635	1910	1392	1708	1708	1741	1622	1886	1380	1652	1652	1715	1608	1857	1365
41000	75	1607	1350	1740	1083	1879	787	1586	1338	1715	1067	1850	774	1560	1323	1686	1053	1816	759
	80	1635	1583	1766	1306	1934	1036	1614	1571	1743	1294	1908	1025	1590	1556	1715	1279	1877	1011
	85	1709	1709	1788	1532	1950	1267	1690	1690	1765	1519	1908	1248	1667	1667	1737	1504	1878	1233
	90	1783	1783	1816	1762	1956	1481	1766	1766	1793	1749	1931	1468	1745	1749	1767	1734	1901	1453
46000	75	1642	1426	1770	1123	1893	795	1620	1412	1745	1110	1863	789	1594	1397	1716	1094	1828	768
	80	1680	1680	1800	1373	2057	1114	1658	1657	1776	1360	2027	1102	1634	1634	1748	1344	1992	1087
	85	1771	1771	1826	1627	1969	1320	1750	1750	1803	1614	1942	1307	1726	1726	1774	1599	1911	1291
	90	1865	1865	1864	1864	1994	1568	1844	1844	1844	1843	1968	1555	1819	1819	1819	1819	1937	1540
51000	75	1671	1495	1795	1160	1901	803	1649	1482	1770	1146	1870	804	1622	1466	1740	1129	1834	775
	80	1726	1726	1829	1436	2036	1137	1705	1705	1804	1423	2008	1129	1681	1681	1775	1407	1975	1114
	85	1823	1823	1860	1721	1998	1376	1802	1802	1836	1708	1971	1363	1777	1777	1807	1692	1939	1347
	90	1930	1930	1921	1921	2026	1654	1900	1900	1900	1899	1999	1640	1873	1873	1874	1873	1968	1625
54000	75	1687	1537	1808	1181	1904	807	1664	1524	1782	1167	1873	809	1637	1507	1752	1150	1836	780
	80	1752	1752	1844	1474	2006	1154	1731	1731	1819	1460	1978	1141	1706	1706	1790	1444	1945	1125
	85	1852	1852	1878	1776	2013	1410	1830	1830	1854	1763	1986	1396	1804	1804	1825	1747	1954	1379
	90	1953	1953	1952	1952	2043	1704	1929	1929	1929	1929	2016	1691	1902	1902	1903	1903	1984	1675

Table 29. Gross cooling capacities—128 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB											
		75						80					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1316	970	1455	829	1608	687	1298	959	1434	818	1584	676
	80	1321	1092	1462	951	1614	808	1302	1081	1441	940	1591	797
	85	1324	1208	1467	1072	1621	929	1306	1197	1447	1061	1598	918
	90	1327	1325	1472	1193	2740	2214	1309	1309	1451	1181	1604	1038
26000	75	1397	1069	1540	892	1686	708	1376	1057	1516	879	1658	696
	80	1451	1237	1549	1042	1701	861	1377	1198	1526	1030	1676	851
	85	1415	1360	1556	1191	1712	1011	1395	1348	1532	1179	1686	999
	90	1379	1379	1559	1332	1724	1162	1413	1413	1532	1318	2653	2135
31000	75	1449	1152	1601	949	1735	724	1427	1139	1576	936	1704	711
	80	1466	1326	1612	1126	1764	910	1444	1313	1587	1114	1736	898
	85	1495	1495	1615	1293	1778	1088	1475	1475	1590	1280	1750	1076
	90	1524	1524	1631	1465	1786	1262	1507	1507	1606	1452	1759	1249
36000	75	1497	1232	1647	1001	1765	736	1473	1218	1620	988	1732	722
	80	1519	1435	1648	1196	1796	948	1496	1421	1622	1182	1782	943
	85	1576	1576	1668	1393	1827	1160	1556	1555	1641	1379	1798	1147
	90	1634	1634	1689	1594	1827	1350	1638	1637	1663	1580	1798	1337
41000	75	1536	1308	1658	1040	1782	745	1511	1294	1630	1026	1748	743
	80	1566	1541	1688	1264	1847	998	1542	1527	1660	1249	1816	985
	85	1645	1645	1710	1489	1848	1218	1622	1622	1683	1475	1818	1204
	90	1724	1724	1741	1720	1871	1439	1703	1703	1715	1706	1838	1424
46000	75	1568	1382	1687	1078	1792	753	1542	1367	1657	1063	1757	752
	80	1611	1611	1720	1329	1837	1015	1588	1588	1691	1313	1922	1059
	85	1703	1702	1747	1584	1881	1276	1679	1678	1718	1569	1850	1261
	90	1795	1795	1794	1794	1907	1525	1769	1769	1770	1770	1876	1510
51000	75	1596	1453	1710	1113	1798	761	1569	1438	1679	1097	1879	791
	80	1657	1657	1746	1391	1899	1082	1633	1632	1717	1375	1868	1066
	85	1752	1752	1779	1676	1908	1331	1727	1726	1750	1661	1876	1316
	90	1849	1848	1848	1848	1936	1609	1823	1823	1823	1822	1905	1594
54000	75	1611	1495	1722	1133	1925	811	1584	1480	1691	1116	1775	769
	80	1681	1681	1760	1428	1912	1103	1656	1656	1731	1412	1880	1091
	85	1779	1778	1796	1731	1922	1363	1753	1753	1768	1716	1890	1348
	90	1877	1877	1877	1876	1952	1659	1852	1852	1851	1850	1921	1644

Table 30. Gross cooling capacities—140 tons—high capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB																	
		60						65						70					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1455	1016	1610	907	1784	764	1438	1038	1591	897	1762	754	1417	1025	1569	883	1737	741
	80	1459	1172	1616	1030	1785	885	1442	1161	1597	1020	1764	875	1422	1148	1566	1002	1739	861
	85	1464	1295	1620	1152	1791	1007	1443	1281	1602	1142	1770	997	1422	1267	1575	1126	1746	984
	90	1468	1418	1624	1274	2820	2284	1443	1400	1606	1263	2816	2277	1423	1386	1584	1250	2807	2251
26000	75	1553	1154	1713	975	1886	794	1534	1142	1692	965	1862	782	1511	1129	1667	950	1834	769
	80	1614	1334	1721	1127	1894	946	1537	1292	1700	1115	1870	935	1518	1276	1676	1102	1839	918
	85	1566	1449	1727	1276	1902	1094	1547	1437	1706	1265	1879	1084	1525	1423	1682	1251	1852	1070
	90	1518	1518	1734	1425	2744	2197	1557	1557	1713	1414	1886	1232	1532	1532	1688	1400	1859	1218
31000	75	1626	1249	1788	1036	1956	815	1605	1238	1733	1009	1930	803	1581	1224	1739	1009	1899	788
	80	1632	1420	1798	1214	1971	995	1611	1407	1776	1202	1947	986	1587	1393	1749	1188	1917	970
	85	1651	1597	1806	1391	1983	1174	1632	1585	1819	1395	1958	1162	1608	1570	1757	1365	1929	1148
	90	1671	1671	1812	1559	1991	1349	1652	1652	1790	1547	1967	1337	1629	1629	1764	1532	1942	1326
36000	75	1675	1330	1845	1090	2004	831	1653	1318	1822	1078	1976	818	1628	1302	1793	1063	1942	803
	80	1694	1532	1857	1295	2030	1042	1673	1520	1833	1283	2004	1032	1648	1504	1805	1269	1973	1016
	85	1729	1729	1861	1491	2044	1248	1709	1709	1837	1478	2018	1236	1687	1687	1810	1463	1988	1222
	90	1763	1763	1880	1691	2054	1450	1746	1746	1857	1678	2027	1437	1727	1727	1829	1662	1997	1423
41000	75	1722	1410	1890	1141	2037	843	1699	1397	1865	1129	2007	830	1672	1381	1835	1115	1972	815
	80	1747	1641	1891	1366	2076	1087	1725	1628	1866	1352	2049	1075	1698	1612	1837	1337	2016	1060
	85	1807	1807	1912	1590	2092	1319	1788	1788	1888	1577	2065	1307	1764	1764	1859	1561	2033	1292
	90	1868	1868	1937	1818	2094	1539	1851	1851	1913	1805	2065	1525	1830	1830	1885	1789	2033	1509
46000	75	1760	1486	1925	1190	2059	853	1737	1473	1899	1178	2027	840	1709	1456	1868	1163	1991	824
	80	1793	1747	1931	1434	2112	1129	1770	1734	1905	1420	2084	1117	1744	1718	1875	1404	2051	1102
	85	1875	1875	1955	1687	2129	1387	1855	1854	1930	1673	2101	1375	1830	1829	1901	1657	2068	1360
	90	1958	1958	1989	1945	2137	1627	1939	1939	1965	1931	2109	1614	1916	1916	1936	1915	2077	1598
51000	75	1793	1558	1932	1226	2074	862	1769	1544	1905	1211	2041	849	1741	1527	1874	1194	2003	833
	80	1835	1835	1964	1499	2142	1170	1812	1811	1937	1485	2112	1158	1786	1786	1907	1468	2078	1143
	85	1934	1934	1993	1781	2146	1439	1912	1912	1967	1768	2117	1425	1886	1886	1936	1751	2084	1408
	90	2037	2037	2036	2036	2173	1714	2013	2013	2013	2013	2145	1700	1986	1986	1987	1986	2111	1684
54000	75	1811	1601	1947	1248	2080	868	1787	1586	1920	1234	2046	854	1758	1569	1888	1216	2008	838
	80	1862	1862	1981	1537	2156	1194	1840	1840	1954	1523	2127	1182	1814	1814	1923	1506	2092	1167
	85	1966	1966	2013	1838	2163	1473	1943	1943	1987	1824	2134	1459	1916	1916	1956	1807	2100	1442
	90	2069	2069	2070	2070	2192	1765	2047	2047	2047	2047	2163	1751	2019	2018	2019	2019	2130	1734
58000	75	1832	1656	1965	1277	2086	874	1808	1642	1938	1262	2052	860	1778	1624	1905	1244	2013	844
	80	1897	1897	2002	1587	2173	1225	1874	1874	1975	1573	2143	1213	1848	1847	1943	1555	2107	1198
	85	2004	2004	2038	1912	2184	1518	1981	1981	2011	1897	2155	1503	1953	1953	1980	1880	2120	1486
	90	2111	2111	2111	2111	2215	1833	2088	2088	2087	2087	2186	1819	2064	2064	2059	2058	2152	1802

Table 30. Gross cooling capacities—140 tons—high capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB											
		75						80					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1397	1013	1547	872	1712	728	1378	1002	1524	859	1687	718
	80	1402	1136	1553	995	1714	849	1382	1124	1531	983	1689	838
	85	1403	1254	1558	1116	1722	971	1384	1242	1536	1104	1697	959
	90	1404	1373	1562	1237	2793	2236	1385	1361	1540	1225	2775	2234
26000	75	1489	1116	1643	938	1806	755	1467	1104	1618	925	1777	742
	80	1546	1291	1651	1089	1815	906	1475	1250	1627	1076	1788	894
	85	1503	1409	1671	1244	1825	1057	1482	1396	1633	1225	1798	1045
	90	1461	1461	1691	1399	1835	1207	1489	1489	1639	1374	1809	1195
31000	75	1557	1210	1712	996	1868	774	1533	1197	1686	984	1837	761
	80	1629	1409	1723	1175	1888	956	1540	1364	1696	1161	1859	944
	85	1586	1556	1730	1351	1900	1135	1563	1543	1770	1363	1871	1122
	90	1542	1542	1738	1517	1909	1309	1586	1586	1784	1534	1884	1300
36000	75	1603	1287	1765	1050	1909	789	1577	1273	1737	1037	1876	782
	80	1623	1489	1777	1255	1942	1003	1598	1475	1749	1242	1912	990
	85	1665	1665	1779	1446	1957	1208	1643	1643	1755	1433	1926	1195
	90	1708	1708	1802	1647	1966	1409	1689	1689	1775	1633	1937	1396
41000	75	1646	1365	1806	1100	1936	800	1619	1350	1776	1087	1901	794
	80	1673	1597	1809	1321	1984	1046	1646	1582	1780	1306	1952	1033
	85	1741	1741	1831	1546	2001	1278	1718	1717	1802	1531	1969	1265
	90	1809	1809	1857	1774	2002	1494	1789	1789	1830	1759	1973	1480
46000	75	1682	1441	1838	1149	1954	809	1655	1425	1784	1125	1916	805
	80	1717	1702	1845	1388	2018	1089	1691	1686	1816	1372	1984	1075
	85	1805	1805	1871	1641	2020	1336	1781	1780	1842	1626	1986	1320
	90	1893	1893	1908	1899	2045	1582	1870	1870	1880	1880	2012	1567
51000	75	1713	1514	1842	1178	1966	824	1684	1497	1811	1161	1926	815
	80	1761	1761	1876	1452	2044	1129	1736	1736	1845	1436	2009	1115
	85	1860	1860	1906	1735	2051	1392	1835	1834	1876	1719	2017	1376
	90	1959	1959	1960	1959	2079	1668	1846	1846	1934	1933	2045	1652
54000	75	1729	1557	1856	1199	1970	823	1700	1540	1824	1183	1930	820
	80	1788	1788	1892	1489	2057	1153	1763	1762	1861	1473	2021	1139
	85	1890	1889	1925	1790	2067	1426	1864	1863	1895	1774	2032	1409
	90	1991	1991	1993	1992	2097	1719	1966	1966	1965	1964	2062	1702
58000	75	1750	1613	1873	1227	1975	829	1721	1597	1840	1210	1934	827
	80	1821	1821	1911	1538	2072	1184	1795	1794	1880	1522	2006	1147
	85	1926	1925	1949	1863	2086	1469	1898	1898	1919	1847	2051	1452
	90	2030	2029	2031	2031	2119	1786	2002	2001	2003	2002	2084	1769

Table 31. Gross cooling capacities—162 tons—standard capacity evaporator coil

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB																	
		60						65						70					
		Entering Wet Bulb																	
		61		67		73		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1535	1065	1700	967	1884	827	1517	1094	1680	955	1862	817	1496	1081	1657	942	1836	802
	80	1539	1229	1705	1090	1885	948	1522	1218	1679	1076	1864	938	1501	1204	1662	1065	1838	923
	85	1544	1353	1709	1213	1890	1070	1526	1341	1680	1197	1869	1059	1505	1327	1667	1187	1843	1045
	90	1548	1476	1707	1331	1894	1192	1530	1464	1680	1318	2920	2370	1509	1451	1671	1309	1910	1199
26000	75	1643	1215	1809	1037	1998	861	1623	1203	1790	1027	1974	849	1600	1189	1764	1012	1944	834
	80	1649	1367	1820	1190	2004	1012	1629	1355	1798	1178	1980	998	1633	1356	1773	1164	1951	984
	85	1654	1512	1901	1382	2011	1161	1635	1499	1804	1328	1988	1149	1612	1484	1850	1353	1959	1134
	90	1659	1657	1832	1490	2018	1310	1640	1640	1811	1478	2077	1339	1590	1590	1785	1463	1967	1283
31000	75	1723	1314	1895	1101	2078	885	1702	1301	1872	1089	2051	872	1676	1286	1843	1074	2019	857
	80	1727	1486	1905	1280	2089	1064	1710	1481	1882	1268	2064	1052	1681	1457	1854	1253	2033	1037
	85	1746	1663	2003	1507	2101	1243	1725	1650	1977	1493	2075	1231	1700	1635	1947	1476	2045	1216
	90	1764	1764	1917	1629	2211	1468	1740	1740	1894	1616	2084	1406	1719	1719	1867	1600	2150	1438
36000	75	1776	1399	1958	1158	2134	903	1753	1386	1933	1146	2105	890	1727	1369	1904	1130	2071	874
	80	1795	1601	1970	1364	2155	1113	1773	1587	1945	1352	2127	1101	1746	1571	1916	1336	2095	1085
	85	1825	1810	1972	1563	2169	1319	1803	1797	2048	1592	2142	1306	1779	1779	1919	1533	2109	1291
	90	1908	1908	1991	1763	2178	1521	1834	1834	1966	1749	2151	1509	1811	1811	1938	1732	2119	1493
41000	75	1827	1481	2008	1211	2174	918	1804	1467	1982	1198	2144	904	1776	1450	1951	1183	2107	888
	80	1852	1712	2020	1444	2206	1159	1828	1698	1995	1431	2177	1146	1801	1681	1964	1416	2144	1131
	85	1904	1904	2028	1664	2221	1392	1883	1883	2003	1650	2193	1379	1859	1859	1973	1633	2160	1363
	90	1956	1956	2053	1892	2231	1621	1981	1981	2028	1878	2203	1608	1917	1917	1998	1862	2170	1592
46000	75	1870	1559	2047	1261	2203	930	1845	1545	2020	1248	2170	916	1816	1528	1988	1232	2132	899
	80	1901	1820	2051	1510	2247	1203	1877	1805	2024	1495	2217	1190	1849	1788	1993	1478	2182	1174
	85	1977	1977	2076	1763	2264	1462	1956	1956	2049	1748	2234	1449	1930	1930	2018	1731	2199	1433
	90	2054	2054	2107	2020	2265	1705	2034	2034	2081	2006	2236	1691	2011	2011	2051	1988	2202	1673
51000	75	1906	1632	2079	1309	2223	940	1881	1620	2051	1296	2189	926	1851	1600	1995	1271	2149	909
	80	1946	1926	2087	1577	2280	1245	1921	1911	2060	1562	2250	1232	1893	1893	2027	1544	2213	1216
	85	2041	2041	2116	1859	2282	1520	2018	2018	2089	1844	2251	1505	1991	1991	2057	1826	2216	1487
	90	2136	2136	2158	2146	2308	1794	2115	2115	2132	2131	2279	1780	2089	2089	2102	2102	2244	1762
54000	75	1925	1676	2073	1328	2232	946	1899	1661	2045	1313	2197	932	1869	1643	2011	1294	2157	914
	80	1970	1970	2106	1616	2297	1269	1944	1944	2078	1601	2266	1256	1917	1917	2046	1583	2229	1240
	85	2075	2075	2138	1916	2301	1555	2052	2052	2110	1901	2270	1540	2024	2024	2078	1883	2234	1522
	90	2185	2185	2184	2184	2329	1846	2159	2159	2160	2160	2299	1832	2131	2130	2131	2131	2264	1813
58000	75	1948	1733	2094	1358	2241	953	1922	1717	2065	1343	2206	939	1892	1699	2031	1324	2164	921
	80	2005	2005	2129	1667	2316	1301	1982	1982	2101	1652	2285	1288	1954	1954	2067	1633	2247	1272
	85	2117	2117	2164	1991	2324	1600	2093	2092	2137	1975	2293	1585	2064	2063	2104	1957	2256	1567
	90	2228	2228	2229	2229	2355	1915	2203	2203	2204	2204	2324	1900	2174	2173	2174	2174	2288	1882

Table 31. Gross cooling capacities—162 tons—standard capacity evaporator coil (continued)

Air Flow CFM	Ent DB (°F)	Ambient Temperature WB											
		75						80					
		Entering Wet Bulb											
		61		67		73		61		67		73	
		CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC	CAP	SHC
21000	75	1476	1068	1634	929	1810	788	1455	1056	1611	917	1785	778
	80	1480	1191	1640	1052	1812	909	1460	1179	1617	1039	1787	898
	85	1485	1314	1645	1174	1818	1032	1463	1301	1621	1161	1793	1020
	90	1489	1437	1649	1296	2898	2329	1466	1423	1626	1283	1857	1171
26000	75	1577	1175	1739	998	1915	820	1554	1162	1713	985	1886	809
	80	1610	1341	1747	1150	1923	970	1560	1309	1721	1136	1894	957
	85	1589	1470	1754	1300	1931	1121	1566	1456	1728	1286	1904	1108
	90	1568	1568	1760	1449	1939	1269	1573	1573	1733	1434	1987	1293
31000	75	1651	1272	1816	1059	1987	842	1626	1258	1788	1046	1955	832
	80	1656	1442	1826	1239	2002	1023	1631	1427	1799	1225	1973	1009
	85	1676	1619	1907	1451	2014	1201	1652	1605	1806	1401	1984	1187
	90	1696	1696	1840	1584	2023	1376	1672	1672	1893	1605	2085	1408
36000	75	1700	1354	1874	1115	2037	859	1673	1338	1845	1101	2002	849
	80	1720	1555	1886	1321	2064	1071	1733	1557	1857	1307	2031	1057
	85	1754	1754	1887	1516	2078	1277	1730	1730	1860	1501	2045	1262
	90	1789	1789	1909	1716	2088	1479	1727	1727	1881	1701	2056	1464
41000	75	1748	1434	1920	1168	2071	872	1720	1417	1889	1153	2033	864
	80	1774	1665	1933	1401	2111	1117	1747	1649	1903	1386	2076	1101
	85	1835	1834	1943	1617	2127	1348	1811	1810	1913	1601	2092	1333
	90	1896	1896	1968	1845	2137	1577	1875	1875	1939	1829	2158	1576
46000	75	1788	1511	1956	1217	2095	883	1759	1494	1924	1202	2055	876
	80	1821	1771	1961	1461	2148	1160	1793	1755	1930	1445	2112	1144
	85	1904	1904	1987	1714	2165	1418	1879	1878	1956	1698	2130	1403
	90	2005	2004	2021	1972	2168	1657	1964	1964	1991	1956	2137	1641
51000	75	1821	1585	1962	1254	2110	897	1792	1569	1929	1237	2069	886
	80	1865	1865	1995	1527	2178	1201	1837	1837	1963	1510	2141	1186
	85	1964	1964	2026	1809	2181	1471	1937	1937	1993	1792	2145	1453
	90	2063	2062	2072	2072	2209	1745	2038	2037	2040	2040	2173	1728
54000	75	1839	1629	1978	1276	2117	908	1810	1612	1944	1259	2075	892
	80	1890	1890	2013	1566	2193	1225	1864	1863	1980	1548	2155	1209
	85	1997	1997	2046	1866	2199	1505	1969	1968	2013	1848	2162	1487
	90	2104	2104	2103	2103	2229	1797	2074	2073	2075	2075	2192	1779
58000	75	1861	1687	1997	1306	2124	916	1831	1670	1962	1288	2081	900
	80	1926	1926	2035	1616	2211	1256	1899	1898	2001	1598	2172	1241
	85	2036	2036	2072	1940	2221	1549	2007	2006	2038	1922	2183	1531
	90	2145	2145	2146	2145	2253	1865	2117	2116	2116	2116	2217	1847

Supply Fan (with or without Variable Frequency Drive)

Table 32. Supply fan performance LOW CFM—90 tons air-cooled/100 tons evap-condensing (25")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
16000	1030[a]	6.16	1062	6.81	1095	7.52	1126	8.14	1152	8.58	1177	9.05	1205	9.67	1234	10.38
17000	1090	7.30	1121	7.99	1152	8.74	1182	9.46	1208	9.98	1232	10.47	1256	10.99	1282	11.66
18000	1151	8.57	1180	9.31	1209	10.07	1238	10.86	1265	11.57	1288	12.05	1311	12.57	1333	13.13
19000	1211	9.99	1239	10.77	1266	11.55	1294	12.41	1321	13.20	1345	13.82	1367	14.34	1388	14.89
20000	1272	11.57	1299	12.39	1325	13.20	1351	14.08	1377	14.96	1402	15.76	1423	16.31	1444	16.87
21000	1333	13.30	1359	14.16	1383	15.02	1408	15.91	1433	16.85	1458	17.74	1480	18.48	1500	19.04
22000	1394	15.21	1419	16.11	1443	17.01	1466	17.90	1490	18.90	1513	19.85	1536	20.76	1556	21.42
23000	1455	17.28	1479	18.23	1502	19.17	1524	20.11	1547	21.12	1570	22.14	1592	23.11	1613	24.02
24000	1516	19.55	1539	20.54	1561	21.52	1583	22.49	1604	23.50	1626	24.58	1648	25.64	1669	26.63
25000	1578	22.01	1600	23.04	1621	24.07	1642	25.09	1662	26.09	1683	27.22	1705	28.33	1725	29.42
26000	1639	24.67	1660	25.74	1681	26.81	1701	27.87	1721	28.93	1741	30.04	1762	31.22	1781	32.36
27000	1701	27.54	1721	28.66	1741	29.77	1760	30.88	1780	31.97	1798	33.06	1818	34.29	1838	35.51
28000	1762	30.62	1782	31.78	1801	32.94	1820	34.09	1838	35.22	1857	36.35	1876	37.58	1895	38.83
29000	1824	33.94	1843	35.14	1861	36.34	1880	37.53	1898	38.71	1915	39.88	1933	41.08	1952	42.41
30000	1885	37.48	1904	38.73	1922	39.96	1939	41.19	1957	42.42	1974	43.64	1991	44.86	2009	46.19
31000	1947	41.27	1965	42.56	1982	43.83	2000	45.11								

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
16000	1262[a]	11.09	1289	11.80	1315	12.50	1341	13.22	1366	13.95	1391	14.67	1415	15.41	1438	16.13
17000	1309	12.40	1337	13.18	1362	13.92	1388	14.68	1412	15.45	1435	16.20	1459	17.00	1481	17.74
18000	1359	13.87	1385	14.67	1410	15.48	1435	16.28	1459	17.08	1481	17.86	1505	18.68	1527	19.49
19000	1410	15.51	1433	16.28	1458	17.13	1482	17.97	1506	18.84	1528	19.65	1551	20.50	1573	21.36
20000	1464	17.45	1484	18.09	1507	18.92	1530	19.80	1554	20.70	1577	21.62	1599	22.50	1619	23.34
21000	1519	19.63	1539	20.26	1558	20.94	1579	21.79	1602	22.73	1623	23.63	1645	24.58	1667	25.53
22000	1576	22.03	1594	22.65	1612	23.31	1631	24.00	1652	24.92	1672	25.86	1694	26.83	1714	27.80
23000	1632	24.63	1650	25.27	1668	25.93	1685	26.61	1703	27.34	1722	28.23	1742	29.23	1763	30.28
24000	1688	27.48	1706	28.13	1724	28.79	1740	29.47	1757	30.19	1775	30.97	1792	31.86	1811	32.87
25000	1745	30.41	1763	31.23	1780	31.89	1796	32.59	1813	33.31	1828	34.03	1845	34.85	1863	35.76
26000	1801	33.44	1820	34.48	1836	35.23	1853	35.94	1868	36.66	1884	37.41	1899	38.16	1916	39.02
27000	1857	36.66	1876	37.79	1893	38.83	1909	39.58	1925	40.30	1940	41.05	1956	41.84	1970	42.62
28000	1913	40.07	1931	41.26	1949	42.42	1967	43.48	1982	44.22	1996	44.95				
29000	1970	43.70	1987	44.93	2005	46.18										

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
16000	1461	16.88	1484	17.60	1508	18.39	1530	19.15	1551	19.86	1575	20.69	1598	21.47	1620	22.29
17000	1504	18.52	1527	19.34	1549	20.13	1569	20.86	1591	21.67	1613	22.46	1633	23.25	1656	24.12
18000	1548	20.29	1571	21.14	1591	21.94	1613	22.78	1633	23.61	1655	24.47	1674	25.26	1694	26.08
19000	1595	22.23	1615	23.05	1636	23.91	1656	24.77	1676	25.66	1698	26.58	1717	27.44	1737	28.32
20000	1640	24.22	1661	25.15	1681	26.02	1701	26.94	1722	27.89	1741	28.77	1760	29.69	1779	30.64
21000	1687	26.43	1707	27.37	1727	28.31	1746	29.23	1766	30.18	1786	31.18	1804	32.10	1823	33.05
22000	1736	28.82	1755	29.78	1774	30.73	1793	31.71	1813	32.73	1831	33.67	1849	34.64	1867	35.65
23000	1782	31.26	1803	32.35	1822	33.35	1841	34.34	1859	35.37	1878	36.43	1895	37.40	1913	38.40
24000	1831	33.92	1851	35.02	1869	36.03	1889	37.15	1908	38.24	1926	39.31	1943	40.33	1960	41.39
25000	1880	36.77	1899	37.87	1918	38.96	1936	40.08	1954	41.17	1973	42.37	1991	43.46	2007	44.51
26000	1932	39.88	1949	40.93	1967	42.08	1985	43.21	2003	44.37						
27000	1985	43.44	2000	44.30												

Continued on next page

Table 32. Supply fan performance LOW CFM—90 tons air-cooled/100 tons evap-condensing (25") (continued)

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
16000	1644	23.14	1665	23.93	1687	24.77	1710	25.65	1733	26.56	1754	27.40	1776	28.28	1798	29.18
17000	1676	24.92	1697	25.75	1719	26.62	1741	27.52	1762	28.41	1784	29.33	1805	30.23	1826	31.17
18000	1714	26.94	1735	27.82	1755	28.69	1775	29.58	1794	30.44	1814	31.34	1835	32.27	1855	33.23
19000	1755	29.18	1775	30.07	1793	30.92	1812	31.81	1831	32.72	1851	33.67	1871	34.65	1888	35.51
20000	1797	31.50	1816	32.45	1836	33.43	1853	34.30	1871	35.21	1890	36.21	1907	37.10	1925	38.01
21000	1841	34.03	1859	34.98	1878	35.96	1895	36.90	1914	37.94	1930	38.85	1947	39.79	1964	40.76
22000	1886	36.69	1904	37.71	1921	38.67	1938	39.67	1956	40.70	1974	41.76	1991	42.76	2008	43.79
23000	1930	39.43	1948	40.50	1967	41.61	1983	42.58	2000	43.68						
24000	1978	42.49	1995	43.54												

CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
16000	1820	30.13	1843	31.11	1863	31.99	1887	33.04
17000	1846	32.07	1867	33.02	1887	33.92	1910	35.00
18000	1877	34.22	1895	35.11	1914	36.04	1935	37.08
19000	1909	36.55	1927	37.47	1946	38.43	1965	39.41
20000	1944	39.03	1962	40.00	1980	40.99	1997	41.93
21000	1982	41.75	2000	42.77				

Notes:
1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (evap coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the rooftop is 5.5" H_20 positive.
3. Max CFM allowable CFM is 31000
4. Max rpm 2000, Max hp 50
5. Min rpm 1400, Min hp 15

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 27. Supply fan performance LOW CFM — 90 tons air-cooled/100 tons evap-condensing (25")

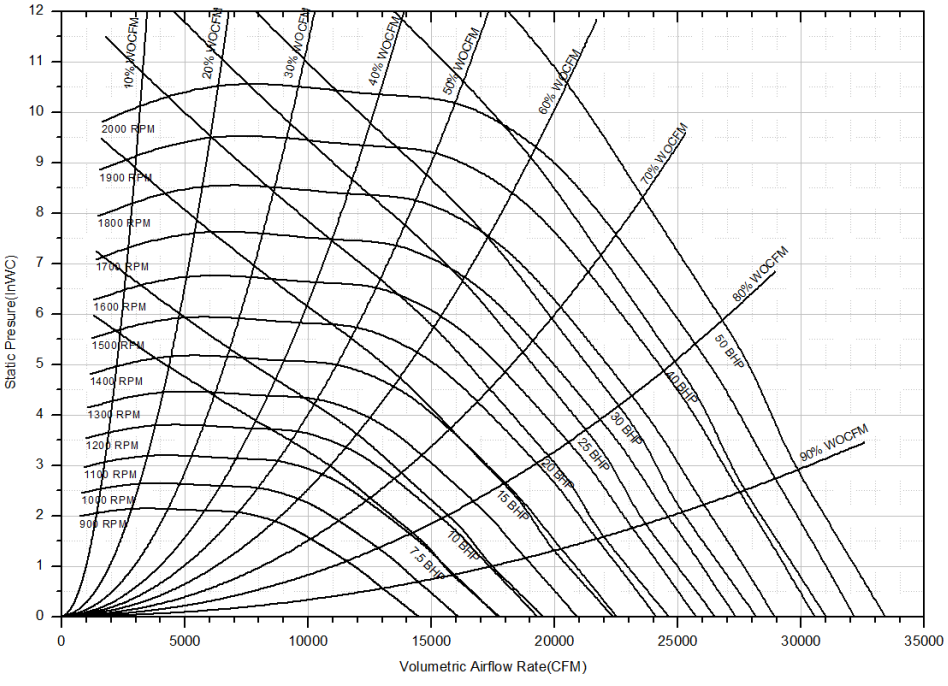

Table 33. Supply fan performance STANDARD CFM—90-105 tons air-cool/100-118 tons evap-condensing (36")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
20000	490[a]	3.76	520	4.39	552	5.19	583	6.08	611	6.98	638	7.91	664	8.81	690	9.77
21000	511	4.26	541	4.95	570	5.72	600	6.66	628	7.59	655	8.56	680	9.51	704	10.49
22000	532	4.80	561	5.57	588	6.30	618	7.28	645	8.26	671	9.24	696	10.24	720	11.28
23000	553	5.39	582	6.25	607	6.94	636	7.93	662	8.95	688	9.98	712	11.03	736	12.09
24000	574	6.04	603	6.99	627	7.68	654	8.63	680	9.71	705	10.76	729	11.86	752	12.94
25000	595	6.73	624	7.78	648	8.48	672	9.38	698	10.50	722	11.60	746	12.72	768	13.87
26000	617	7.47	645	8.59	668	9.35	691	10.20	716	11.32	740	12.50	763	13.63	785	14.79
27000	638	8.27	666	9.45	689	10.29	710	11.11	733	12.20	758	13.43	780	14.61	802	15.81
28000	660	9.14	686	10.36	710	11.30	730	12.12	752	13.15	776	14.41	798	15.67	819	16.90
29000	682	10.07	707	11.34	730	12.39	750	13.20	771	14.17	793	15.44	816	16.74	836	18.01
30000	704	11.07	728	12.37	752	13.56	771	14.37	790	15.29	812	16.54	834	17.89	854	19.20
31000	726	12.13	749	13.46	772	14.76	792	15.62	810	16.54	830	17.70	851	19.06	872	20.44
32000	748	13.25	771	14.63	793	15.99	812	16.95	830	17.86	849	18.95	869	20.32	890	21.74
33000	770	14.45	792	15.85	814	17.28	833	18.36	851	19.28	868	20.30	888	21.64	907	23.07
34000	791	15.72	813	17.15	835	18.63	854	19.86	872	20.79	888	21.80	906	23.04	925	24.50
35000	813	17.06	834	18.52	856	20.06	875	21.44	892	22.39	909	23.40	925	24.54	944	26.00
36000	836	18.48	856	19.97	877	21.56	896	23.05	913	24.07	929	25.08	945	26.18	962	27.58
37000	858	19.98	877	21.49	898	23.14	917	24.69	934	25.86	950	26.87	965	27.97	981	29.24
38000	880	21.56	899	23.09	919	24.79	938	26.41	955	27.73	970	28.76	986	29.87	1001	31.06
39000	902	23.22	921	24.80	940	26.52	958	28.21	976	29.69	991	30.74	1006	31.85	1021	33.04
40000	924	24.96	942	26.58	961	28.33	979	30.09	997	31.71	1012	32.83	1026	33.95	1041	35.13
41000	946	26.80	964	28.47	982	30.24	1000	32.04	1017	33.73	1033	35.02	1047	36.13	1061	37.31
42000	968	28.72	986	30.43	1003	32.22	1021	34.10	1038	35.86	1054	37.33	1068	38.44	1081	39.61
43000	991	30.74	1008	32.49	1025	34.31	1042	36.23	1059	38.05	1075	39.73	1089	40.87	1102	42.06
44000	1013	32.85	1030	34.64	1046	36.47	1063	38.44	1080	40.35	1095	42.11	1109	43.38	1123	44.59
45000	1035	35.06	1052	36.89	1068	38.74	1084	40.74	1101	42.71	1116	44.56	1130	46.02	1144	47.25

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
20000	715	10.76	741	11.79	766	12.86	791	13.97	816	15.14	841	16.35	865	17.52	890	18.79
21000	728	11.49	753	12.55	777	13.63	802	14.76	825	15.90	849	17.14	872	18.33	896	19.64
22000	743	12.30	767	13.37	789	14.43	813	15.60	836	16.76	858	17.96	880	19.18	904	20.52
23000	758	13.15	780	14.22	803	15.34	825	16.49	847	17.68	869	18.91	891	20.17	913	21.44
24000	774	14.04	796	15.17	817	16.29	838	17.43	860	18.66	881	19.88	901	21.12	922	22.42
25000	790	15.00	811	16.18	832	17.32	852	18.48	872	19.70	893	20.92	914	22.24	934	23.57
26000	806	15.99	827	17.20	847	18.41	867	19.60	886	20.79	906	22.07	925	23.35	946	24.71
27000	823	17.04	843	18.29	863	19.53	882	20.78	902	22.03	920	23.28	939	24.61	958	25.93
28000	839	18.13	859	19.41	879	20.71	898	21.99	916	23.26	935	24.57	953	25.86	971	27.23
29000	857	19.31	876	20.61	895	21.94	914	23.28	933	24.62	951	25.94	968	27.30	985	28.62
30000	874	20.53	894	21.89	912	23.25	931	24.61	948	25.97	966	27.36	983	28.72	1000	30.10
31000	891	21.80	910	23.19	929	24.56	947	25.99	965	27.42	983	28.88	999	30.25	1016	31.69
32000	909	23.18	928	24.60	946	25.99	964	27.43	981	28.86	998	30.33	1016	31.89	1031	33.27
33000	927	24.57	945	26.02	963	27.47	980	28.92	998	30.48	1015	31.96	1031	33.46	1048	34.97
34000	945	26.04	963	27.55	981	29.03	998	30.54	1015	32.11	1031	33.59	1048	35.15	1064	36.73
35000	962	27.52	981	29.11	998	30.65	1015	32.18	1032	33.75	1049	35.35	1064	36.91	1080	38.49
36000	980	29.13	998	30.74	1016	32.36	1033	33.96	1049	35.54	1065	37.14	1081	38.76	1097	40.40
37000	999	30.82	1016	32.46	1034	34.15	1051	35.76	1067	37.41	1083	39.01	1099	40.69	1114	42.32
38000	1017	32.54	1034	34.20	1051	35.91	1069	37.65	1084	39.30	1100	40.97	1115	42.64	1130	44.33
39000	1036	34.41	1053	36.09	1070	37.81	1086	39.57	1102	41.29	1118	43.02	1133	44.77	1148	46.52
40000	1055	36.40	1071	38.02	1087	39.75	1103	41.51	1120	43.38	1135	45.10	1151	46.92	1165	48.66
41000	1075	38.58	1090	40.05	1105	41.79	1122	43.63	1138	45.49	1153	47.29	1168	49.10	1183	50.99

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Table 33. Supply fan performance STANDARD CFM—90-105 tons air-cool/100-118 tons evap-condensing (36")

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
42000	1095	40.91	1109	42.26	1125	44.02	1140	45.78	1155	47.64	1171	49.60	1186	51.47	1200	53.25
43000	1116	43.31	1129	44.68	1143	46.20	1158	48.05	1174	49.99	1189	51.93	1203	53.79	1218	55.73
44000	1136	45.86	1149	47.17	1162	48.59	1177	50.44	1192	52.37	1207	54.30	1221	56.23	1236	58.25
45000	1156	48.50	1169	49.81	1182	51.24	1195	52.87	1210	54.79	1225	56.80	1239	58.80	1253	60.79
CFM	**Total Static Pressure**															
Std.	**4.25**		**4.50**		**4.75**		**5.00**		**5.25**		**5.50**		**5.75**		**6.00**	
Air	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**
20000	916	20.12	944	21.56	970	22.91	995	24.26	1019	25.60	1043	26.97	1065	28.31	1088	29.66
21000	918	20.86	943	22.25	969	23.72	995	25.19	1018	26.52	1042	27.95	1067	29.49	1089	30.84
22000	925	21.76	948	23.10	969	24.43	994	25.94	1020	27.52	1043	28.96	1067	30.50	1089	31.99
23000	934	22.77	955	24.09	976	25.44	998	26.89	1019	28.31	1043	29.91	1066	31.45	1090	33.09
24000	944	23.83	964	25.13	984	26.52	1006	28.00	1026	29.45	1045	30.84	1065	32.32	1088	33.98
25000	954	24.91	974	26.24	994	27.66	1014	29.11	1033	30.52	1053	32.08	1073	33.59	1091	35.02
26000	966	26.07	984	27.43	1004	28.88	1023	30.30	1042	31.81	1061	33.26	1080	34.80	1099	36.42
27000	978	27.34	996	28.72	1015	30.13	1034	31.65	1052	33.05	1070	34.61	1088	36.10	1107	37.75
28000	990	28.63	1008	30.06	1027	31.51	1045	32.98	1062	34.40	1081	35.99	1098	37.51	1117	39.20
29000	1003	30.02	1021	31.49	1039	32.92	1057	34.43	1074	35.88	1091	37.42	1109	39.05	1126	40.60
30000	1018	31.56	1035	32.97	1052	34.45	1070	36.01	1086	37.50	1103	39.07	1119	40.56	1137	42.22
31000	1032	33.08	1049	34.55	1066	36.09	1082	37.55	1098	39.09	1115	40.71	1131	42.23	1148	43.83
32000	1048	34.79	1064	36.25	1080	37.78	1096	39.30	1112	40.81	1129	42.48	1144	44.06	1160	45.70
33000	1064	36.49	1080	38.08	1096	39.60	1111	41.10	1126	42.68	1141	44.23	1157	45.85	1173	47.54
34000	1079	38.25	1096	39.91	1110	41.41	1126	42.97	1141	44.60	1155	46.12	1171	47.80	1187	49.55
35000	1096	40.14	1111	41.72	1126	43.37	1142	44.99	1156	46.60	1170	48.18	1186	49.92	1200	51.52
36000	1112	42.04	1127	43.68	1143	45.40	1157	47.01	1172	48.68	1186	50.31	1200	52.02	1214	53.68
37000	1129	44.03	1144	45.73	1159	47.43	1173	49.10	1188	50.84	1202	52.54	1216	54.31	1230	56.03
38000	1146	46.10	1160	47.78	1175	49.54	1189	51.28	1203	52.99	1218	54.86	1232	56.59	1246	58.37
39000	1163	48.28	1177	49.93	1191	51.75	1206	53.56	1220	55.33	1234	57.17	1247	58.96	1260	60.70
40000	1180	50.47	1194	52.28	1209	54.07	1222	55.84	1236	57.67	1249	59.47	1263	61.32	1277	63.25
41000	1197	52.78	1211	54.56	1225	56.40	1239	58.23	1253	60.13	1266	61.99	1280	63.92	1293	65.79
42000	1214	55.11	1229	57.05	1242	58.86	1256	60.75	1269	62.60	1282	64.52	1296	66.51	1309	68.44
43000	1232	57.56	1246	59.46	1260	61.45	1273	63.28	1287	65.31	1299	67.18	1313	69.24	1325	71.10
44000	1250	60.14	1263	62.12	1277	64.06	1291	66.08	1304	68.05	1316	69.98	1329	71.97	1342	73.90
45000	1268	62.86	1281	64.80	1295	66.81	1308	68.78	1321	70.82	1333	72.80	1346	74.86		
CFM	**Total Static Pressure**															
Std.	**6.25**		**6.50**		**6.75**		**7.00**		**7.25**		**7.50**		**7.75**		**8.00**	
Air	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**
20000	1111	31.11	1133	32.60	1153	33.99	1173	35.49	1194	37.09	1213	38.55	1233	40.10	1253	41.75
21000	1111	32.27	1133	33.71	1155	35.16	1175	36.64	1196	38.19	1217	39.84	1235	41.34	1254	42.94
22000	1112	33.49	1133	34.93	1156	36.54	1176	37.97	1197	39.48	1217	40.97	1237	42.62	1256	44.17
23000	1113	34.68	1134	36.20	1156	37.81	1177	39.32	1198	40.92	1217	42.39	1237	43.95	1257	45.59
24000	1112	35.73	1133	37.25	1156	39.04	1176	40.55	1199	42.34	1217	43.81	1239	45.57	1258	47.20
25000	1112	36.70	1134	38.41	1154	40.02	1177	41.91	1197	43.50	1217	45.18	1238	46.94	1257	48.55
26000	1118	37.96	1137	39.58	1154	41.09	1177	43.01	1198	44.81	1217	46.49	1237	48.25	1258	50.10
27000	1125	39.32	1144	40.97	1161	42.51	1179	44.22	1196	45.80	1217	47.73	1237	49.50	1256	51.35
28000	1134	40.80	1151	42.39	1169	44.06	1186	45.70	1204	47.41	1222	49.21	1238	50.84	1257	52.75
29000	1143	42.23	1161	43.94	1177	45.54	1194	47.20	1211	48.95	1229	50.77	1244	52.43	1261	54.16
30000	1153	43.79	1170	45.54	1186	47.16	1203	48.86	1220	50.64	1237	52.49	1253	54.19	1269	55.95
31000	1164	45.51	1182	47.29	1197	48.95	1213	50.69	1229	52.38	1245	54.15	1260	55.87	1276	57.66
32000	1176	47.32	1192	49.02	1208	50.70	1224	52.47	1240	54.31	1255	56.00	1270	57.75	1285	59.56
33000	1187	49.11	1204	50.95	1220	52.66	1235	54.44	1250	56.08	1265	57.91	1281	59.82	1296	61.68
34000	1201	51.16	1216	52.84	1231	54.59	1247	56.41	1261	58.07	1277	60.04	1292	61.86	1307	63.75
35000	1214	53.19	1229	54.92	1244	56.72	1258	58.47	1273	60.29	1287	62.05	1302	63.87	1317	65.78

Continued on next page

Table 33. Supply fan performance STANDARD CFM—90-105 tons air-cool/100-118 tons evap-condensing (36")

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
36000	1229	55.40	1243	57.19	1256	58.81	1272	60.73	1285	62.47	1299	64.28	1314	66.14	1328	68.08
37000	1244	57.71	1257	59.44	1270	61.11	1285	63.09	1299	64.88	1313	66.74	1326	68.52	1340	70.35
38000	1258	59.99	1273	61.90	1286	63.63	1299	65.42	1312	67.27	1326	69.17	1339	71.00		
39000	1274	62.49	1287	64.35	1300	66.13	1314	67.98	1327	69.89	1339	71.57				
40000	1289	64.98	1303	66.90	1316	68.75	1328	70.52	1341	72.48	1354	74.36				
41000	1306	67.72	1319	69.58	1332	71.49	1344	73.32								
42000	1322	70.45	1335	72.38	1347	74.22										
43000	1338	73.03														

CFM	Total Static Pressure			
Std.	8.25		8.50	
Air	rpm	bhp	rpm	bhp
20000	1271	43.35	1291	45.04
21000	1274	44.63	1291	46.11
22000	1275	45.80	1294	47.53
23000	1275	47.06	1294	48.70
24000	1276	48.66	1296	50.45
25000	1276	50.25	1296	52.02
26000	1276	51.80	1296	53.57
27000	1277	53.29	1295	55.06
28000	1277	54.70	1295	56.48
29000	1278	55.96	1295	57.81
30000	1285	57.78	1302	59.68
31000	1292	59.52	1308	61.45
32000	1301	61.46	1317	63.42
33000	1311	63.47	1325	65.33
34000	1320	65.43	1335	67.46
35000	1332	67.77	1345	69.54
36000	1342	69.94		

Notes:

1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (evap coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the rooftop is 5.5" H_20 positive.
3. Max CFM for 90T is 40000 CFM, 105T 45000
4. Max rpm 1300, Max hp 60 for 90T. Max rpm 1350, Max hp 75 for 105T
5. Min rpm 750; Min hp 15 for 90T, Min hp 20 for 105T

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 28. Supply fan performance STANDARD CFM —90-105 tons air-cool/100-118 tons evap-condensing (36")

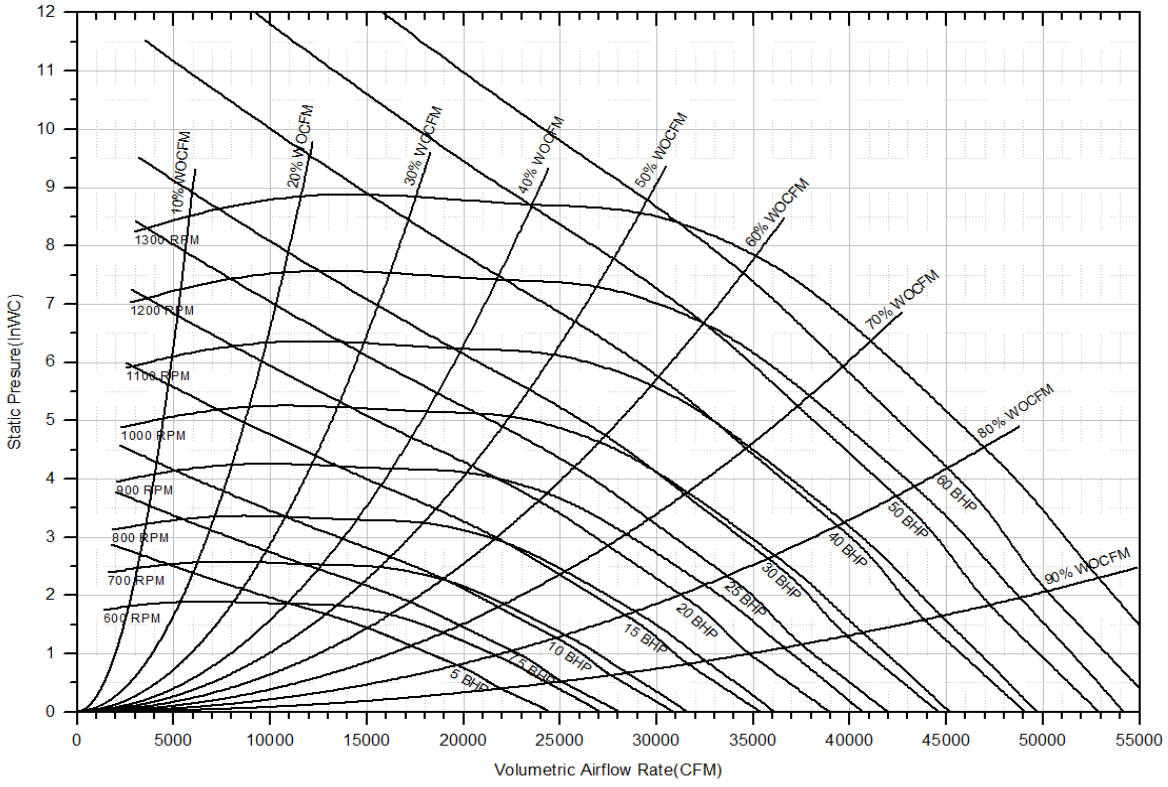

Table 34. Supply fan performance LOW CFM—105-150 tons air-cool/118-162 tons evap-condensing (32")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
19000	632[a]	4.48	667	5.30	695	5.87	723	6.53	754	7.38	782	8.22	809	9.07	835	9.93
20000	662	5.14	695	6.00	723	6.66	749	7.26	778	8.11	806	9.01	832	9.90	857	10.78
21000	692	5.86	723	6.76	752	7.53	776	8.13	802	8.93	830	9.86	856	10.78	881	11.72
22000	722	6.65	752	7.59	780	8.49	804	9.09	828	9.81	854	10.76	880	11.73	904	12.72
23000	752	7.51	781	8.48	809	9.46	832	10.14	854	10.82	879	11.73	904	12.74	928	13.77
24000	782	8.45	809	9.44	837	10.49	861	11.29	882	11.98	904	12.78	929	13.82	953	14.90
25000	813	9.46	839	10.47	865	11.59	889	12.53	910	13.22	931	13.98	953	14.95	977	16.08
26000	843	10.56	868	11.62	894	12.76	918	13.85	939	14.57	958	15.31	978	16.19	1000	17.30
27000	874	11.73	898	12.84	922	14.01	946	15.16	967	16.03	986	16.79	1005	17.61	1025	18.64
28000	904	13.00	928	14.14	951	15.34	975	16.57	996	17.60	1014	18.35	1033	19.18	1051	20.08
29000	935	14.35	957	15.54	980	16.75	1003	18.04	1024	19.23	1043	20.04	1061	20.86	1078	21.76
30000	965	15.80	987	17.03	1009	18.26	1031	19.61	1052	20.86	1072	21.86	1089	22.67	1106	23.56
31000	996	17.35	1018	18.62	1038	19.89	1060	21.27	1081	22.61	1100	23.77	1117	24.61	1134	25.48
32000	1027	19.00	1048	20.31	1068	21.62	1089	23.01	1109	24.42	1129	25.73	1146	26.66	1162	27.53
33000	1057	20.75	1078	22.11	1098	23.46	1117	24.85	1138	26.34	1157	27.72	1174	28.84	1190	29.74
34000	1088	22.61	1108	24.00	1127	25.40	1146	26.81	1166	28.35	1185	29.78	1203	31.16	1219	32.07
35000	1119	24.58	1138	26.02	1157	27.44	1176	28.86	1195	30.45	1214	31.98	1231	33.40	1248	34.54
36000	1150	26.66	1169	28.14	1187	29.60	1205	31.07	1223	32.66	1242	34.25	1259	35.76	1276	37.13
37000	1181	28.86	1199	30.38	1217	31.90	1235	33.40	1252	35.00	1271	36.66	1288	38.26	1305	39.74
38000	1212	31.17	1230	32.74	1247	34.30	1264	35.85	1281	37.42	1299	39.14	1316	40.83	1333	42.40
39000	1243	33.61	1260	35.22	1277	36.82	1294	38.40	1311	40.00	1328	41.77	1345	43.47	1361	45.13
40000	1274	36.17	1291	37.82	1308	39.48	1324	41.10	1340	42.73	1357	44.49	1373	46.27	1390	48.02
41000	1305	38.87	1321	40.56	1338	42.25	1354	43.91	1370	45.59	1386	47.37	1402	49.20	1418	50.98
42000	1336	41.70	1352	43.44	1368	45.17	1384	46.89	1399	48.58	1415	50.36	1431	52.26	1446	54.12
43000	1367	44.66	1383	46.44	1398	48.21	1414	49.97	1429	51.72	1444	53.48	1459	55.41	1475	57.34
44000	1398	47.77	1413	49.60	1429	51.40	1444	53.20	1459	55.00	1473	56.77	1488	58.70		
45000	1429	51.01	1444	52.88	1459	54.73	1474	56.58	1488	58.40						

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
19000	860	10.81	885	11.68	909	12.58	933	13.47	957	14.42	981	15.38	1005	16.38	1028	17.41
20000	882	11.70	906	12.63	929	13.54	953	14.49	975	15.43	998	16.44	1021	17.42	1044	18.47
21000	905	12.68	929	13.65	951	14.59	973	15.55	995	16.54	1017	17.54	1039	18.57	1060	19.59
22000	928	13.71	951	14.69	973	15.69	995	16.71	1016	17.74	1037	18.75	1057	19.76	1078	20.83
23000	952	14.80	974	15.81	995	16.85	1017	17.93	1037	18.95	1058	20.03	1078	21.09	1097	22.13
24000	975	15.97	997	17.01	1018	18.07	1039	19.18	1060	20.29	1079	21.36	1099	22.49	1118	23.58
25000	999	17.18	1021	18.28	1042	19.41	1062	20.50	1082	21.64	1102	22.80	1121	23.95	1140	25.11
26000	1023	18.47	1045	19.65	1065	20.76	1086	21.95	1105	23.11	1124	24.29	1144	25.50	1162	26.68
27000	1047	19.82	1069	21.06	1089	22.24	1109	23.42	1128	24.63	1147	25.83	1165	27.05	1184	28.34
28000	1072	21.27	1092	22.50	1113	23.79	1133	25.03	1152	26.27	1171	27.52	1188	28.75	1207	30.05
29000	1097	22.82	1117	24.09	1137	25.36	1157	26.67	1176	27.97	1194	29.24	1212	30.52	1229	31.82
30000	1123	24.49	1142	25.75	1161	27.05	1181	28.38	1200	29.74	1218	31.08	1235	32.37	1253	33.72
31000	1150	26.42	1168	27.54	1186	28.86	1205	30.22	1224	31.60	1242	33.00	1259	34.35	1276	35.71
32000	1178	28.47	1194	29.50	1211	30.71	1229	32.08	1248	33.53	1265	34.94	1284	36.43	1301	37.85
33000	1206	30.67	1222	31.68	1237	32.77	1254	34.10	1272	35.56	1290	37.04	1307	38.53	1325	40.02
34000	1234	33.03	1249	34.00	1264	35.06	1280	36.27	1297	37.68	1314	39.17	1331	40.73	1348	42.21
35000	1263	35.48	1277	36.47	1292	37.52	1306	38.60	1322	39.98	1339	41.47	1356	43.03	1372	44.59
36000	1291	38.10	1306	39.10	1320	40.13	1334	41.25	1348	42.39	1364	43.88	1380	45.44	1396	46.99

Continued on next page

Table 34. Supply fan performance LOW CFM—105-150 tons air-cool/118-162 tons evap-condensing (32") (continued)

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
37000	1320	40.85	1334	41.87	1348	42.91	1362	44.00	1375	45.12	1390	46.42	1405	47.98	1421	49.60
38000	1348	43.78	1362	44.78	1376	45.83	1390	46.93	1403	48.02	1416	49.25	1431	50.64	1446	52.24
39000	1377	46.73	1391	47.84	1404	48.90	1418	49.98	1431	51.09	1444	52.29	1457	53.57	1472	55.12
40000	1405	49.66	1420	51.09	1433	52.13	1446	53.24	1459	54.36	1471	55.52	1484	56.75	1497	58.06
41000	1434	52.74	1449	54.38	1462	55.55	1474	56.64	1487	57.76	1500	58.95				
42000	1462	55.91	1477	57.62	1490	59.11										
43000	1490	59.21														

CFM	Total Static Pressure															
Std.	4.25		4.50		4.75		5.00		5.25		5.50		5.75		6.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
19000	1051	18.44	1075	19.55	1099	20.65	1121	21.72	1144	22.87	1166	23.97	1188	25.14	1214	26.48
20000	1066	19.52	1088	20.57	1111	21.70	1132	22.80	1154	23.97	1177	25.16	1199	26.36	1220	27.57
21000	1082	20.67	1103	21.75	1125	22.90	1146	24.03	1168	25.23	1189	26.39	1210	27.62	1230	28.79
22000	1098	21.88	1119	22.99	1141	24.17	1161	25.32	1181	26.44	1201	27.63	1222	28.88	1242	30.14
23000	1117	23.23	1138	24.39	1157	25.52	1177	26.71	1197	27.85	1216	29.06	1237	30.34	1255	31.57
24000	1138	24.74	1157	25.86	1175	26.99	1194	28.17	1213	29.36	1233	30.60	1251	31.78	1270	33.09
25000	1158	26.23	1177	27.41	1194	28.53	1213	29.77	1231	30.94	1250	32.24	1268	33.46	1286	34.73
26000	1180	27.86	1198	29.04	1215	30.22	1233	31.46	1250	32.69	1268	33.97	1286	35.24	1303	36.49
27000	1202	29.58	1219	30.77	1237	32.02	1254	33.31	1271	34.53	1288	35.80	1305	37.13	1321	38.35
28000	1224	31.30	1242	32.61	1259	33.92	1275	35.15	1292	36.42	1308	37.75	1325	39.05	1342	40.41
29000	1246	33.13	1263	34.43	1281	35.80	1297	37.09	1313	38.44	1330	39.83	1345	41.11	1361	42.44
30000	1270	35.09	1286	36.39	1303	37.83	1319	39.17	1336	40.58	1351	41.88	1367	43.31	1383	44.71
31000	1293	37.07	1310	38.50	1325	39.84	1341	41.25	1358	42.72	1374	44.17	1389	45.58	1404	46.95
32000	1316	39.21	1333	40.62	1348	42.02	1364	43.49	1381	45.03	1396	46.44	1411	47.92	1427	49.45
33000	1340	41.44	1357	42.92	1373	44.39	1388	45.83	1403	47.33	1418	48.81	1434	50.35	1448	51.84
34000	1365	43.77	1380	45.24	1396	46.77	1411	48.27	1427	49.84	1441	51.28	1457	52.87	1471	54.43
35000	1389	46.21	1405	47.75	1420	49.26	1435	50.83	1450	52.36	1465	53.96	1479	55.41	1494	57.12
36000	1412	48.60	1429	50.29	1444	51.86	1460	53.50	1473	55.00	1488	56.56	1503	58.28	1517	59.84
37000	1437	51.20	1452	52.86	1469	54.60	1483	56.20	1498	57.87	1512	59.38				
38000	1461	53.92	1476	55.56	1492	57.26	1507	59.04								
39000	1486	56.67	1501	58.39												
40000	1511	59.68														

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
19000	1239	27.74	1265	29.08	1289	30.35	1314	31.70	1337	32.96	1360	34.30	1382	35.52	1404	36.82
20000	1241	28.77	1263	30.04	1289	31.46	1312	32.81	1337	34.24	1359	35.57	1383	36.97	1404	38.26
21000	1250	30.02	1271	31.32	1292	32.60	1314	33.95	1334	35.26	1358	36.76	1381	38.17	1404	39.64
22000	1263	31.47	1281	32.65	1303	34.04	1322	35.33	1342	36.69	1360	37.93	1381	39.41	1401	40.72
23000	1275	32.85	1295	34.21	1313	35.47	1332	36.79	1352	38.18	1369	39.44	1390	40.95	1408	42.32
24000	1288	34.33	1308	35.71	1326	37.00	1344	38.35	1363	39.76	1380	41.05	1400	42.58	1418	43.99
25000	1305	36.07	1322	37.32	1340	38.63	1358	40.01	1376	41.45	1393	42.76	1413	44.33	1430	45.76
26000	1321	37.79	1337	39.07	1355	40.41	1373	41.80	1391	43.26	1407	44.61	1424	46.00	1441	47.46
27000	1338	39.62	1355	41.03	1371	42.32	1389	43.76	1406	45.15	1423	46.61	1440	48.03	1456	49.52
28000	1358	41.74	1373	43.03	1389	44.37	1407	45.85	1422	47.20	1438	48.60	1454	50.04	1471	51.54
29000	1377	43.83	1394	45.26	1408	46.57	1423	47.91	1440	49.40	1456	50.84	1471	52.22	1487	53.77
30000	1398	46.06	1413	47.46	1429	48.91	1444	50.31	1459	51.76	1475	53.25	1488	54.58	1505	56.17
30000	1398	46.06	1413	47.46	1429	48.91	1444	50.31	1459	51.76	1475	53.25	1488	54.58	1505	56.17
31000	1420	48.46	1434	49.82	1449	51.23	1464	52.68	1479	54.19	1493	55.63	1508	57.11		
32000	1441	50.83	1455	52.26	1470	53.72	1485	55.24	1500	56.80	1513	58.18	1528	5972		
33000	1463	53.38	1478	54.87	1492	56.41	1507	57.99	1520	59.39						
34000	1485	55.93	1499	57.47	1514	59.08										
35000	1508	58.69														

Table 34. Supply fan performance LOW CFM—105-150 tons air-cool/118-162 tons evap-condensing (32") (continued)

CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
19000	1427	38.17	1448	39.40	1468	40.68	1490	42.02
20000	1426	39.60	1448	41.02	1468	42.29	1490	43.72
21000	1424	40.98	1449	42.59	1468	43.86	1490	45.39
22000	1423	42.27	1446	43.88	1467	45.36	1489	46.89
23000	1428	43.75	1444	45.03	1464	46.53	1488	48.30
24000	1437	45.45	1453	46.74	1473	48.32	1490	49.71
25000	1447	47.14	1464	48.58	1482	50.06	1500	51.61
26000	1459	48.97	1477	50.55	1493	51.95	1509	53.40
27000	1473	50.95	1489	52.44	1504	53.87	1523	55.59
28000	1488	53.11	1503	54.51	1519	56.08	1536	57.71
29000	1504	55.37	1518	56.78	1533	58.25		
30000	1519	57.58	1535	59.15				

Notes:

1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static pressure must be added to appropriate component sp drops (evap coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the rooftop is 5.5" H_20 positive.
3. Max CFM as follows: 105T 36000 CFM; 120T 42000 CFM, 130T and 150T 45000 CFM.
4. Max rpm 1500, Max hp 60
5. Min rpm 900, Min hp 15 for 105-120T, Min hp 20 for 130-150T

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 29. Supply fan performance LOW CFM—105-150 tons air-cool/118-162 tons evap-condensing (32")

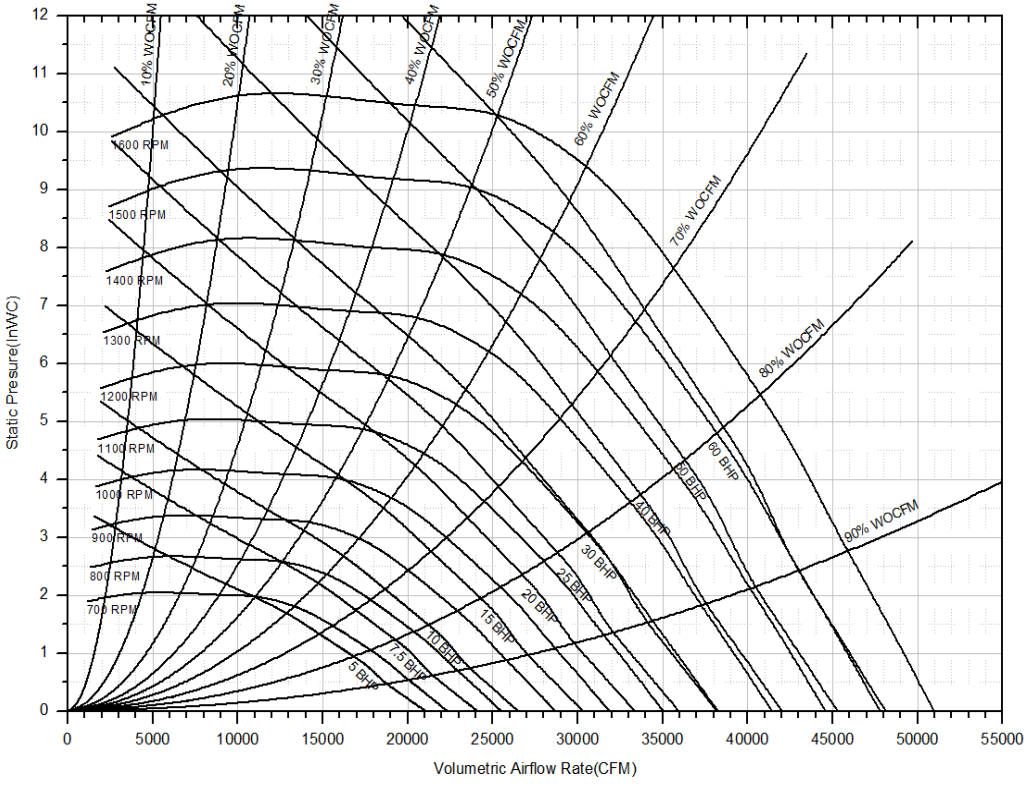

Table 35. Supply fan performance STANDARD CFM—120-150 tons air-cool/128-162 tons evap-condensing (40")

CFM	Total Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
27000	464[a]	4.87	492	5.95	519	7.04	550	8.26	577	9.50	602	10.72	626	11.96	648	13.18
28000	479	5.34	507	6.48	531	7.58	561	8.81	589	10.11	614	11.40	637	12.65	659	13.92
29000	493	5.84	522	7.04	545	8.16	573	9.41	601	10.74	626	12.09	649	13.39	670	14.69
30000	508	6.36	537	7.63	559	8.77	585	10.04	612	11.41	637	12.79	660	14.16	682	15.52
31000	522	6.92	552	8.25	573	9.44	597	10.71	624	12.10	649	13.54	672	14.97	693	16.35
32000	537	7.52	566	8.92	587	10.14	610	11.43	635	12.81	661	14.30	684	15.78	705	17.22
33000	552	8.15	581	9.61	602	10.88	622	12.17	647	13.59	672	15.10	695	16.64	717	18.16
34000	566	8.81	596	10.34	617	11.67	636	12.97	659	14.42	684	15.94	707	17.50	729	19.11
35000	581	9.51	610	11.11	631	12.49	650	13.82	671	15.26	696	16.82	718	18.41	741	20.08
36000	596	10.26	625	11.90	646	13.34	664	14.72	684	16.16	707	17.73	730	19.36	752	21.05
37000	611	11.04	639	12.74	661	14.26	679	15.66	697	17.12	719	18.71	742	20.36	763	22.07
38000	626	11.86	654	13.62	676	15.20	694	16.65	711	18.11	732	19.73	753	21.38	775	23.14
39000	640	12.72	668	14.54	691	16.18	708	17.69	725	19.18	744	20.75	765	22.47	786	24.23
40000	655	13.62	683	15.49	706	17.22	723	18.75	739	20.29	757	21.90	777	23.60	798	25.37
41000	670	14.57	698	16.50	721	18.30	738	19.89	754	21.44	770	23.05	789	24.78	810	26.59
42000	685	15.56	712	17.55	735	19.40	753	21.06	768	22.66	784	24.29	802	26.01	821	27.83
43000	700	16.61	727	18.63	750	20.56	768	22.29	783	23.93	798	25.58	815	27.30	834	29.17
44000	715	17.69	741	19.78	764	21.76	782	23.55	798	25.23	813	26.93	828	28.64	846	30.52
45000	730	18.82	756	20.95	779	23.00	797	24.88	812	26.59	827	28.32	842	30.07	859	31.94
46000	745	20.01	771	22.20	793	24.30	812	26.24	827	28.03	842	29.80	856	31.57	872	33.42
47000	761	21.25	785	23.49	808	25.63	827	27.67	842	29.49	856	31.28	870	33.08	885	34.97
48000	776	22.53	800	24.82	822	27.03	842	29.13	857	31.01	871	32.86	884	34.68	898	36.57
49000	791	23.87	815	26.21	836	28.47	856	30.64	872	32.59	886	34.47	899	36.38	912	38.23
50000	806	25.26	829	27.65	851	29.97	870	32.19	887	34.22	901	36.18	914	38.08	927	39.98
51000	821	26.71	844	29.15	866	31.52	885	33.80	902	35.93	915	37.90	928	39.85	941	41.80
52000	836	28.22	859	30.70	880	33.14	899	35.46	916	37.68	930	39.70	943	41.69	955	43.66
53000	852	29.77	874	32.31	895	34.80	914	37.20	931	39.50	945	41.57	958	43.61	970	45.63
54000	867	31.40	889	33.97	910	36.53	929	38.98	946	41.33	960	43.50	973	45.58	985	47.63
55000	882	33.07	903	35.70	924	38.29	943	40.80	960	43.21	975	45.46	987	47.58	999	49.68
56000	897	34.82	918	37.49	939	40.15	958	42.71	975	45.18	990	47.52	1002	49.68	1014	51.81
57000	913	36.62	933	39.34	953	42.03	972	44.66	989	47.19	1005	49.63	1017	51.82	1029	54.04
58000	928	38.48	948	41.25	968	44.00	987	46.71	1004	49.29	1019	51.76	1032	54.06	1044	56.31

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
27000	669	14.43	691	15.73	712	17.05	733	18.42	753	19.80	773	21.19	793	22.61	816	24.22
28000	680	15.23	701	16.52	721	17.85	741	19.23	761	20.64	781	22.08	800	23.53	819	24.98
29000	691	16.02	711	17.36	731	18.75	751	20.13	770	21.55	790	23.03	809	24.53	828	26.02
30000	702	16.88	722	18.27	741	19.63	761	21.07	780	22.53	799	24.02	817	25.50	835	27.03
31000	714	17.77	733	19.17	752	20.58	771	22.03	789	23.50	808	25.03	826	26.56	844	28.14
32000	725	18.69	745	20.15	764	21.62	782	23.08	799	24.55	817	26.07	836	27.71	853	29.21
33000	737	19.65	756	21.13	775	22.65	792	24.11	811	25.69	828	27.21	845	28.84	862	30.39
34000	749	20.66	768	22.19	786	23.68	804	25.24	821	26.82	838	28.39	855	29.95	872	31.68
35000	761	21.67	780	23.26	797	24.80	815	26.37	832	27.99	849	29.62	866	31.24	882	32.89
36000	772	22.69	791	24.33	809	25.97	827	27.60	844	29.23	860	30.91	876	32.51	892	34.21
37000	784	23.81	803	25.50	821	27.15	838	28.83	855	30.52	871	32.19	887	33.84	903	35.60
38000	795	24.89	815	26.68	833	28.39	850	30.12	866	31.80	883	33.54	899	35.31	914	36.97
39000	807	26.03	826	27.88	844	29.63	862	31.42	878	33.16	894	34.95	910	36.70	925	38.49
40000	818	27.24	838	29.09	856	30.94	873	32.73	890	34.58	905	36.35	921	38.17	937	40.01
41000	830	28.45	849	30.36	868	32.27	885	34.17	901	36.01	917	37.84	933	39.71	948	41.52
42000	841	29.73	860	31.64	879	33.67	897	35.62	913	37.52	929	39.40	945	41.33	960	43.20
43000	854	31.09	872	32.99	890	35.02	908	37.02	925	39.04	941	40.97	957	42.96	971	44.89

Continued on next page

Table 35. Supply fan performance STANDARD CFM—120-150 tons air-cool/128-162 tons evap-condensing (40")

CFM	Total Static Pressure															
Std.	2.25		2.50		2.75		3.00		3.25		3.50		3.75		4.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
44000	865	32.42	884	34.42	902	36.45	920	38.57	937	40.57	952	42.56	968	44.59	983	46.58
45000	877	33.88	895	35.87	914	37.95	931	40.07	948	42.19	964	44.23	979	46.23	994	48.27
46000	889	35.35	907	37.43	925	39.47	942	41.57	959	43.75	976	45.92	992	48.07	1007	50.16
47000	902	36.95	919	38.99	937	41.08	954	43.24	971	45.48	987	47.63	1003	49.82	1018	51.97
48000	914	38.56	931	40.57	949	42.74	966	44.93	983	47.15	999	49.34	1014	51.59	1029	53.78
49000	927	40.25	943	42.30	961	44.48	977	46.63	994	48.91	1010	51.17	1026	53.47	1041	55.71
50000	940	41.96	956	44.04	973	46.24	989	48.47	1006	50.78	1022	53.00	1037	55.36	1052	57.66
51000	954	43.78	969	45.86	985	48.09	1001	50.32	1017	52.57	1033	54.95	1049	57.27	1064	59.62
52000	968	45.69	982	47.78	997	49.96	1013	52.28	1029	54.52	1045	56.92	1060	59.30	1075	61.71
53000	982	47.67	995	49.71	1010	51.91	1025	54.25	1041	56.57	1057	58.91	1072	61.34	1087	63.81
54000	997	49.67	1009	51.77	1023	53.97	1038	56.32	1053	58.65	1069	61.05	1084	63.52	1099	66.05
55000	1011	51.81	1023	53.95	1036	56.14	1050	58.41	1065	60.83	1080	63.22	1096	65.72	1110	68.19
56000	1026	53.98	1037	56.12	1049	58.30	1063	60.61	1078	63.03	1092	65.41	1107	67.98	1122	70.46
57000	1040	56.19	1052	58.42	1063	60.59	1076	62.93	1090	65.24	1104	67.71	1119	70.26	1134	72.78
58000	1055	58.49	1066	60.70	1078	62.96	1089	65.26	1103	67.69	1117	70.15	1131	72.67	1146	75.27
CFM	**Total Static Pressure**															
Std.	**4.25**		**4.50**		**4.75**		**5.00**		**5.25**		**5.50**		**5.75**		**6.00**	
Air	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**	**rpm**	**bhp**
27000	839	25.96	863	27.73	884	29.37	906	31.14	927	32.89	948	34.59	969	36.42	989	38.17
28000	841	26.64	864	28.42	886	30.21	907	31.98	930	33.89	949	35.60	970	37.42	989	39.17
29000	846	27.50	866	29.20	888	31.00	910	32.93	930	34.69	951	36.57	971	38.40	992	40.35
30000	854	28.61	872	30.16	889	31.74	911	33.69	932	35.62	953	37.51	974	39.53	994	41.48
31000	862	29.69	880	31.35	897	32.97	914	34.53	935	36.49	955	38.48	975	40.42	994	42.38
32000	871	30.88	888	32.51	905	34.17	921	35.77	938	37.46	958	39.41	978	41.45	997	43.43
33000	879	32.04	896	33.71	913	35.34	930	37.14	947	38.87	962	40.52	978	42.24	999	44.42
34000	889	33.31	906	35.04	922	36.71	939	38.48	954	40.16	970	41.94	986	43.70	1002	45.56
35000	898	34.56	914	36.26	931	38.05	947	39.78	963	41.60	978	43.32	994	45.12	1010	47.02
36000	908	35.86	924	37.61	940	39.45	956	41.23	971	43.00	987	44.86	1002	46.71	1017	48.55
37000	919	37.30	935	39.10	949	40.83	965	42.65	981	44.56	996	46.37	1011	48.27	1025	50.03
38000	929	38.72	945	40.58	960	42.36	975	44.23	989	46.00	1004	47.85	1019	49.79	1035	51.82
39000	941	40.30	955	42.04	970	43.87	985	45.79	999	47.61	1014	49.51	1029	51.50	1043	53.35
40000	952	41.88	966	43.67	981	45.55	995	47.33	1010	49.30	1023	51.14	1038	53.18	1052	55.08
41000	963	43.44	977	45.28	992	47.22	1005	49.05	1020	50.97	1034	52.98	1048	54.96	1062	57.02
42000	974	45.09	988	46.99	1002	48.88	1017	50.87	1030	52.73	1044	54.79	1057	56.70	1071	58.69
43000	985	46.74	1000	48.69	1014	50.74	1028	52.68	1042	54.70	1055	56.59	1068	58.67	1081	60.59
44000	997	48.48	1011	50.49	1025	52.49	1039	54.59	1052	56.56	1066	58.61	1079	60.63	1092	62.73
45000	1009	50.33	1023	52.39	1037	54.45	1051	56.50	1064	58.52	1077	60.63	1090	62.70	1103	64.72
46000	1020	52.18	1035	54.30	1048	56.30	1062	58.40	1075	60.47	1088	62.64	1101	64.76	1114	66.83
47000	1033	54.14	1046	56.21	1060	58.38	1073	60.42	1086	62.55	1099	64.64	1112	66.81	1125	69.08
48000	1044	56.00	1057	58.12	1071	60.35	1084	62.44	1098	64.75	1111	66.90	1123	68.99	1135	71.17
49000	1056	57.99	1069	60.16	1083	62.44	1096	64.59	1109	66.83	1122	69.03	1135	71.32	1147	73.55
50000	1068	60.09	1081	62.33	1095	64.55	1108	66.74	1121	69.04	1133	71.29	1146	73.49	1159	75.93
51000	1079	62.11	1094	64.51	1107	66.78	1120	69.04	1133	71.39	1146	73.70	1158	75.96	1170	78.31
52000	1090	64.14	1105	66.58	1118	68.90	1132	71.34	1144	73.61	1157	75.97	1170	78.44	1181	80.68
53000	1102	66.30	1116	68.80	1130	71.30	1143	73.66	1157	76.13	1169	78.55	1181	80.76	1193	83.22
54000	1113	68.48	1128	71.04	1141	73.46	1155	75.99	1168	78.51	1180	80.83	1193	83.41		
55000	1125	70.80	1139	73.29	1153	75.90	1167	78.49	1179	80.91	1192	83.44				
56000	1136	73.01	1151	75.69	1165	78.36	1178	80.86	1191	83.48						
57000	1148	75.50	1162	78.10	1176	80.69	1190	83.39								
58000	1160	77.87	1174	80.54	1187	83.18										

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Table 35. Supply fan performance STANDARD CFM—120-150 tons air-cool/128-162 tons evap-condensing (40")

CFM	Total Static Pressure															
Std.	6.25		6.50		6.75		7.00		7.25		7.50		7.75		8.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
27000	1007	39.87	1026	41.70	1045	43.52	1063	45.33	1080	47.10	1098	48.98	1116	50.97	1132	52.75
28000	1009	41.04	1028	42.80	1047	44.72	1064	46.50	1082	48.40	1101	50.40	1117	52.22	1134	54.13
29000	1011	42.21	1029	43.97	1048	45.83	1067	47.80	1084	49.68	1102	51.67	1119	53.62	1137	55.67
30000	1013	43.36	1033	45.34	1051	47.21	1069	49.18	1086	51.01	1104	52.92	1122	55.00	1137	56.88
31000	1015	44.46	1034	46.45	1051	48.31	1070	50.41	1088	52.35	1106	54.41	1122	56.28	1140	58.39
32000	1016	45.52	1035	47.51	1054	49.62	1071	51.59	1090	53.67	1108	55.86	1126	57.88	1143	60.00
33000	1018	46.53	1038	48.76	1056	50.88	1074	52.86	1091	54.95	1110	57.14	1126	59.15	1143	61.27
34000	1019	47.48	1039	49.72	1057	51.85	1076	54.08	1093	56.18	1111	58.37	1129	60.68	1146	62.80
35000	1024	48.79	1041	50.86	1059	53.00	1077	55.25	1096	57.63	1114	59.84	1129	61.87	1148	64.30
36000	1033	50.47	1048	52.36	1062	54.21	1079	56.36	1098	58.75	1115	60.97	1132	63.30	1150	65.74
37000	1041	52.11	1056	54.05	1069	55.81	1085	57.90	1099	59.81	1118	62.33	1135	64.67	1152	67.13
38000	1049	53.72	1064	55.69	1078	57.62	1092	59.63	1106	61.58	1120	63.61	1137	65.99	1153	68.30
39000	1057	55.40	1071	57.29	1086	59.39	1099	61.31	1113	63.29	1127	65.35	1141	67.50	1156	69.72
40000	1066	57.05	1080	59.11	1095	61.26	1108	63.22	1122	65.25	1135	67.36	1150	69.55	1162	71.49
41000	1076	59.05	1089	60.90	1103	63.09	1116	65.09	1130	67.17	1144	69.32	1158	71.55	1170	73.54
42000	1085	60.77	1099	62.93	1112	64.89	1126	67.08	1139	69.20	1151	71.24	1165	73.51	1178	75.53
43000	1095	62.72	1109	64.93	1121	66.94	1134	69.03	1148	71.19	1161	73.44	1173	75.43	1187	77.83
44000	1104	64.64	1118	66.90	1131	68.96	1144	71.10	1157	73.31	1170	75.60	1182	77.64	1195	79.92
45000	1116	66.82	1128	68.85	1141	71.11	1154	73.29	1166	75.39	1179	77.74	1191	79.81		
46000	1126	68.98	1139	71.07	1151	73.23	1164	75.47	1177	77.78	1188	79.83				
47000	1137	71.14	1149	73.27	1161	75.48	1174	77.78	1186	79.98	1198	82.25				
48000	1148	73.43	1160	75.61	1173	77.88	1184	80.06	1196	82.32						
49000	1159	75.71	1171	77.95	1184	80.27	1195	82.50								
50000	1171	78.14	1183	80.44	1194	82.65										
51000	1182	80.58	1194	82.93												
52000	1193	83.00														

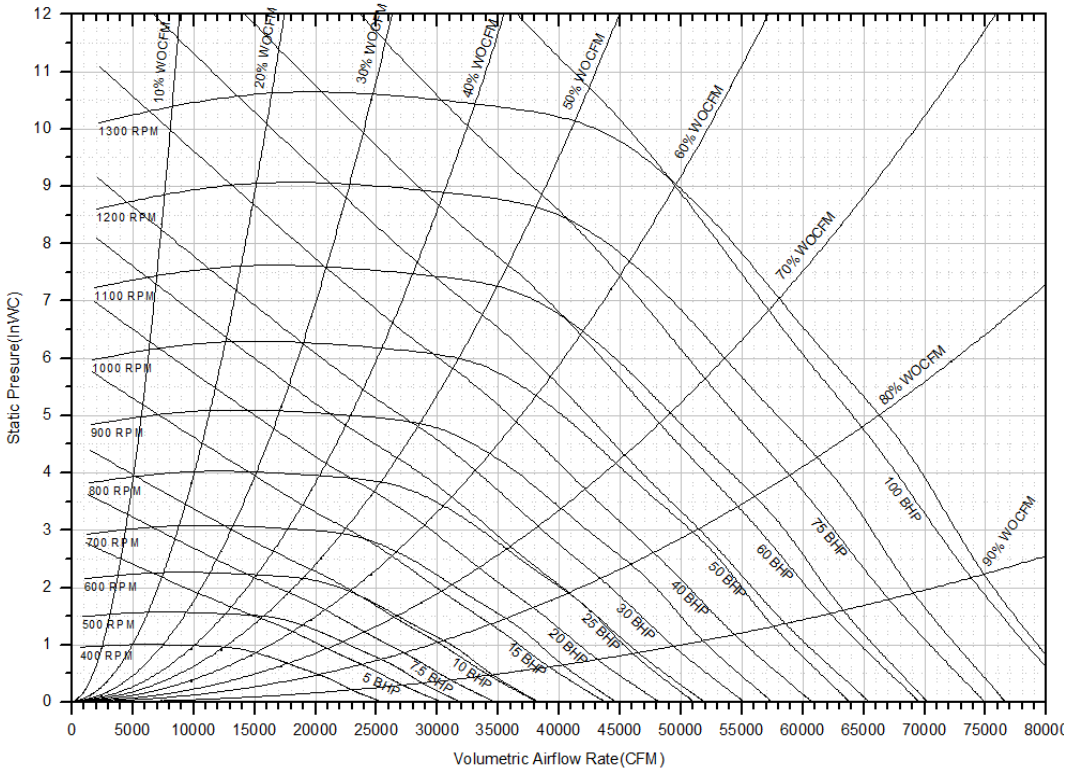
CFM	Total Static Pressure							
Std.	8.25		8.50		8.75		9.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
27000	1149	54.61	1166	56.58	1182	58.45	1198	60.42
28000	1151	56.15	1166	57.91	1183	59.95	1199	61.89
29000	1153	57.50	1169	59.42	1187	61.62		
30000	1155	59.02	1171	60.92	1188	63.10		
31000	1156	60.35	1173	62.40	1189	64.56		
32000	1159	61.90	1176	64.06	1191	66.01		
33000	1161	63.48	1177	65.63	1195	67.89		
34000	1163	65.02	1179	67.17	1196	69.43		
35000	1165	66.52	1182	68.85	1197	70.93		
36000	1166	67.97	1183	70.30	1198	72.39		
37000	1168	69.37	1184	71.71				
38000	1170	70.71	1186	73.06				
39000	1171	71.99	1189	74.69				
40000	1176	73.67	1190	75.91				
41000	1183	75.59	1197	77.88				
42000	1191	77.80						
43000	1199	79.97						

Notes:

1. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static pressure mustbe added to appropriate component sp drops (evap coil, filters, optional economizer, optional heating system).
2. Maximum SP leaving the rooftop is 5.5" H_20 positive.
3. Max CFM as follows: 120T & 128T 54000 CFM, 130T - 162T 58000 CFM.
4. Max rpm 1200, Max hp 100 for 130-162T; Max rpm 1100, Max hp 75 for 120T & 128T
5. Min rpm 700, Min hp 20

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 30. Supply fan performance STANDARD CFM —120-150 tons air-cool/128-162 tons evap-condensing (40")



Exhaust Fan (with or without Energy Recovery Wheel)

Table 36. Exhaust fan performance[a] LOW CFM—90 tons air-cooled/100 tons evap-condensing (25" Fan)

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
10000	260[b]	1.42	319	1.91	372	2.44	423	3.03	470	3.65	515	4.27	555	4.89	594	5.52
11000	274	1.77	330	2.32	380	2.87	427	3.48	472	4.14	516	4.84	556	5.51	593	6.18
12000	288	2.19	341	2.78	389	3.38	433	4.00	476	4.69	517	5.41	558	6.18	594	6.90
13000	303	2.67	354	3.32	399	3.96	441	4.61	481	5.30	520	6.05	559	6.85	596	7.66
14000	319	3.23	366	3.92	410	4.61	450	5.31	488	6.02	525	6.78	563	7.61	598	8.46
15000	335	3.86	379	4.60	422	5.35	461	6.09	497	6.83	532	7.60	567	8.43	601	9.33
16000	352	4.58	394	5.36	434	6.16	472	6.95	507	7.73	541	8.55	574	9.39	606	10.27
17000	368	5.39	408	6.21	447	7.07	483	7.90	518	8.74	550	9.58	582	10.46	612	11.33
18000	385	6.29	423	7.16	460	8.05	495	8.95	529	9.85	560	10.72	591	11.63	620	12.55
19000	403	7.30	438	8.21	474	9.15	508	10.10	541	11.05	571	11.98	601	12.92	629	13.87
20000	420	8.41	454	9.37	488	10.34	520	11.35	552	12.34	583	13.33	611	14.31	639	15.30
21000	437	9.63	470	10.63	502	11.65	534	12.71	564	13.76	594	14.79	622	15.81	649	16.87
22000	455	10.97	487	12.02	517	13.08	548	14.17	577	15.29	606	16.37	633	17.44	661	18.55
23000	473	12.43	503	13.53	532	14.64	562	15.77	590	16.93	618	18.08	646	19.21	672	20.34
24000	491	14.02	520	15.16	548	16.32	577	17.49	604	18.69	631	19.90	657	21.08	683	22.27
25000	508	15.74	537	16.94	564	18.15	591	19.35	618	20.59	644	21.86	670	23.10	695	24.35
26000	527	17.60	554	18.86	580	20.10	606	21.35	632	22.62	658	23.95	682	25.26		
27000	545	19.59	572	20.92	597	22.20	622	23.52	647	24.82						
28000	563	21.74	589	23.13	614	24.46	637	25.81								

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
10000	630	6.15	666	6.80
11000	630	6.87	664	7.55
12000	629	7.62	664	8.38
13000	631	8.47	664	9.26
14000	632	9.34	665	10.20
15000	635	10.23	667	11.17
16000	638	11.20	669	12.16
17000	642	12.28	673	13.30
18000	649	13.49	677	14.48
19000	657	14.85	684	15.84
20000	666	16.31	692	17.34
21000	676	17.91	701	18.98
22000	686	19.62	711	20.72
23000	697	21.49	721	22.61
24000	708	23.45	732	24.65
25000	719	25.57		

Notes:
1. Max hp is 25.
2. Min. hp is 7.5
3. Max CFM airflow for 90/100T is 28000
4. Min CFM airflow for 90/100T is 10000.

(a) To determine exhaust fan performance for units with Energy Recovery Wheel, see Component Static Pressure Drop table for any additional static pressure drops. For Energy Recovery Wheel selection, see Selection Procedure or contact the local Trane Sales Office to configure selection in TOPSS.
(b) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 31. Exhaust fan performance LOW CFM—90 tons air-cooled/100 tons evap-condensing (25" Fan)

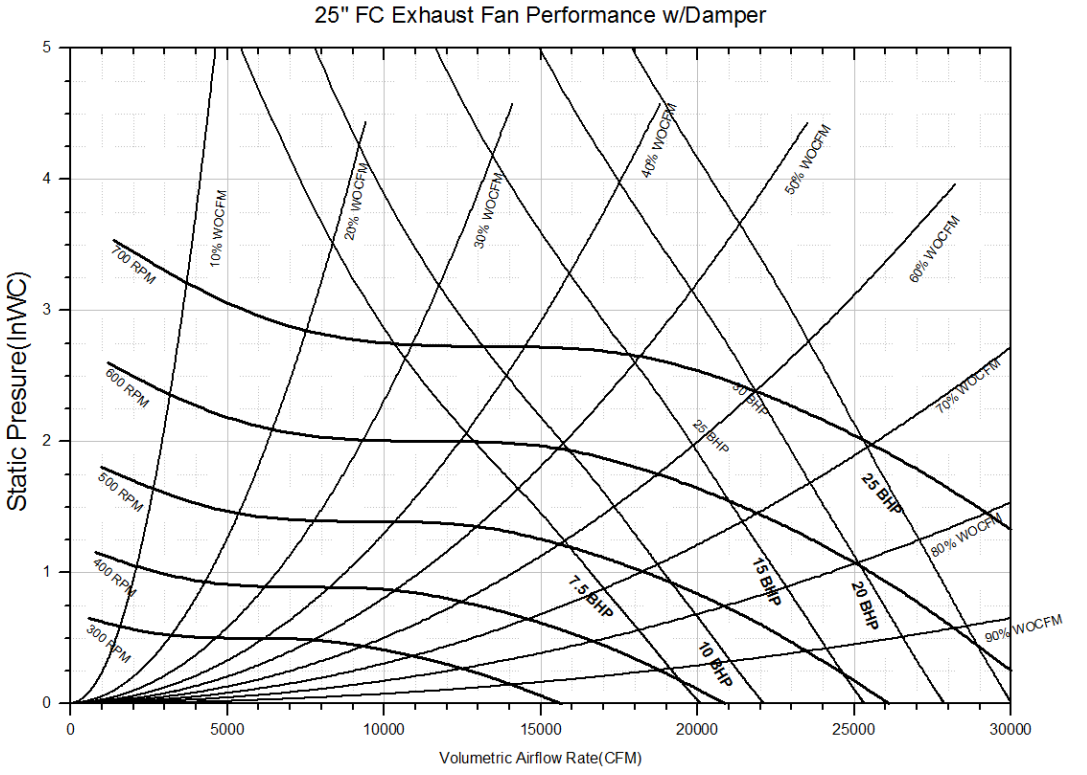


Table 37. Exhaust fan performance[a] STANDARD CFM—90 tons air-cooled/100 tons evap-condensing; LOW CFM—105-150 tons air-cooled/118-162 tons evap-condensing (28")

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
13000	237[b]	1.90	289	2.58	335	3.29	377	4.06	417	4.86	455	5.69	490	6.56	524	7.46
14000	247	2.27	297	2.98	341	3.74	382	4.54	420	5.39	457	6.25	491	7.14	524	8.07
15000	257	2.68	305	3.44	347	4.23	387	5.08	424	5.96	459	6.86	493	7.79	525	8.74
16000	267	3.15	313	3.95	354	4.78	392	5.65	429	6.58	462	7.52	495	8.49	527	9.49
17000	278	3.67	322	4.51	362	5.39	399	6.29	434	7.25	467	8.23	498	9.25	529	10.29
18000	289	4.24	332	5.14	370	6.06	406	7.00	439	7.98	471	9.00	502	10.07	532	11.15
19000	301	4.89	342	5.82	379	6.79	413	7.77	446	8.79	477	9.85	507	10.94	536	12.06
20000	312	5.59	352	6.57	387	7.59	421	8.62	452	9.66	483	10.76	512	11.88	541	13.07
21000	324	6.37	361	7.39	397	8.46	429	9.53	460	10.63	490	11.75	518	12.90	546	14.11
22000	336	7.21	372	8.30	406	9.40	438	10.52	468	11.65	497	12.82	524	14.01	551	15.24
23000	349	8.13	382	9.27	416	10.41	446	11.58	476	12.75	504	13.96	531	15.19	557	16.45
24000	361	9.13	393	10.32	426	11.50	456	12.73	484	13.95	511	15.18	538	16.45	564	17.76
25000	374	10.21	404	11.46	436	12.68	465	13.94	493	15.22	520	16.51	545	17.80	571	19.14
26000	386	11.38	415	12.68	446	13.95	474	15.24	502	16.59	528	17.93	553	19.26	578	20.63
27000	399	12.64	427	13.99	456	15.31	484	16.65	511	18.03	537	19.43	561	20.80	585	22.20
28000	412	13.99	439	15.40	466	16.78	494	18.14	520	19.56	545	20.98	570	22.44	593	23.88
29000	424	15.43	450	16.89	477	18.33	504	19.73	530	21.19	554	22.69	578	24.18	601	25.68
30000	437	16.98	462	18.49	488	19.98	514	21.45	540	22.93	564	24.45	587	26.00	609	27.54
31000	450	18.63	474	20.19	499	21.73	524	23.25	549	24.77	573	26.34	596	27.95	618	29.53
32000	463	20.38	487	22.00	510	23.59	535	25.17	560	26.74	583	28.33	605	29.98	626	31.59
33000	476	22.25	499	23.92	522	25.56	545	27.19	569	28.79	593	30.46	615	32.12	636	33.82
34000	489	24.23	511	25.94	534	27.65	556	29.33	579	30.97	602	32.65	624	34.38	645	36.11
35000	502	26.33	524	28.09	546	29.85	567	31.58	590	33.30	612	34.99	634	36.75	654	38.52
36000	515	28.54	536	30.35	557	32.17	579	33.94	600	35.72	622	37.47	643	39.25	664	41.09
37000	528	30.89	549	32.75	569	34.62	590	36.44	611	38.29	632	40.08	653	41.89	673	43.75
38000	541	33.36	562	35.26	581	37.18	602	39.09	622	40.94	643	42.83	663	44.66	683	46.55
39000	555	35.96	574	37.92	594	39.88	613	41.83	633	43.76	653[l]	45.67	673	47.56	693	49.50
40000	568	38.69	587	40.69	606	42.70	625	44.71	644	46.68	663	48.65				
41000	581	41.57	600	43.61	618	45.68	637	47.76	655	49.78						

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
13000	557	8.41	589	9.40
14000	557	9.06	587	10.04
15000	556	9.75	586	10.79
16000	557	10.51	586	11.57
17000	558	11.34	587	12.44
18000	561	12.23	589	13.37
19000	564	13.21	592	14.39
20000	567	14.22	595	15.44
21000	572	15.34	598	16.58
22000	577	16.49	603	17.79
23000	583	17.74	608	19.09
24000	589	19.08	614	20.47
25000	595	20.50	619	21.89
26000	602	22.03	625	23.43
27000	609	23.64	631	25.08
28000	616	25.35	639	26.86
29000	624	27.17	646	28.70
30000	632	29.10	653	30.68
31000	640	31.12	661	32.72
32000	648	33.28	669	34.90
33000	657[l]	35.51	677	37.20
34000	666	37.89	685	39.61
35000	674	40.35	694	42.14
36000	684	42.95	703	44.79
37000	693	45.64		

Notes:
1. Max CFM for 90/100T is 36000, 105/118T is 33000, 120/128T is 37000, 130-162T is 41000
2. Min. CFM for 90/100T is 20000, 105T is 12000, 120/128T is 14000, 130-162T is 15000 CFM
3. Max hp for 90T and 105/118T is 25, Max hp 30 for 120/128T and 50 for 120-162T
4. Min hp for 90/100T is 10, Min hp for 105-162T is 7.5

(a) To determine exhaust fan performance for units with Energy Recovery Wheel, see Component Static Pressure Drop tables for any additional static pressure drops. For Energy Recovery Wheel selection, see Selection Procedure or contact the local Trane Sales Office to configure selection in TOPSS.
(b) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 32. Exhaust fan performance STANDARD CFM—90 tons air-cooled; LOW CFM—105-150 tons air-cooled; STANDARD CFM—100 tons evap-condenser—LOW CFM—118-162 tons evap-condensing (28")

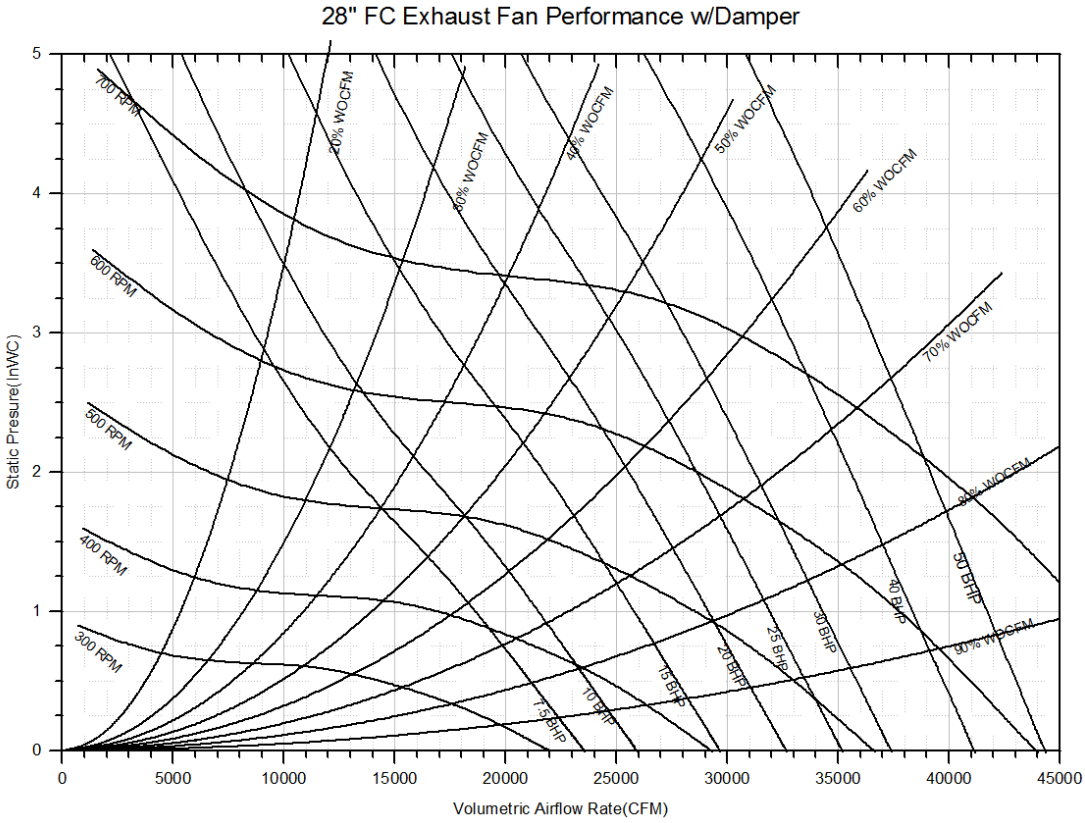


Table 38. Exhaust fan performance[a] STANDARD CFM—105-150 tons air-cool/118-162 tons evap-condensing (32")

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
23000	272	6.16	307	7.39	339	8.59	370	9.96	400	11.36	429	12.87	458	14.48	484	16.02
24000	280	6.87	314	8.17	345	9.42	375	10.77	405	12.25	433	13.75	460	15.39	487	17.09
25000	288	7.63	321	8.98	352	10.31	381	11.66	410	13.21	437	14.71	464	16.37	490	18.10
26000	296	8.45	328	9.83	359	11.27	387	12.62	415	14.21	442	15.79	468	17.43	494	19.19
27000	305	9.34	336	10.76	367	12.30	394	13.69	421	15.25	447	16.90	472	18.52	497	20.31
28000	314	10.30	344	11.77	374	13.38	401	14.84	426	16.34	452	18.09	477	19.77	501	21.51
29000	323	11.35	353	12.88	382	14.54	407	16.03	432	17.55	458	19.30	482	21.10	505	22.83
30000	333	12.50	362	14.07	389	15.73	415	17.34	439	18.87	463	20.59	488	22.47	510	24.25
31000	343	13.73	371	15.35	396	16.96	422	18.69	446	20.28	469	21.97	493	23.87	516	25.78
32000	353	15.04	380	16.70	403	18.26	430	20.13	452	21.75	475	23.42	498	25.35	521	27.35
33000	363	16.44	388	18.08	411	19.68	437	21.63	460	23.35	482	25.04	504	26.88	526	28.94
34000	373	17.91	397	19.53	419	21.17	445	23.22	467	24.99	488	26.72	510	28.53	531	30.60
35000	383	19.48	405	21.04	427	22.77	452	24.80	475	26.72	495	28.52	516	30.32	537	32.38
36000	393	21.14	413	22.63	436	24.50	459	26.47	482	28.53	502	30.37	523	32.24	543	34.17
37000	403	22.89	421	24.29	445	26.33	466	28.23	490	30.42	510	32.33	529	34.23	549	36.21
38000	413	24.73	429	26.08	454	28.27	474	30.10	497	32.41	517	34.42	537	36.35	556	38.32
39000	423	26.68	438	27.96	464	30.28	481	32.06	504	34.40	525	36.55	544	38.54	562	40.58
40000	433	28.72	447	29.96	472	32.35	490	34.17	511	36.45	533	38.80	551	40.85	569	42.91
41000	444	30.87	456	32.07	481	34.48	499	36.42	518	38.62	540	41.09	558	43.24	576	45.35
42000	454	33.12	466	34.34	489	36.67	508	38.78	526	40.89	547	43.48	566	45.73	583	47.90
43000	464	35.48	476	36.74	497	38.96	517	41.23	534	43.30	554	45.86	573	48.29	591	50.56
44000	474	37.95	486	39.24	505	41.34	526	43.83	542	45.83	561	48.38	581	51.02	598	53.34
45000	484	40.53	496	41.86	513	43.83	535	46.52	550	48.48	568	50.97	589	53.78	606	56.19
46000	495	43.23	506	44.59	521	46.44	544	49.28	559	51.34	576	53.77	595	56.55	613	59.12
47000	505	46.05	516	47.44	530	49.18	552	52.11	568	54.30	583	56.60	603	59.45		
48000	515	48.99	526	50.42	539	52.05	560	54.99	577	57.40	591	59.61	610	62.41		
49000	525	52.05	536	53.51	548	55.06	568	57.96	586	60.60	600	62.76	617	65.51		
50000	536	55.24	546	56.74	557	58.21	576	61.07	595	63.96	609	66.16				
51000	546	58.55	556	60.08	566	61.56	585	64.28	604	67.41						
52000	556[b]	62.00	566	63.57	576	65.07	593	67.63								

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
23000	508	17.55	533	19.11
24000	512	18.66	536	20.29
25000	516	19.86	538	21.48
26000	518	20.99	542	22.78
27000	522	22.20	545	24.08
28000	525	23.44	548	25.34
29000	528	24.70	551	26.71
30000	533	26.15	555	28.11
31000	537	27.65	559	29.63
32000	542	29.27	563	31.19
33000	547	30.93	567	32.90
34000	553	32.72	573	34.74
35000	558	34.53	578	36.62
36000	563	36.37	583	38.64
37000	569	38.34	589	40.69
38000	574	40.38	594	42.77
39000	580	42.59	599	44.90

Continued on next page

Performance Data

Exhaust Fan (with or without Energy Recovery Wheel)

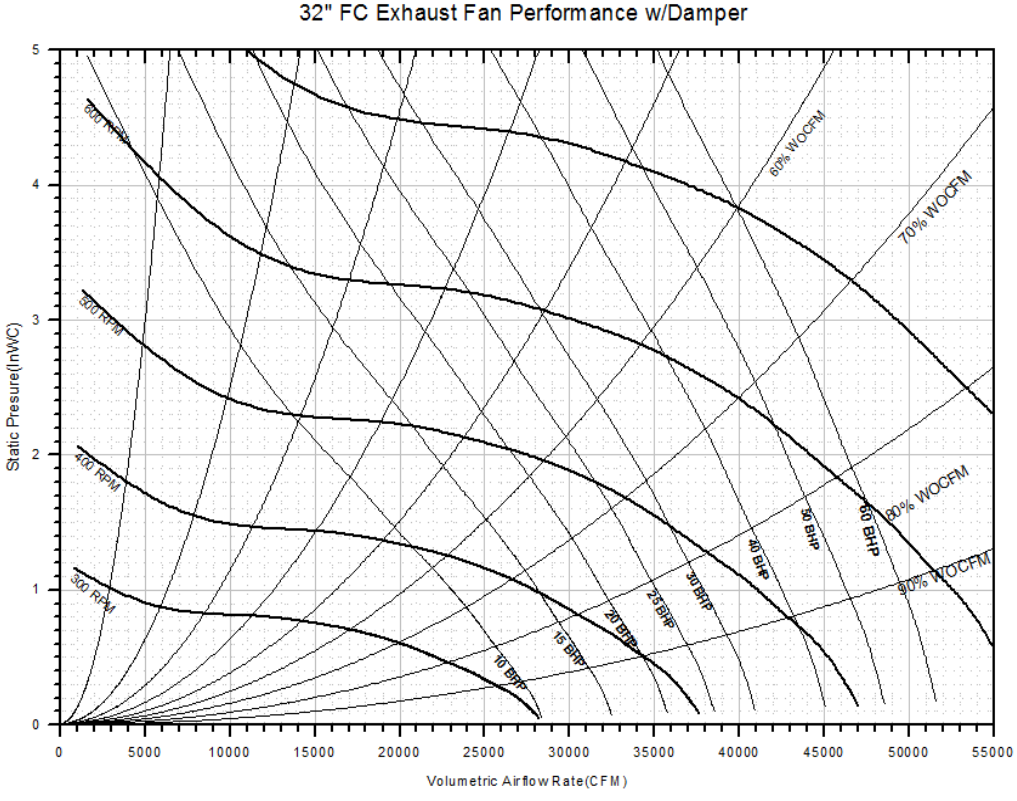
Table 38. Exhaust fan performance[a] STANDARD CFM—105-150 tons air-cool/118-162 tons evap-condensing (32")

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
40000	587	44.97	605	47.20
41000	594	47.44	611	49.64
42000	601	50.07	618	52.23
43000	608	52.78		
44000	615	55.56		

Notes:
1. Max CFM for 105T is 40000; 120T is 48000, 130 and 150T is 52000.
2. Min. CFM for 105T is 23000, 120T is 27000, 130T and 150T is 29000.
3. Max hp for 105T is 50, Max hp for 120-150T is 60 hp.
4. Min. hp for 105-150T is 15.

(a) To determine exhaust fan performance for units with Energy Recovery Wheel, see Component Static Pressure Drop tables for any additional static pressure drops. For Energy Recovery Wheel selection, see Selection Procedure or contact the local Trane Sales Office to configure selection in TOPSS.
(b) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 33. Exhaust fan performance standard CFM —105-150 tons air-cool/118-162 tons evap-condensing (32")



Return Fan

Table 39. Return fan performance LOW CFM—90-150 tons air-cooled/100-162 tons evap-condensing (36.5")

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
16000	614[a]	2.65	647	3.39	678	4.15	709	5.00	739	5.83	767	6.65	797	7.53	825	8.41
17000	648	3.07	680	3.87	710	4.66	739	5.53	767	6.44	795	7.31	822	8.19	849	9.11
18000	683	3.55	713	4.39	741	5.22	769	6.10	797	7.08	823	8.01	848	8.92	875	9.89
19000	717	4.07	746	4.96	773	5.84	799	6.74	826	7.72	851	8.74	876	9.73	900	10.69
20000	752	4.65	780	5.57	806	6.51	831	7.45	855	8.44	881	9.52	904	10.56	928	11.60
21000	787	5.29	813	6.25	839	7.23	863	8.21	886	9.21	910	10.33	934	11.45	956	12.53
22000	822	5.99	847	6.99	872	8.02	895	9.04	917	10.07	940	11.17	963	12.34	985	13.54
23000	858	6.75	881	7.80	905	8.87	928	9.93	949	11.00	971	12.11	992	13.31	1014	14.55
24000	893	7.57	915	8.66	938	9.78	960	10.89	981	12.00	1002	13.13	1022	14.33	1043	15.61
25000	928	8.46	950	9.59	972	10.75	994	11.92	1014	13.07	1034	14.24	1054	15.46	1074	16.76
26000	964	9.43	984	10.60	1006	11.79	1026	13.00	1046	14.21	1066	15.42	1085	16.65	1104	17.95
27000	999	10.46	1019	11.67	1039	12.91	1060	14.17	1079	15.43	1098	16.67	1116	17.93	1135	19.24
28000	1035	11.57	1054	12.82	1073	14.11	1093	15.41	1112	16.73	1131	18.01	1148	19.31	1166	20.64
29000	1070	12.76	1089	14.06	1108	15.39	1127	16.72	1145	18.09	1163	19.43	1181	20.76	1198	22.11
30000	1106	14.04	1124	15.38	1142	16.73	1160	18.12	1179	19.53	1196	20.93	1213	22.31	1230	23.72
31000	1142	15.40	1159	16.77	1176	18.17	1194	19.61	1212	21.05	1229	22.50	1246	23.93	1262	25.35
32000	1177	16.84	1194	18.27	1211	19.70	1228	21.19	1245	22.66	1263	24.18	1279	25.65	1295	27.15
33000	1213	18.37	1230	19.84	1245	21.32	1262	22.85	1279	24.36	1296	25.93	1312	27.45	1327	28.98
34000	1249	20.01	1265	21.51	1280	23.04	1297	24.59	1313	26.17	1329	27.77	1345	29.36	1360	30.92
35000	1285	21.73	1300	23.28	1315	24.85	1331	26.45	1347	28.05	1362	29.69	1378	31.33	1394	32.99
36000	1321	23.56	1336	25.15	1350	26.76	1365	28.39	1381	30.06	1396	31.75				

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
16000	851	9.29	876	10.20
17000	875	10.04	900	11.00
18000	901	10.86	925	11.84
19000	925	11.70	949	12.72
20000	951	12.61	974	13.68
21000	978	13.61	1000	14.69
22000	1007	14.67	1027	15.78
23000	1035	15.76	1056	16.95
24000	1064	16.89	1084	18.16
25000	1093	18.07	1113	19.41
26000	1123	19.32	1142	20.72
27000	1153	20.60	1172	22.06
28000	1183	21.99	1202	23.49
29000	1215	23.49	1232	24.97
30000	1247	25.14	1263	26.58
31000	1278	26.81	1294	28.28
32000	1310	28.61	1326	30.15
33000	1343	30.51	1358	32.03
34000	1375	32.48	1390	34.07

Notes:
1. Max. speed for plenum fan is 1400 rpm, Max. power is 40 hp
2. Max. CFM airflow are as follows: 90T 28000; 105T 33000; 120T 36000, 130-150T 36000
3. Min. CFM airflow are as follows: 90T 16000, 105T 19000; 120T 21000; 130-150T 23000
4. Performance data includes cabinet, damper, and rain hood effect
5. Return fans are not available on units with Energy Recovery Wheel.

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 34. Return fan performance LOW CFM — 90-150 tons air-cooled/100-162 tons evap-condensing (36.5")

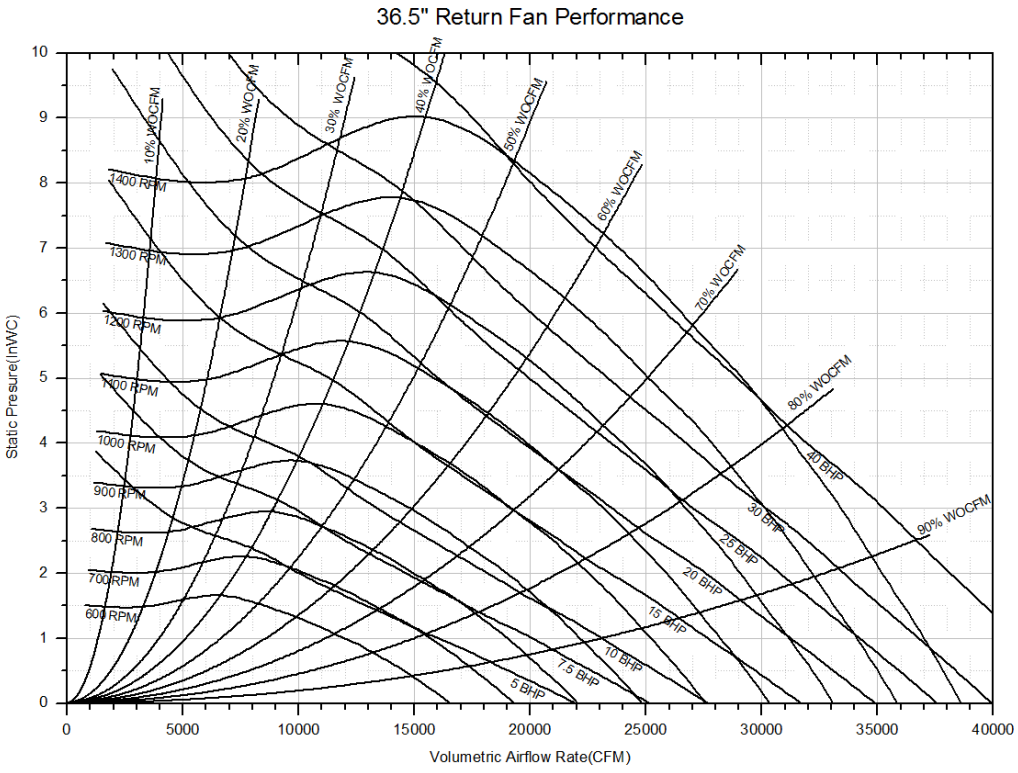


Table 40. Return fan performance STD CFM—90-105 tons air-cooled/100-118 tons evap-condensing (40")

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
20000	571[a]	3.45	600	4.37	627	5.31	655	6.38	682	7.42	707	8.43	732	9.49	758	10.60
21000	596	3.89	625	4.87	651	5.85	677	6.92	703	8.04	727	9.10	752	10.20	776	11.32
22000	622	4.37	649	5.39	675	6.42	700	7.50	725	8.67	748	9.81	772	10.94	795	12.11
23000	648	4.90	674	5.97	699	7.04	722	8.12	747	9.33	770	10.56	792	11.72	814	12.91
24000	674	5.47	699	6.58	723	7.69	746	8.81	769	10.03	792	11.31	813	12.56	835	13.80
25000	700	6.09	724	7.24	747	8.40	770	9.56	792	10.79	813	12.10	835	13.44	856	14.72
26000	726	6.75	749	7.95	772	9.16	794	10.37	814	11.59	836	12.94	857	14.35	877	15.68
27000	752	7.46	774	8.70	797	9.96	818	11.20	838	12.49	858	13.83	878	15.25	898	16.69
28000	779	8.23	800	9.50	821	10.81	842	12.10	862	13.41	881	14.76	901	16.24	920	17.71
29000	805	9.05	825	10.37	846	11.71	867	13.07	885	14.40	904	15.77	923	17.26	942	18.80
30000	831	9.92	851	11.28	871	12.68	891	14.08	910	15.46	928	16.88	946	18.33	965	19.92
31000	858	10.85	877	12.26	896	13.69	916	15.14	934	16.57	952	18.00	969	19.50	987	21.09
32000	884	11.85	902	13.29	921	14.76	940	16.25	958	17.74	976	19.23	993	20.74	1010	22.30
33000	911	12.90	928	14.38	947	15.90	965	17.43	983	18.98	1000	20.48	1016	22.03	1033	23.64
34000	937	14.02	954	15.54	972	17.10	990	18.69	1008	20.28	1024	21.83	1040	23.41	1056	25.02
35000	964	15.20	980	16.76	998	18.37	1015	19.98	1032	21.63	1048	23.24	1064	24.86	1080	26.48
36000	990	16.44	1007	18.05	1023	19.69	1040	21.36	1057	23.05	1073	24.70	1089	26.40	1104	28.06
37000	1017	17.76	1033	19.41	1049	21.09	1065	22.81	1082	24.54	1098	26.26	1113	27.96	1128	29.65
38000	1043	19.15	1059	20.84	1075	22.56	1091	24.31	1107	26.09	1122	27.86	1137	29.63	1152	31.35
39000	1070	20.61	1085	22.35	1100	24.10	1116	25.91	1132	27.71	1147	29.53	1162	31.37	1176	33.15
40000	1097	22.14	1112	23.92	1126	25.71	1141	27.56	1157	29.41	1172	31.27	1186	33.14	1201	34.99
41000	1123	23.75	1138	25.58	1152	27.42	1167	29.30	1182	31.20	1196	33.09	1211	35.03		
42000	1150	25.44	1164	27.30	1178	29.19	1193	31.11	1207	33.05	1221	35.00				
43000	1177	27.21	1191	29.11	1204	31.04	1218	33.01								
44000	1204	29.06	1217	31.01												

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
20000	782	11.73	804	12.83
21000	800	12.46	822	13.64
22000	819	13.30	841	14.52
23000	837	14.13	859	15.39
24000	856	15.02	878	16.33
25000	876	16.01	897	17.31
26000	896	17.01	916	18.33
27000	918	18.09	937	19.47
28000	940	19.23	958	20.63
29000	961	20.34	979	21.86
30000	983	21.52	1001	23.11
31000	1004	22.69	1022	24.38
32000	1027	23.94	1044	25.69
33000	1050	25.31	1066	27.04
34000	1072	26.69	1088	28.44
35000	1096	28.20	1111	29.98
36000	1119	29.74	1134	31.52
37000	1143	31.44	1157	33.16
38000	1166	33.16	1181	34.98
39000	1191	34.98	1204	36.82
40000	1214	36.83		

Notes:
1. Max. speed for plenum fan is 1200 rpm, Max power is 40 hp
2. Max. CFM airflow are as follows: 90T 40000; 105T 44000.
3. Min. CFM airflow are as follows: 90T 20000; 105T 24000.
4. Performance data includes cabinet, damper, and rain hood effect
5. Return fans are not available on units with Energy Recovery Wheel.

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 35. Return fan performance STANDARD CFM — 90-105 tons air-cool/100-118 tons evap-condensing (40")

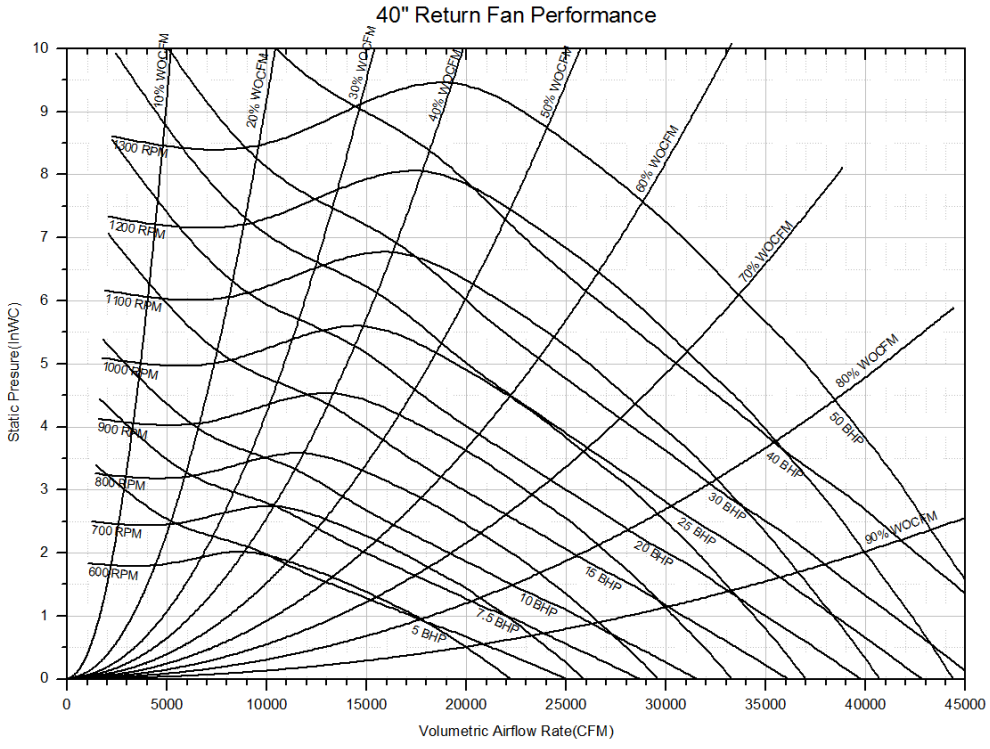


Table 41. Return fan performance STD CFM—120-150 tons air-cooled/128-162 tons evap-condensing (44")

CFM	Negative Static Pressure															
Std.	0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00	
Air	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
27000	565[a]	5.40	589	6.66	612	7.90	635	9.23	657	10.65	679	12.08	699	13.44	720	14.85
28000	584	5.93	608	7.22	630	8.52	652	9.85	673	11.33	694	12.81	715	14.25	735	15.69
29000	603	6.49	626	7.83	648	9.17	669	10.53	690	12.02	711	13.58	731	15.10	750	16.58
30000	622	7.09	645	8.47	666	9.87	686	11.27	706	12.76	727	14.34	746	15.94	765	17.48
31000	642	7.72	663	9.15	684	10.60	704	12.03	723	13.54	743	15.15	762	16.83	781	18.45
32000	661	8.40	682	9.86	702	11.37	722	12.84	740	14.36	760	16.03	779	17.74	797	19.39
33000	680	9.12	700	10.63	721	12.17	740	13.69	758	15.26	776	16.90	794	18.63	813	20.40
34000	700	9.88	719	11.43	739	13.01	758	14.59	775	16.17	793	17.82	811	19.60	829	21.43
35000	719	10.69	738	12.28	757	13.90	776	15.53	793	17.15	810	18.83	828	20.61	845	22.50
36000	739	11.53	757	13.17	776	14.85	794	16.51	811	18.19	827	19.86	844	21.68	861	23.55
37000	758	12.43	776	14.10	794	15.82	812	17.55	829	19.25	845	20.99	861	22.79	878	24.71
38000	778	13.37	795	15.09	813	16.84	830	18.62	847	20.37	863	22.14	878	23.95	894	25.87
39000	797	14.36	814	16.12	831	17.93	848	19.74	865	21.54	880	23.36	896	25.18	911	27.09
40000	817	15.41	833	17.20	850	19.05	867	20.90	883	22.76	898	24.62	913	26.49	928	28.38
41000	837	16.50	852	18.33	869	20.23	885	22.12	901	24.06	916	25.94	931	27.84	945	29.76
42000	856	17.65	872	19.52	888	21.44	904	23.40	919	25.36	934	27.31	949	29.24	963	31.23
43000	876	18.84	891	20.76	907	22.74	922	24.73	938	26.75	952	28.73	967	30.70	980	32.71
44000	896	20.10	910	22.05	925	24.06	941	26.10	956	28.17	970	30.18	985	32.26	998	34.28
45000	915	21.41	930	23.41	944	25.46	959	27.54	974	29.65	989	31.74	1003	33.83	1016	35.88
46000	935	22.77	949	24.83	963	26.91	978	29.04	993	31.17	1007	33.32	1020	35.44	1034	37.58
47000	955	24.20	969	26.29	982	28.42	997	30.59	1011	32.75	1025	34.98	1039	37.15	1052	39.31
48000	974	25.69	988	27.83	1001	29.98	1016	32.21	1029	34.40	1043	36.66	1057	38.90	1070	41.11
49000	994	27.24	1008	29.41	1021	31.61	1034	33.87	1048	36.14	1062	38.43	1075	40.72	1088	42.99
51000	1034	30.52	1047	32.79	1059	35.08	1072	37.40	1086	39.78	1099	42.16				
52000	1053	32.26	1066	34.56	1078	36.89	1091	39.28								
53000	1073	34.07	1086	36.41	1098	38.79										
54000	1093	35.95														

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
27000	742	16.31	762	17.81
28000	755	17.17	776	18.71
29000	770	18.09	789	19.62
30000	784	19.01	803	20.59
31000	799	19.99	817	21.62
32000	814	21.03	832	22.67
33000	830	22.10	847	23.79
34000	846	23.26	863	24.95
35000	862	24.34	879	26.19
36000	878	25.50	895	27.42
37000	894	26.64	911	28.68
38000	911	27.90	926	29.92
39000	927	29.15	942	31.20
40000	944	30.47	959	32.62
41000	961	31.86	975	33.95
42000	977	33.26	992	35.45

Continued next page

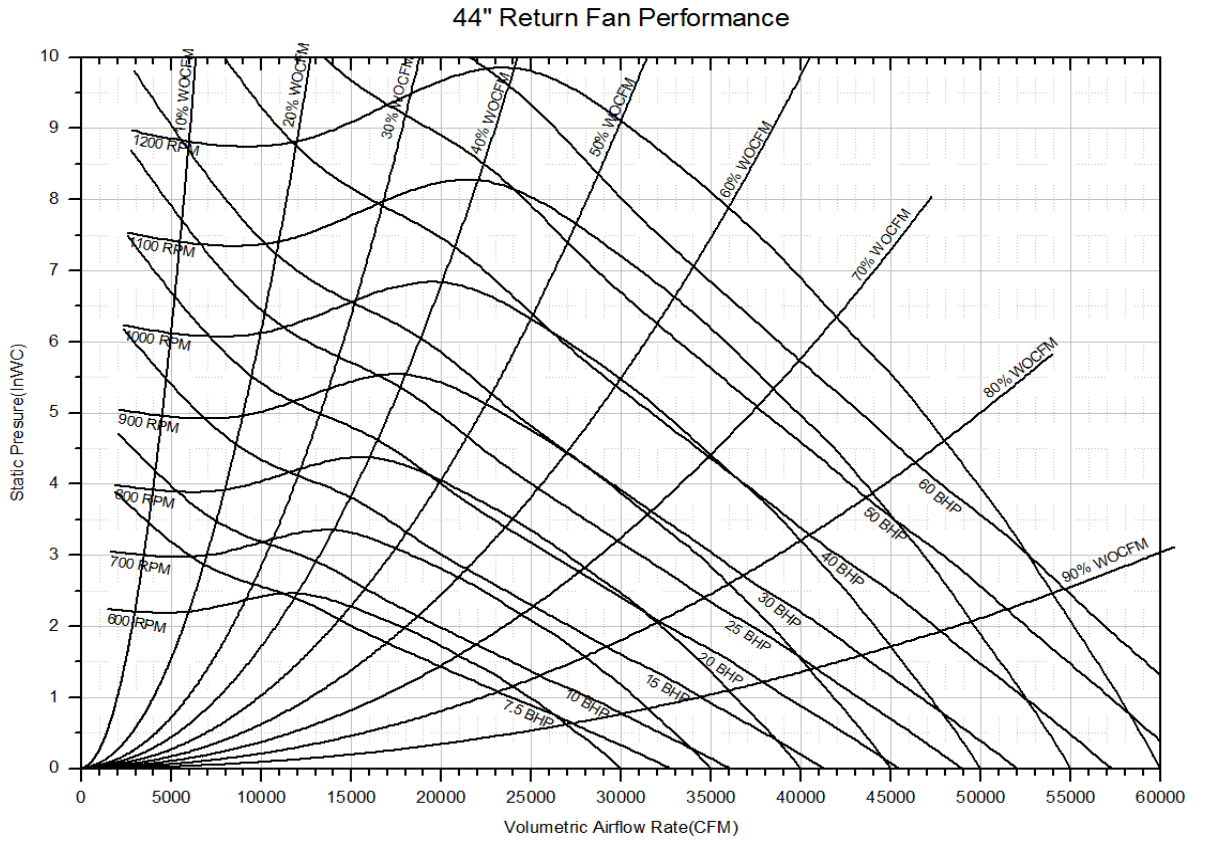
Table 41. Return fan performance STD CFM—120-150 tons air-cooled/128-162 tons evap-condensing (44") (continued)

CFM	Negative Static Pressure			
Std.	2.25		2.50	
Air	rpm	bhp	rpm	bhp
43000	994	34.75	1009	36.94
44000	1012	36.34	1026	38.52
45000	1030	38.04	1043	40.22
46000	1047	39.75	1060	41.93
47000	1065	41.48	1078	43.76
48000	1082	43.33	1095	45.61
49000	1100	45.21		

Notes:
1. Max. speed for plenum fan is 1100 rpm, Max power is 50 hp
2. Max. CFM airflow is as follows: 120T 51000; 130-150T 54000
3. Min. CFM airflow is as follows: 120T 27000; 130-150T 29000
4. Performance data includes cabinet, damper, and rain hood effect
5. Return fans are not available on units with Energy Recovery Wheel.

(a) Outlined area indicates nonstandard bhp or rpm selections. Contact a local Trane representative for more information.

Figure 36. Return fan performance STANDARD CFM—120-150 tons air-cool/128-162 tons evap-condensing (44")



Heating Capacities

Table 42. Natural gas heating capacities — air-cooled and evaporative condensing[1, 2]

				Air Temperature Rise vs. Unit CFM											
				CFM											
Nominal Tons (AC/EC)	Gas Heat Modules	Heat Input (MBh)	Heat Output (MBh)	18000	20000	22000	24000	26000	30000	34000	38000	42000	46000	54000	58000
90/100	LOW	850	680	34.8	31.3	28.5	26.1	24.1	20.9	18.4	16.5	14.9	13.6	11.6	10.8
	MEDIUM	1100	880	-	40.6	36.9	33.8	31.2	27.0	23.9	21.3	19.3	17.6	15.0	14.0
	HIGH	1800	1440	-	-	-	55.3	51.0	44.2	39.0	34.9	31.6	28.9	24.6	22.9
105/118	LOW	850	680	34.8	31.3	28.5	26.1	24.1	20.9	18.4	16.5	14.9	13.6	11.6	10.8
	MEDIUM	1100	880	-	40.6	36.9	33.8	31.2	27.0	23.9	21.3	19.3	17.6	15.0	14.0
	HIGH	1800	1440	-	-	-	55.3	51.0	44.2	39.0	34.9	31.6	28.9	24.6	22.9
120/128	LOW	1100	880	-	-	-	33.8	31.2	27.0	23.9	21.3	19.3	17.6	15.0	14.0
	MEDIUM	1800	1440	-	-	-	-	51.0	44.2	39.0	34.9	31.6	28.9	24.6	22.9
	HIGH	2500	2000	-	-	-	-	-	61.4	54.2	48.5	43.9	40.1	34.1	31.8
130-162	LOW	1100	880	-	-	-	33.8	31.2	27.0	23.9	21.3	19.3	17.6	15.0	14.0
	MEDIUM	1800	1440	-	-	-	-	51.0	44.2	39.0	34.9	31.6	28.9	24.6	22.9
	HIGH	2500	2000	-	-	-	-	-	61.4	54.2	48.5	43.9	40.1	34.1	31.8

Notes:
1. Actual limits may be + or - the values shown; to accurately calculate capacities, contact the local Trane Sales Office or utilize TOPSS.
2. Follow the supply CFM ranges posted in the General Data for each case size.

Table 43. Electric heat air temperature rise (50 & 60 Hz) — air-cooled and evaporative-condensing[1, 2]

			CFM									
Nominal Tons (AC/EC)	KW Input (60 Hz)	Total (MBh)	20000	22000	26000	30000	34000	38000	42000	46000	54000	58000
90/100	90	307.2	14.2	12.9	10.9	9.4	8.3	7.5	6.7			
	265	904.4	-	37.9	32.1	27.8	24.5	21.9	19.8	-	-	-
105/118	90	307.2	14.2	12.9	10.9	9.4	8.3	7.5	6.7	-	-	-
	265	904.4	41.6	37.9	32.1	27.8	24.5	21.9	19.8	-	-	-
120/162	140	477.8	-	20.0	16.9	14.7	13.0	11.6	10.5	9.6	8.2	7.6
	300	1023.9	-	42.9	36.3	31.5	27.8	24.8	22.5	20.5	17.5	16.3
			CFM									
Nominal Tons	KW Input (50 Hz)	Total (MBh)	20000	22000	26000	30000	34000	38000	42000	46000	54000	58000
90/100	56	191.1	8.8	8.0	6.8	5.9	5.2	4.6	4.2	-	-	-
	166	566.6	-	23.7	20.1	17.4	15.4	13.7	12.4	-	-	-
105/118	56	191.1	8.8	8.0	6.8	5.9	5.2	4.6	4.2	-	-	-
	166	566.6	26.1	23.7	20.1	17.4	15.4	13.7	12.4	-	-	-
120-162	88	300.3	-	12.6	10.6	9.2	8.1	7.3	6.6	6.0	5.3	4.8
	188	641.6	-	26.9	22.7	19.7	17.4	15.6	14.1	12.9	11.4	10.2

Notes:
1. Actual limits may be + or - the values shown; to accurately calculate capacities, contact the local Trane Sales Office or utilize TOPSS.
2. Follow the supply CFM ranges posted in the General Data for each case size.

Table 44. Electric heat kW ranges — air-cooled and evaporative-condensing[1, 2]

Nominal Tons (AC/EC)	Nominal Voltage		
	460	575	380
90/100	90-265	90-265	56-166
105/118	90-265	90-265	56-166
120/128	140-300	140-300	88-188
130-162	140-300	140-300	88-188

Notes:
1. Actual limits may be + or - the values shown; to accurately calculate capacities, contact the local Trane Sales Office or utilize TOPSS.
2. Follow the supply CFM ranges posted in the General Data for each case size.

Table 45. Hot water coil heating capacities (Q/ITD) — air-cooled and evaporative-condensing

		Water Flow	High Capacity					Low Capacity				
		(GPM)	40	80	120	160	200	30	60	100	140	175
Nominal Tons (AC/EC)	Airflow (CFM)	WPD (ft.)	0.3	1.0	2.1	3.7	5.6	0.2	0.6	1.5	2.8	4.3
90/100	16000		7.57	9.02	9.59	9.90	10.10	5.50	6.54	7.05	7.29	7.42
	20000		8.26	10.08	10.84	11.25	11.52	6.02	7.34	8.01	8.33	8.50
	25000		8.90	11.15	12.12	12.66	13.01	6.52	8.15	9.00	9.42	9.65
	30000		9.40	12.02	13.18	13.84	14.27	6.91	8.81	9.84	10.35	10.62
	33000		9.65	12.46	13.74	14.47	14.94	7.11	9.15	10.28	10.84	11.14
	36000		9.86	12.86	14.25	15.04	15.56	7.28	9.46	10.68	11.29	11.63
	40000		10.12	13.35	14.86	15.73	16.31	7.48	9.83	11.16	11.84	12.21
105/118	19000		8.10	9.83	10.55	10.94	11.18	5.90	7.15	7.78	8.09	8.25
	23000		8.67	10.75	11.64	12.13	12.44	6.34	7.85	8.63	9.01	9.21
	28000		9.21	11.69	12.78	13.39	13.79	6.77	8.56	9.52	9.99	10.25
	33000		9.65	12.46	13.74	14.47	14.94	7.11	9.15	10.28	10.84	11.14
	38000		10.00	13.11	14.56	15.40	15.94	7.38	9.65	10.93	11.58	11.93
	43000		10.29	13.67	15.28	16.21	16.83	7.61	10.08	11.50	12.22	12.62
	45000		10.39	13.87	15.54	16.51	17.15	7.69	10.23	11.71	12.46	12.88

Continued on next page

Table 45. Hot water coil heating capacities (Q/ITD) — air-cooled and evaporative-condensing (continued)

Nominal Tons (AC/EC)	Airflow (CFM)	GPM	40	80	120	160	200	30	60	100	140	175
		WPD (ft.)	0.3	1.1	2.4	4.1	6.2	0.2	0.7	1.7	3.2	4.8
120/128	21000		9.19	11.27	12.12	12.58	12.88	6.67	8.17	8.93	9.29	9.48
	26000		9.89	12.46	13.55	14.16	14.55	7.21	9.07	10.04	10.51	10.76
	31000		0.00	13.43	14.75	15.50	15.98	7.64	9.81	10.98	11.55	11.86
	36000		0.00	14.24	15.78	16.66	17.22	0.00	10.43	11.78	12.46	12.83
	41000		0.00	14.94	16.67	17.67	18.32	0.00	10.96	12.49	13.27	13.69
	46000		0.00	15.54	17.45	18.57	19.30	0.00	11.42	13.12	13.99	14.46
	51000		0.00	16.06	18.15	19.37	20.18	0.00	11.83	13.68	14.63	15.15
	54000		0.00	16.35	18.53	19.82	20.67	0.00	12.05	13.98	14.99	15.54
130/140	23000		9.49	11.77	12.73	13.25	13.58	6.91	8.55	9.39	9.80	10.01
	26000		9.89	12.46	13.55	14.16	14.55	7.21	9.07	10.04	10.51	10.76
	30000		10.33	13.25	14.53	15.25	15.71	7.56	9.67	10.80	11.35	11.65
	35000		0.00	14.09	15.59	16.44	16.99	0.00	10.31	11.63	12.29	12.64
	40000		0.00	14.81	16.50	17.48	18.11	0.00	10.86	12.36	13.11	13.52
	45000		0.00	15.42	17.30	18.40	19.11	0.00	11.34	13.00	13.85	14.31
	50000		0.00	15.96	18.02	19.22	20.01	0.00	11.75	13.57	14.51	15.02
	55000		0.00	16.44	18.65	19.96	20.82	0.00	12.12	14.08	15.10	15.67
	58000		0.00	16.70	19.00	20.37	21.28	0.00	12.32	14.37	15.44	16.03
150/162	23000		9.49	11.77	12.73	13.25	13.58	6.91	8.55	9.39	9.80	10.01
	26000		9.89	12.46	13.55	14.16	14.55	7.21	9.07	10.04	10.51	10.76
	30000		10.33	13.25	14.53	15.25	15.71	7.56	9.67	10.80	11.35	11.65
	35000		0.00	14.09	15.59	16.44	16.99	0.00	10.31	11.63	12.29	12.64
	40000		0.00	14.81	16.50	17.48	18.11	0.00	10.86	12.36	13.11	13.52
	45000		0.00	15.42	17.30	18.40	19.11	0.00	11.34	13.00	13.85	14.31
	50000		0.00	15.96	18.02	19.22	20.01	0.00	11.75	13.57	14.51	15.02
	55000		0.00	16.44	18.65	19.96	20.82	0.00	12.12	14.08	15.10	15.67
	58000		0.00	16.70	19.00	20.37	21.28	0.00	12.32	14.37	15.44	16.03

Notes:
1. Nominal capacity is in tons
2. WPD is waterside pressure drop in feet of water
3. Hot water capacity is at 180°F entering water temperature and 65°F entering air temperature
4. Maximum entering water temperature is 200°F.

Table 46. Steam coil heating capacities (Q/ITD) — air-cooled and evaporative-condensing

Nominal Tons (AC/EC)	Airflow	High Cap	Low Cap
90/100	16000	7.33	4.99
	20000	8.17	5.67
	25000	9.06	6.35
	30000	9.84	6.91
	33000	10.26	7.19
	36000	10.66	7.44
	40000	11.16	7.74

Continued on next page

Table 46. Steam coil heating capacities (Q/ITD) — air-cooled and evaporative-condensing

Nominal Tons (AC/EC)	Airflow	High Cap	Low Cap
105/118	19000	7.97	5.51
	23000	8.73	6.10
	28000	9.55	6.71
	33000	10.27	7.20
	38000	10.92	7.61
	43000	11.52	7.95
	45000	11.74	8.07
120/128	21000	9.40	6.43
	26000	10.41	7.24
	31000	11.29	7.92
	36000	12.08	8.49
	41000	12.80	8.97
	46000	13.45	9.39
	51000	14.06	9.75
	54000	14.40	9.95
130/140	23000	9.82	6.78
	26000	10.41	7.24
	30000	11.12	7.79
	35000	11.93	8.38
	40000	12.66	8.88
	45000	13.32	9.31
	50000	13.94	9.68
	55000	14.52	10.01
	58000	14.84	10.18
150/162	23000	9.82	6.78
	26000	10.41	7.24
	30000	11.12	7.79
	35000	11.93	8.38
	40000	12.66	8.88
	45000	13.32	9.31
	50000	13.94	9.68
	55000	14.52	10.01
	58000	14.84	10.18

Notes:
1. Nominal capacity is in tons.
2. Steam coil capacity is at 15 psig and 65°F entering air temperature.
3. Capacities are expressed as mbh (Q) per degree (°F) of initial temperature difference (ITD) between the entering steam temperature (°F) and the entering (return) air temperature (°F) to the coil.
4. The maximum recommended steam pressure is 35 psig.

Table 47. Properties of steam

Steam Pressure (psig)	2	5	10	15	20	25	30	40	50
Temperature of Steam (°F)	219	227	239	250	259	267	274	287	298

Component Static Pressure Drops

Table 48. Component static pressure drops (in. H_2O) — air-cooled and evaporative condensing

Nom Tons AC/EC	CFM[a]	Evaporator Coil				Reheat Coil	(Dampers wide open)		
		Standard		High Capacity					
		Dry	Wet	Dry	Wet	Dry	Return Damper	Econo Damper	Traq Damper
90/100	16000	0.10	0.13	0.17	0.22	0.04	0.06	0.11	0.19
	20000	0.15	0.19	0.24	0.31	0.06	0.10	0.17	0.29
	25000	0.21	0.27	0.35	0.45	0.08	0.16	0.27	0.45
	30000	0.28	0.36	0.47	0.60	0.11	0.23	0.39	0.65
	33000	0.33	0.42	0.55	0.70	0.13	0.28	0.47	0.79
	36000	0.38	0.48	0.63	0.80	0.15	0.34	0.57	0.94
	40000	0.45	0.57	0.75	0.95	0.18	0.42	0.70	1.16
105/118	19000	0.18	0.23	0.27	0.32	0.05	0.09	0.15	0.26
	23000	0.20	0.31	0.37	0.47	0.07	0.13	0.23	0.38
	28000	0.34	0.43	0.51	0.64	0.10	0.20	0.34	0.57
	33000	0.44	0.56	0.66	0.84	0.13	0.28	0.47	0.79
	38000	0.55	0.70	0.83	1.05	0.16	0.38	0.63	1.05
	43000	0.67	0.85	1.01	1.28	0.20	0.49	0.81	1.34
	45000	0.73	0.92	1.09	1.38	0.21	0.53	0.89	1.47
120/128	21000	0.09	0.12	0.18	0.23	0.04	0.05	0.10	0.17
	26000	0.13	0.16	0.25	0.32	0.06	0.09	0.15	0.26
	31000	0.17	0.21	0.34	0.43	0.08	0.12	0.22	0.36
	36000	0.21	0.27	0.43	0.55	0.10	0.17	0.30	0.49
	41000	0.26	0.34	0.53	0.67	0.12	0.22	0.39	0.64
	46000	0.32	0.40	0.64	0.81	0.15	0.28	0.49	0.80
	51000	0.38	0.48	0.75	0.95	0.18	0.35	0.61	0.99
	54000	0.41	0.52	0.83	1.05	0.20	0.39	0.68	1.11
130/140	23000	0.14	0.18	0.21	0.27	0.05	0.07	0.12	0.20
	26000	0.17	0.22	0.25	0.32	0.06	0.09	0.15	0.26
	30000	0.21	0.27	0.32	0.41	0.07	0.12	0.21	0.34
	35000	0.27	0.35	0.41	0.52	0.10	0.16	0.28	0.46
	40000	0.34	0.43	0.51	0.65	0.12	0.21	0.37	0.61
	45000	0.41	0.52	0.61	0.78	0.15	0.27	0.47	0.77
	50000	0.49	0.62	0.73	0.93	0.17	0.33	0.59	0.95
	55000	0.57	0.72	0.85	1.08	0.20	0.40	0.71	1.15
	58000	0.62	0.78	0.93	1.18	0.22	0.45	0.79	1.28
150/162	23000	0.21	0.27	-	-	0.05	0.07	0.12	0.20
	26000	0.25	0.32	-	-	0.06	0.09	0.15	0.26
	30000	0.32	0.41	-	-	0.07	0.12	0.21	0.34
	35000	0.41	0.52	-	-	0.10	0.16	0.28	0.46
	40000	0.51	0.65	-	-	0.12	0.21	0.37	0.61
	45000	0.61	0.78	-	-	0.15	0.27	0.47	0.77
	50000	0.73	0.93	-	-	0.17	0.33	0.59	0.95
	55000	0.85	1.08	-	-	0.20	0.40	0.71	1.15
	58000	0.93	1.18	-	-	0.22	0.45	0.79	1.28

(a)Actual Supply Fan CFM Range:90/100 Ton 16000-40000; 105/118 Ton 19000-45000; 120/128 Ton 21000-54000; 130-150/140-162 Ton 23000-58000

Table 49. Component static pressure drops (in. H_2O) — air-cooled and evaporative condensing

Nom Tons AC/EC	CFM	Electric Heating (Hrztl) All KWs[a]	Gas Heating						Hydronic Heating Coil Data			
			Low Heat		Medium Heat		High Heat		Hot Water Coil		Steam Coil	
			DF	Hz	DF	Hz	DF	Hz	High	Low	High	Low
90/100	16000	0.01	0.01	0.10	0.01	0.12	0.01	0.14	0.13	0.08	0.12	0.08
	20000	0.02	0.01	0.16	0.01	0.19	0.01	0.22	0.19	0.12	0.17	0.12
	25000	0.03	0.01	0.24	0.01	0.30	0.01	0.35	0.27	0.17	0.26	0.18
	30000	0.05	0.02	0.35	0.02	0.44	0.02	0.50	0.36	0.24	0.35	0.25
	33000	0.06	0.02	0.42	0.02	0.53	0.02	0.61	0.42	0.28	0.41	0.30
	36000	0.07	0.03	0.51	0.03	0.63	0.03	0.72	0.49	0.33	0.48	0.35
	40000	0.08	0.03	0.62	0.03	0.77	0.03	0.89	0.58	0.39	0.57	0.43
105/118	19000	0.02	0.01	0.14	0.01	0.17	0.01	0.20	0.17	0.11	0.16	0.11
	23000	0.03	0.01	0.21	0.01	0.26	0.01	0.30	0.23	0.15	0.22	0.16
	28000	0.04	0.02	0.31	0.02	0.38	0.02	0.44	0.32	0.21	0.31	0.22
	33000	0.06	0.02	0.42	0.02	0.53	0.02	0.61	0.42	0.28	0.41	0.30
	38000	0.07	0.03	0.56	0.03	0.70	0.03	0.81	0.53	0.36	0.52	0.39
	43000	0.10	0.04	0.72	0.04	0.89	0.04	1.03	0.65	0.45	0.65	0.49
	45000	0.10	0.04	0.79	0.04	0.98	0.04	1.13	0.71	0.49	0.70	0.53
120/128	21000	0.02	0.00	0.16	0.00	0.19	0.00	0.23	0.14	0.09	0.13	0.09
	26000	0.03	0.00	0.25	0.00	0.30	0.00	0.35	0.20	0.13	0.19	0.13
	31000	0.05	0.00	0.35	0.00	0.42	0.00	0.49	0.26	0.17	0.25	0.18
	36000	0.07	0.00	0.48	0.00	0.57	0.00	0.67	0.33	0.22	0.33	0.24
	41000	0.09	0.00	0.62	0.00	0.74	0.00	0.86	0.42	0.28	0.41	0.30
	46000	0.11	0.00	0.78	0.00	0.93	0.00	1.09	0.50	0.34	0.50	0.37
	51000	0.13	0.00	0.96	0.00	1.15	0.00	1.34	0.60	0.41	0.59	0.44
	54000	0.15	0.00	1.07	0.00	1.28	0.01	1.50	0.66	0.45	0.65	0.49
130/140	23000	0.03	0.00	0.20	0.00	0.23	0.01	0.27	0.16	0.10	0.15	0.10
	26000	0.03	0.00	0.25	0.00	0.30	0.00	0.35	0.20	0.13	0.19	0.13
	30000	0.05	0.00	0.33	0.00	0.40	0.00	0.46	0.25	0.16	0.24	0.17
	35000	0.06	0.00	0.45	0.00	0.54	0.00	0.63	0.32	0.21	0.31	0.22
	40000	0.08	0.00	0.59	0.00	0.70	0.00	0.82	0.40	0.27	0.39	0.28
	45000	0.10	0.00	0.75	0.00	0.89	0.00	1.04	0.49	0.33	0.48	0.35
	50000	0.13	0.00	0.92	0.00	1.10	0.00	1.29	0.58	0.39	0.57	0.43
	55000	0.16	0.00	1.12	0.01	1.33	0.01	1.56	0.68	0.47	0.67	0.51
	58000	0.17	0.01	1.24	0.01	1.48	0.01	1.74	0.75	0.51	0.74	0.56
150/162	23000	0.03	0.00	0.20	0.00	0.23	0.01	0.27	0.16	0.10	0.15	0.10
	26000	0.03	0.00	0.25	0.00	0.30	0.00	0.35	0.20	0.13	0.19	0.13
	30000	0.05	0.00	0.33	0.00	0.40	0.00	0.46	0.25	0.16	0.24	0.17
	35000	0.06	0.00	0.45	0.00	0.54	0.00	0.63	0.32	0.21	0.31	0.22
	40000	0.08	0.00	0.59	0.00	0.70	0.00	0.82	0.40	0.27	0.39	0.28
	45000	0.10	0.00	0.75	0.00	0.89	0.00	1.04	0.49	0.33	0.48	0.35
	50000	0.13	0.00	0.92	0.00	1.10	0.00	1.29	0.58	0.39	0.57	0.43
	55000	0.16	0.00	1.12	0.01	1.33	0.01	1.56	0.68	0.47	0.67	0.51
	58000	0.17	0.01	1.24	0.01	1.48	0.01	1.74	0.75	0.51	0.74	0.56

(a)There is no pressure drop with electric heat DF configuration

Table 50. Component static pressure drops (in. H_2O) — air-cooled and evaporative condensing

Nom Tons AC/EC	CFM	Standard Filter Section (Pre Evap)					Final Filter Section (Post Evap)					
		Std 2" High Eff Throw Away Filters	90-95% Low PD Cartridge Filters w/ 2" Prefilter	90-95% Low PD Cartridge Filters w/ 4" Prefilter	90-95% Cartridge Filters w/ 2" Prefilter[a]	90-95% Bag Filters w/ 2" Prefilter (a)	90-95% Std Temp Low PD Cartridge Filters w/4" Prefilter[b]	90-95% Std Temp Bag Filters w/ 2" Prefilter (c)	90-95% Std Temp Cartridge Filters w/ 2" Prefilter (c)	90-95% Hi Temp Cartridge Filters w/ 2" Hi Temp Prefilter (c)	90-95% Hi Temp HEPA w/ 2" Hi Temp Prefilter (d)	90-95% Std Temp HEPA Filters w/ 2" Hi Temp Prefilter (d)
90/100	16000	0.08	0.24	-	0.27	0.34	0.23	0.36	0.29	0.35	0.54	0.48
	20000	0.11	0.31	-	0.33	0.41	0.31	0.43	0.36	0.44	0.69	0.61
	25000	0.15	0.42	-	0.42	0.50	0.43	0.54	0.47	0.58	0.89	0.78
	30000	0.20	0.53	-	0.54	0.60	0.56	0.65	0.60	0.74	1.10	0.95
	33000	0.23	0.61	-	0.61	0.67	0.65	0.73	0.69	0.86	1.22	1.06
	36000	0.26	0.69	-	0.70	0.73	0.74	0.80	0.79	0.98	1.36	1.16
	40000	0.30	0.80	-	0.82	0.83	0.88	0.91	0.93	1.15	-	-
105/118	19000	0.10	0.27	-	0.30	0.37	0.27	0.40	0.32	0.40	0.62	0.55
	23000	0.11	0.29	-	0.32	0.39	0.29	0.42	0.34	0.42	0.66	0.58
	28000	0.18	0.49	-	0.49	0.56	0.51	0.61	0.54	0.68	1.01	0.88
	33000	0.23	0.61	-	0.61	0.67	0.65	0.73	0.69	0.86	1.22	1.06
	38000	0.28	0.74	-	0.76	0.78	0.81	0.86	0.86	1.06	-	-
	43000	0.33	0.89	-	0.92	0.91	0.98	1.00	1.05	1.30	-	-
	45000	0.36	0.95	-	0.99	0.96	1.05	1.06	1.13	1.40	-	-
120/128	21000	0.10	-	0.30	0.35	0.42	0.34	0.45	0.38	0.47	0.73	0.64
	26000	0.13	-	0.41	0.44	0.52	0.46	0.56	0.49	0.61	0.93	0.81
	31000	0.17	-	0.53	0.56	0.62	0.59	0.68	0.63	0.78	1.14	0.99
	36000	0.20	-	0.66	0.70	0.73	0.74	0.80	0.79	0.98	1.36	1.16
	41000	0.25	-	0.81	0.85	0.86	0.91	0.94	0.97	1.20	-	-
	46000	0.29	-	0.96	1.03	0.99	1.09	1.09	1.17	1.45	-	-
	51000	0.34	-	1.14	-	-	1.29	-	-	-	-	-
	54000	0.37	-	1.25	-	-	1.42	-	-	-	-	-
130/140	23000	0.10	-	0.32	0.37	0.44	0.36	0.47	0.40	0.49	0.77	0.68
	26000	0.14	-	0.43	0.47	0.54	0.48	0.58	0.52	0.64	0.97	0.85
	30000	0.17	-	0.55	0.59	0.64	0.62	0.70	0.66	0.82	1.18	1.02
	35000	0.21	-	0.69	0.73	0.76	0.78	0.83	0.82	1.02	1.40	1.20
	40000	0.26	-	0.84	0.89	0.88	0.94	0.97	1.01	1.25	-	-
	45000	0.30	-	1.00	1.07	1.02	1.13	1.12	1.22	1.51	-	-
	50000	0.35	-	1.17	1.27	1.16	1.33	-	-	-	-	-
	55000	0.41	-	1.36	-	-	1.55	-	-	-	-	-
	58000	0.44	-	1.48	-	-	-	-	-	-	-	-
150/162	23000	0.10	-	0.32	0.37	0.44	0.36	0.47	0.40	0.49	0.77	0.68
	26000	0.14	-	0.43	0.47	0.54	0.48	0.58	0.52	0.64	0.97	0.85
	30000	0.17	-	0.55	0.59	0.64	0.62	0.70	0.66	0.82	1.18	1.02
	35000	0.21	-	0.69	0.73	0.76	0.78	0.83	0.82	1.02	1.40	1.20
	40000	0.26	-	0.84	0.89	0.88	0.94	0.97	1.01	1.25	-	-
	45000	0.30	-	1.00	1.07	1.02	1.13	1.12	1.22	1.51	-	-
	50000	0.35	-	1.17	1.27	1.16	1.33	-	-	-	-	-
	55000	0.41	-	1.36	-	-	1.55	-	-	-	-	-
	58000	0.44	-	1.48	-	-	-	-	-	-	-	-

(a)120-150/128-162 Ton Max CFM 50000
(b)130-150/140-162 Ton Max CFM 55500
(c)120-150/128-162 Ton Max CFM 46250
(d)90-150/100-162 Ton Max CFM 37000

Table 51. Energy recovery wheel component static pressure drops — air-cooled and evaporative condensing

Nom Tons AC/EC	CFM	Outside Air Bypass Damper Open	Outside Air Bypass Damper Closed	Exhaust Air Bypass Damper Open	Exhaust Air Bypass Damper Closed
Low CFM Energy Recovery Wheel					
90/100	8000	0.07	0.78	0.09	0.66
	9000	0.09	0.88	0.11	0.79
	10000	0.12	0.99	0.14	0.92
	12000	0.16	1.20	0.19	1.16
	14000	0.21	1.42	0.24	1.41
	16000	0.27	-	0.29	-
	20000	0.40	-	0.42	-
	25000	0.59	-	0.60	-
	30000	0.80	-	0.80	-
	33000	0.94	-	0.94	-
	36000	1.08	-	1.07	-
	40000	1.30	-	1.27	-
105/118	9000	0.09	0.88	0.11	0.79
	12000	0.16	1.20	0.19	1.16
	14000	0.21	1.42	0.24	1.41
	16000	0.27	-	0.29	-
	19000	0.36	-	0.39	
	23000	0.51	-	0.52	-
	28000	0.71	-	0.72	-
	33000	0.94	-	0.94	-
	38000	1.19	-	1.18	-
	43000	1.46	-	1.41	-
	45000	1.58	-	1.52	-
120/128	9000	0.09	0.78	0.11	0.69
	12000	0.16	1.06	0.18	1.02
	15000	0.23	1.36	0.26	1.36
	18000	0.31	-	0.34	-
	21000	0.41	-	0.44	-
	26000	0.59	-	0.62	-
	31000	0.79	-	0.82	-
	36000	1.01	-	1.04	-
	41000	1.25	-	1.28	-
	46000	1.51	-	1.52	-
	51000	1.79	-	1.79	-
	54000	1.96	-	1.95	-
130/140	9000	0.09	0.71	0.10	0.62
	12000	0.15	0.97	0.18	0.92
	16000	0.25	1.34	0.28	1.33
	20000	0.36	-	0.40	-
	23000	0.46	-	0.49	-
	26000	0.57	-	0.60	-
	30000	0.72	-	0.75	-
	35000	0.93	-	0.97	-
	40000	1.16	-	1.20	-
	45000	1.40	-	1.43	-
	50000	1.67	-	1.69	-
	55000	1.95	-	1.96	-
	58000	2.12	-	2.12	-
150/162	9000	0.09	0.71	0.10	0.62
	12000	0.15	0.97	0.18	0.92
	16000	0.25	1.34	0.28	1.33
	20000	0.36	-	0.40	-
	23000	0.46	-	0.49	-
	26000	0.57	-	0.60	-
	30000	0.72	-	0.75	-
	35000	0.93	-	0.97	-
	40000	1.16	-	1.20	-
	45000	1.40	-	1.43	-
	50000	1.67	-	1.69	-
	55000	1.95	-	1.96	-
	58000	2.12	-	2.12	-

Continued on next page

Table 51. Energy recovery wheel component static pressure drops — air-cooled and evaporative condensing (continued)

Nom Tons AC/EC	CFM	Outside Air Bypass Damper Open	Outside Air Bypass Damper Closed	Exhaust Air Bypass Damper Open	Exhaust Air Bypass Damper Closed
Standard CFM Energy Recovery Wheel					
90/100	8000	0.06	0.54	0.07	0.44
	9000	0.08	0.61	0.10	0.53
	10000	0.10	0.68	0.12	0.62
	12000	0.15	0.83	0.17	0.77
	14000	0.19	0.99	0.22	0.94
	16000	0.24	1.16	0.26	1.12
	18000	0.30	1.32	0.31	1.29
	20000	0.35	-	0.37	-
	25000	0.52	-	0.54	-
	30000	0.70	-	0.73	-
	33000	0.82	-	0.84	-
	36000	0.95	-	0.97	-
	40000	1.12	-	1.14	-
105/118	9000	0.08	0.57	0.09	0.47
	12000	0.14	0.77	0.16	0.65
	14000	0.19	0.93	0.21	0.78
	16000	0.24	1.08	0.26	0.91
	19000	0.32	1.33	0.34	1.11
	21000	0.37	1.49	0.40	1.25
	23000	0.44	-	0.46	-
	28000	0.61	-	0.64	-
	33000	0.80	-	0.82	-
	38000	1.00	-	1.03	-
	43000	1.23	-	1.25	-
	45000	1.33	-	1.34	-
120/128	10000	0.10	0.56	0.11	0.50
	12000	0.14	0.69	0.16	0.63
	15000	0.20	0.89	0.23	0.85
	18000	0.27	1.10	0.29	1.05
	21000	0.35	1.33	0.38	1.28
	24000	0.43	1.57	0.47	1.51
	26000	0.50	-	0.54	-
	31000	0.66	-	0.72	-
	36000	0.84	-	0.91	-
	41000	1.04	-	1.11	-
	46000	1.26	-	1.34	-
	51000	1.49	-	1.56	-
	54000	1.63	-	1.71	-
130-162	13000	0.16	0.59	0.17	0.53
	15000	0.20	0.69	0.22	0.63
	18000	0.26	0.86	0.28	0.79
	21000	0.33	1.04	0.36	0.96
	23000	0.38	1.16	0.42	1.06
	26000	0.45	1.36	0.50	1.24
	29000	0.54	1.57	0.60	1.42
	30000	0.57	-	0.63	-
	35000	0.72	-	0.80	-
	40000	0.89	-	0.98	-
	45000	1.08	-	1.17	-
	50000	1.28	-	1.38	-
	55000	1.50	-	1.60	-
	58000	1.63	-	1.74	-

Continued on next page

Table 51. Energy recovery wheel component static pressure drops — air-cooled and evaporative condensing (continued)

Tons AC/EC	CFM	Return Damper, ERW only	Econo Damper, ERW only
90/100	16000	0.14	0.15
	20000	0.20	0.24
	25000	0.29	0.39
	30000	0.42	0.56
	33000	0.51	0.69
	36000	0.61	0.82
	40000	0.75	1.01
105/118	19000	0.19	0.22
	23000	0.25	0.33
	28000	0.37	0.49
	33000	0.51	0.69
	38000	0.68	0.91
	43000	0.87	1.17
	45000	0.96	1.29
120/128	21000	0.22	0.18
	26000	0.32	0.27
	31000	0.45	0.39
	36000	0.61	0.53
	41000	0.79	0.69
	46000	1.00	0.87
	51000	1.24	1.07
	54000	1.40	1.20
130/140 150/162	23000	0.25	0.21
	26000	0.32	0.27
	30000	0.42	0.36
	35000	0.57	0.50
	40000	0.75	0.65
	45000	0.96	0.83
	50000	1.19	1.02
	55000	1.45	1.24
	58000	1.63	1.38

Table 52. Energy recovery wheel pressure loss ΔP (in. wg) and total effectiveness

Actual Air Flow CFM	90-118 Tons Low		120/128 Tons Low		130-162 Tons Low		90/100 Tons Standard		105/118 Tons Standard		120/128 Tons Standard		130-162 Tons Standard	
	ΔP	Eff	ΔP	Eff	ΔP	Eff	ΔP	Eff	ΔP	Eff	ΔP	Eff	ΔP	Eff
8000	0.73	77.5	0.64	79.0	0.58	80.0	0.49	81.6						
9000	0.82	75.9	0.72	77.6	0.65	78.7	0.55	80.6	0.51	81.3				
10000	0.91	74.3	0.80	76.2	0.73	77.5	0.61	79.5	0.56	80.3	0.49	81.6		
11000	1.00	72.7	0.88	74.8	0.80	76.2	0.67	78.5	0.62	79.4	0.54	80.7		
12000	1.09	71.1	0.96	73.4	0.87	75.0	0.73	77.4	0.67	78.4	0.59	79.8		
13000	1.18	69.5	1.04	72.0	0.94	73.7	0.79	76.4	0.73	77.4	0.64	79.0	0.48	74.7
14000			1.12	70.6	1.02	72.4	0.85	75.3	0.79	76.5	0.69	78.1	0.51	72.9
15000			1.20	69.2	1.09	71.1	0.91	74.3	0.84	75.5	0.74	77.3	0.55	71.9
16000					1.16	69.8	0.97	73.2	0.90	74.5	0.79	76.4	0.58	71.0
17000					1.24	68.5	1.03	72.1	0.95	73.5	0.83	75.6	0.61	70.0
18000							1.09	71.1	1.01	72.5	0.88	74.7	0.64	69.0
19000							1.15	70.0	1.07	71.5	0.93	73.9	0.67	68.1
20000							1.22	68.9	1.12	70.5	0.98	73.0	0.71	67.1
21000									1.18	69.5	1.03	72.1	0.74	66.1
22000									1.23	68.5	1.08	71.3	0.77	65.1
23000											1.13	70.4	0.80	64.2
24000											1.18	69.5	0.84	63.2
25000											1.23	68.7	0.87	62.2
26000													0.90	61.2
27000													0.93	60.3
28000													0.97	59.3
29000													1.00	58.3

Fan Drive Selections

Table 53. Supply air fan drive selections — air-cooled (AC) and evaporative condensing (EC)

			Horse Power (hp)								
Nom Tons AC/EC	Low/ Std	rpm	15 hp Drive No.	20 hp Drive No.	25 hp Drive No.	30 hp Drive No.	40 hp Drive No.	50 hp Drive No.	60 hp Drive No.	75 hp Drive No.	100 hp Drive No.
90/100	Low	2000						L			
	Low	1900					K				
	Low	1800					J				
	Low	1700				H					
	Low	1600			G						
	Low	1500		F							
	Low	1400	E	E							
90-105 AC 100-118 EC	Std	1300							D	D	
	Std	1200						C	C		
	Std	1100					B	B			
	Std	1000				A	A				
	Std	900		9	9	9					
	Std	800	8	8	8						
All	Low	1500							F		
	Low	1400						E	E		
	Low	1300					D	D			
	Low	1200				C	C				
	Low	1100			B	B					
	Low	1000		A	A						
	Low	900	9	9							
120-150 AC 128-162 EC	Std	1200									C
	Std	1100							B	B	B
	Std	1000						A	A	A	A
	Std	900					9	9	9	9	
	Std	800			8	8	8	8			
	Std	700		7	7	7	7				

Table 54. Exhaust air fan drive selections — air-cooled (AC) and evaporative condensing (EC)

			Horse Power (hp)								
			7.5 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp
Nom Tons	Low / Std	rpm	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.
90 AC 100 EC	Low	700				7	7				
	Low	600	6	6	6	6	6				
	Low	500	5	5	5	5					
	Low	400	4	4	4						
	Std	600				6	6				
	Std	500			5	5	5				
	Std	400		4	4	4	4				
	Std	300		3	3						
105-150 AC/ 118-162 EC	Low	600				6	6	6	6	6	
	Low	500			5	5	5	5	5	5	
	Low	400	4	4	4	4	4	4	4		
	Low	300	3	3	3						
	Std	600								6	6
	Std	500			5	5	5	5	5		
	Std	400			4	4	4				

Table 55. Return air fan drive selections air-cooled (AC) and evaporative condensing (EC)

			Horse Power (hp)							
			7.5 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp
Nom Tons AC / EC	Low / Std	rpm	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.	Drive No.
All	Low	1400							E	
	Low	1300						D		
	Low	1200					C	C		
	Low	1100				B				
	Low	1000			A	A				
	Low	900			9					
	Low	800	8	8						
	Low	700	7							
90-105 AC 100-118 EC	Std	1200							C	
	Std	1100						B	B	
	Std	1000					A	A		
	Std	900				9				
	Std	800			8					
	Std	700		7						
120-150 AC/ 128-162 EC	Std	1100								B
	Std	1000							A	A
	Std	900						9	9	
	Std	800				8	8			
	Std	700			7					
	Std	600			6					

Electrical Data

Electrical Service Sizing

To correctly size electrical service wiring for a unit, find the appropriate calculations listed below. Each type of unit has its own set of calculations for MCA (Minimum Circuit Ampacity), MOP (Maximum Overcurrent Protection), and RDE (Recommended Dual Element fuse size). Read the load definitions that follow and then find the appropriate set of calculations based on unit type.

Note: *Set 1 is for cooling only and cooling with gas heat units, and set 2 is for cooling with electric heat units.*

Load Definitions: (To determine load values, see the Electrical Service Sizing Data Tables on the following page.)

LOAD1 = CURRENT OF THE LARGEST MOTOR (COMPRESSOR OR FAN MOTOR)

LOAD2 = SUM OF THE CURRENTS OF ALL REMAINING MOTORS

LOAD3 = CURRENT OF ELECTRIC HEATERS

LOAD4 = ANY OTHER LOAD RATED AT 1 AMP OR MORE

Set 1. Cooling Only Rooftop Units and Cooling with Gas Heat Rooftop Units

MCA = (1.25 x LOAD1) + LOAD2 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

RDE = (1.5 x LOAD1) + LOAD2 + LOAD4

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Note: *If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*

Set 2. Rooftop units with Electric Heat

To arrive at the correct MCA, MOP, and RDE values for these units, two sets of calculations must be performed. First calculate the MCA, MOP, and RDE values as if the unit was in cooling mode (use the equations given in Set 1). Then calculate the MCA, MOP, and RDE values as if the unit were in the heating mode as follows.

(Keep in mind when determining LOADS that the compressors don't run while the unit is in the heating mode).

MCA = 1.25 x (LOAD1 + LOAD2 + LOAD4) + LOAD3

The nameplate MCA value will be the larger of the cooling mode MCA value or the heating mode MCA value calculated above.

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

The selection MOP value will be the larger of the cooling mode MOP value or the heating mode MOP value calculated above.

Select a fuse rating equal to the MOP value. If the MOP value does not equal a standard fuse size as listed in NEC 240-6, select the next lower standard fuse rating.

Note: *If selected MOP is less than the MCA, then select the lowest standard maximum fuse size which is equal to or larger than the MCA, provided the selected fuse size does not exceed 800 amps.*

RDE = (1.5 x LOAD1) + LOAD2 + LOAD3 + LOAD4

The selection RDE value will be the larger of the cooling mode RDE value or the heating mode RDE value calculated above.

Select a fuse rating equal to the RDE value. If the RDE value does not equal a standard fuse size as listed in NEC 240-6, select the next higher standard fuse rating.

Notes:

- *If the selected RDE is greater than the selected MOP value, then select the RDE value to equal the MOP value.*
- *On 90 to 162 ton rooftops, the selected MOP value is stamped in the MOP field on the unit nameplate.*

Table 56. Electrical service sizing data — air-cooled and evaporative condensing

	Compressor						Nominal Voltage					
							460 V		575 V		380 V	
			Capacity KW (ea.)									
			60 Hz		50 Hz							
Nom Tons AC/EC	Size	Number per Unit	Std. Coil	High Cap Coil	Std. Coil	High Cap Coil	RLA (ea.)	LRA (ea.)	RLA (ea.)	LRA (ea.)	RLA (ea.)	LRA (ea.)
90/100	240	4	21.3	21.6	17.6	17.9	34.1	215	27.3	175	34.0	215
105/118	240	2	24.2	24.5	20.2	20.3	34.1	215	27.3	175	34.0	215
	300	2	25.0	25.3	20.9	21.0	44.7	260	35.8	210	44.6	260
120/128	300	4	26.9	27.8	22.4	23.0	44.7	260	35.8	210	44.6	260
130/140	300	2	28.5	28.8	23.8	23.8	44.7	260	35.8	210	44.6	260
	380	2	33.7	34.2	28.2	28.2	52.1	320	41.1	235	52.0	320
150/162	380	4	34.7	--	28.7	--	52.1	320	41.1	235	52.0	320

Table 57. Electrical service sizing data—motors — air-cooled and evaporative condensing

Condenser Fan Motors				
		460 V	575 V	380 V
Nominal Tons	No. of Fans	FLA	FLA	FLA
Air-Cooled Condenser Fan Motors				
90-105	6	16.2	13.2	15
120, 130, 150	8	21.6	17.6	20
Evaporative Condensing Condenser Motors				
100	2	11.8	N/A	N/A
118, 128, 140, 162	2	11.8	N/A	N/A
Supply Fan Motors				
	460 V	575 V	380 V	
Motor Horsepower	FLA	FLA	FLA	
15	18.5	15.1	24	
20	24.7	19.6	29	
25	31.0	24.5	38	
30	36.6	29.2	47	
40	49.0	39	54	
50	60.5	48	68	
60	71.5	57.2	81	
75	90	72	103	
100	115	92	N/A	
Exhaust/Return Fan Motors				
	460 V	575 V	380 V	
Motor Horsepower	FLA	FLA	FLA	
7.5	9.4	7.8	13.6	
10	12.6	10.1	16	
15	18.5	15.1	24	
20	24.7	19.6	29	
25	31	24.5	38	
30	36.6	29.2	47	
40	49.0	39	54	
50	60.5	48	68	
60	71.5	57.2	81	

Table 58. Electrical service sizing data—electric heat module (electric heat units only)

	Voltage		
	460	575	380
Module KW	FLA	FLA	FLA
90 / 56	108.3	86.6	85.1
140 / 88	168.4	134.7	133.7
265 / 166	318.8	255	252.2
300 / 188	360.8	288.7	285.6

Table 59. Electrical service sizing data—control power transformer (heating mode only) — air-cooled and evaporative condensing

Nominal Tons AC/EC	Digit 2 Unit Function	Voltages		
		460	575	380
		FLA	FLA	FLA
90-150/100-162	E, L, S, X	3	3	4
90, 105/100, 118	F (850 mbh)	4	4	5
90, 105/100, 118	F (1100 mbh)	4	4	5
90, 105/100, 118	F (1800 mbh)	4	4	5
120-150/128-162	F (1100 mbh)	4	4	5
120-150/128-162	F (1800 mbh)	4	4	5
120-150/128-162	F (2500 mbh)	4	4	5

Table 60. Electrical service sizing data—crankcase heater — air-cooled and evaporative condensing

Nominal Tons AC/EC	Voltage		
	460	575	380
	FLA (add)	FLA (add)	FLA (add)
All	1	1	1

Table 61. Voltage utilization range

Unit Voltage	
460/60/3	414-506
575/60/3[a]	517-633
380/50/3[i]	342-418

(a) Units with air-cooled condensers only.

Table 62. Electrical service sizing data—energy recovery wheel motor — air-cooled and evaporative condensing

Nominal Tons AC/EC	Unit Function	Voltage	
		460	575
		FLA	FLA
90-120/100-128	1 (Low CFM ERW)	1.2	0.95
130-150/140-162	1 (Low CFM ERW)	1.7	1.4
All	2 (Std. CFM ERW)	1.7	1.4

Table 63. Electrical service sizing data—evaporative condenser

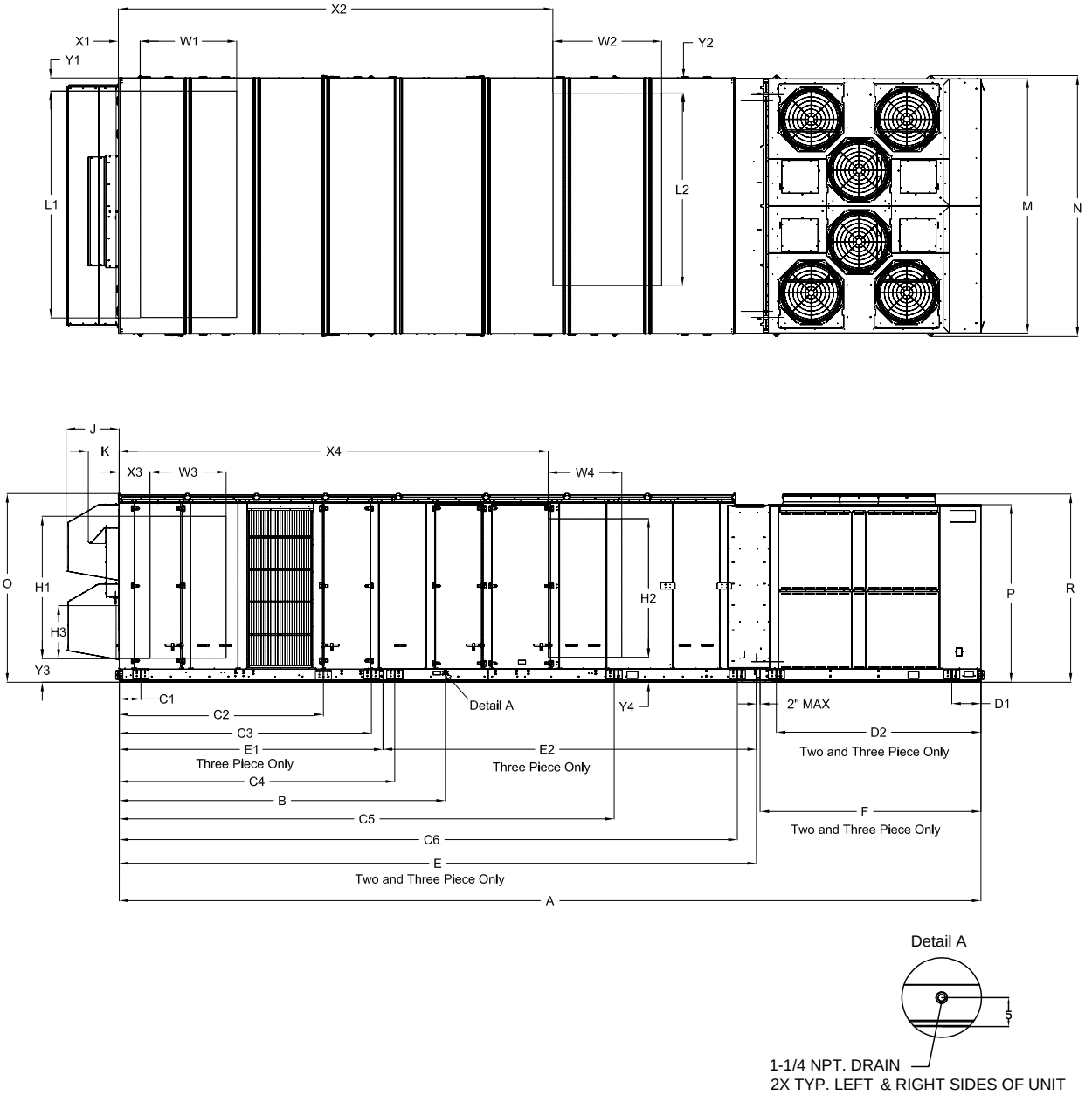
Unit Part	kW	hp	Voltage 460 FLA
Pump		1.5	2.7
Sump Heater	3		3.8

Table 64. Electrical service sizing data—convenience outlet transformer air-cooled (AC) and evaporative condensing (EC)

Nominal Tons AC/EC	Voltage 460 FLA (add)	Voltage 575 FLA (add)
All	3.3	2.6

Dimensional Data

Figure 37. Unit top/left view[a]



(a) Representative view showing air-cooled condenser fans; for a representative view with evaporative condensing fans, see Figure 12, p. 14.

Table 65. Unit dimensions (in.)—ONE-PIECE unit air-cooled—WITHOUT energy recovery wheel

Tonnage	Blank Section	Unit Dimensions		Lifting Lug Locations				Unit Width	
				Air Handler Side			Condenser Side		
		A	B	C1	C2	C3	D1	M	N
90	None	437 3/16	159 15/16	66	252 14/16	N/A	27 11/16	139 13/16	143 8/16
90	4 ft	485 6/16	159 15/16	66	252 14/16	N/A	54 2/16	139 13/16	143 8/16
90	8 ft	533 9/16	159 15/16	66	252 14/16	N/A	54 2/16	139 13/16	143 8/16
105	None	455 3/16	159 15/16	66	252 14/16	N/A	27 11/16	139 13/16	143 8/16
105	4 ft	503 6/16	159 15/16	66	252 14/16	N/A	54 2/16	139 13/16	143 8/16
105	8 ft	551 9/16	159 15/16	66	252 14/16	N/A	54 2/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	None	528 15/16	197 1/16	66	269 6/16	N/A	63 2/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	4 ft	577 2/16	197 1/16	66	269 6/16	N/A	63 2/16	139 13/16	143 8/16
120-150 (High Heat Gas Models Only)	None	540 15/16	197 1/16	66	269 6/16	N/A	63 2/16	139 13/16	143 8/16

Tonnage	Blank Section	Unit Height			Return Fan	Exhaust Fan
		O	P	R	J	K
90-150	None	103 12/16	97 9/16	103 7/16	29 3/16	17
90-150	4 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
90-150	8 ft	103 12/16	97 9/16	103 7/16	29 3/16	17

Table 66. Unit dimensions (in.)—ONE-PIECE unit air-cooled—WITH energy recovery wheel

Tonnage	Blank Section	Unit Dimensions		Lifting Lug Locations				Unit Width	
				Air Handler Side			Condenser Side		
		A	B	C1	C2	C3	D1	M	N
90	None	533 9/16	256 5/16	66	201 1/16	349 4/16	27 11/16	139 13/16	143 8/16
90	4 ft	581 13/16	256 5/16	66	201 1/16	349 4/16	54 2/16	139 13/16	143 8/16
105	None	551 9/16	256 5/16	66	201 1/16	349 4/16	27 11/16	139 13/16	143 8/16
105	4 ft	599 13/16	256 5/16	66	201 1/16	349 4/16	54 2/16	139 13/16	143 8/16

Tonnage	Blank Section	Unit Height			Return Fan	Exhaust Fan
		O	P	R	J	K
90	None	103 12/16	97 9/16	103 7/16	N/A	17
90	4 ft	103 12/16	97 9/16	103 7/16	N/A	17
105	None	103 12/16	97 9/16	103 7/16	N/A	17
105	4 ft	103 12/16	97 9/16	103 7/16	N/A	17

Table 67. Unit dimensions (in.)—TWO-PIECE unit air-cooled—WITHOUT energy recovery wheel

Tonnage	Blank Section	Unit Dimensions				Lifting Lug Locations Air Handler Side			
		A	B	E	F	C1	C2	C3	C4
90	None	454 4/16	159 15/16	330 14/16	121 6/16	66	252 14/16	N/A	N/A
90	4 ft	502 7/16	159 15/16	379 1/16	121 6/16	66	252 14/16	368 6/16	N/A
90	8 ft	550 11/16	159 15/16	427 4/16	121 6/16	66	252 14/16	416 10/16	N/A
105	None	472 4/16	159 15/16	330 14/16	139 6/16	66	252 14/16	N/A	N/A
105	4 ft	520 7/16	159 15/16	379 1/16	139 6/16	66	252 14/16	368 6/16	N/A
105	8 ft	568 11/16	159 15/16	427 4/16	139 6/16	66	252 14/16	416 10/16	N/A
120-150 (All Units Except High Heat Gas Models)	None	546	197 1/16	395 10/16	148 6/16	66	269 6/16	384 15/16	N/A
120-150 (All Units Except High Heat Gas Models)	4 ft	594 4/16	197 1/16	443 13/16	148 6/16	66	269 6/16	433 2/16	N/A
120-150 (All Units Except High Heat Gas Models)	8 ft	642 7/16	197 1/16	492 1/16	148 6/16	66	269 6/16	481 6/16	N/A
120-150 (High Heat Gas Models Only)	None	558	197 1/16	407 10/16	148 6/16	66	269 6/16	396 15/16	N/A

Tonnage	Blank Section	Lug Locations Condenser Side		Unit Width		Unit Height		
		D1	D2	M	N	O	P	R
90	None	16	112 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
90	4 ft	16	112 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
90	8 ft	16	112 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
105	None	16	130 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
105	4 ft	16	130 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
105	8 ft	16	130 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (All Units Except High Heat Gas Models)	None	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (All Units Except High Heat Gas Models)	4 ft	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (All Units Except High Heat Gas Models)	8 ft	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (High Heat Gas Models Only)	None	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16

Continued on next page

Table 67. Unit dimensions (in.)—TWO-PIECE unit air-cooled—WITHOUT energy recovery wheel (continued)

Tonnage	Blank Section	Return Fan	Exhaust Fan
		J	K
90	None	29 3/16	17
90	4 ft	29 3/16	17
90	8 ft	29 3/16	17
105	None	29 3/16	17
105	4 ft	29 3/16	17
105	8 ft	29 3/16	17
120-150 (All Units Except High Heat Gas Models)	None	29 3/16	17
120-150 (All Units Except High Heat Gas Models)	4 ft	29 3/16	17
120-150 (All Units Except High Heat Gas Models)	8 ft	29 3/16	17
120-150 (High Heat Gas Models Only)	None	29 3/16	17

Table 68. Unit dimensions (in.)—TWO-PIECE unit air-cooled—WITH energy recovery wheel

Tonnage	Blank Section	Unit Dimensions				Lifting Lug Locations Air Handler Side			
		A	B	E	F	C1	C2	C3	C4
90	None	550 11/16	256 5/16	427 5/16	121 6/16	66	201 1/16	349 4/16	N/A
90	4 ft	598 14/16	256 5/16	475 8/16	121 6/16	66	201 1/16	349 4/16	464 13/16
90	8 ft	647 2/16	256 5/16	523 12/16	121 6/16	66	201 1/16	349 4/16	513
105	None	568 11/16	256 5/16	427 5/16	139 6/16	66	201 1/16	349 4/16	N/A
105	4 ft	616 14/16	256 5/16	475 8/16	139 6/16	66	201 1/16	349 4/16	464 13/16
105	8 ft	665 2/16	256 5/16	523 12/16	139 6/16	66	201 1/16	349 4/16	513
120-150 (All Units Except High Heat Gas Models)	None	642 7/16	293 8/16	492 1/16	148 6/16	66	238 5/16	365 5/16	480 14/16
120-150 (All Units Except High Heat Gas Models)	4 ft	690 10/16	293 8/16	540 4/16	148 6/16	66	238 5/16	365 5/16	529 2/16
120-150 (All Units Except High Heat Gas Models)	8 ft	738 14/16	293 8/16	588 8/16	148 6/16	66	238 5/16	365 5/16	577 5/16
120-150 (High Heat Gas Models Only)	None	654 7/16	293 8/16	504 1/16	148 6/16	66	238 5/16	365 5/16	492 14/16

Tonnage	Blank Section	Lug Locations Condenser Side		Unit Width		Unit Height		
		D1	D2	M	N	O	P	R
90	None	16	112 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
90	4 ft	16	112 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
90	8 ft	16	112 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
105	None	16	130 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
105	4 ft	16	130 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
105	8 ft	16	130 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (All Units Except High Heat Gas Models)	None	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (All Units Except High Heat Gas Models)	4 ft	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (All Units Except High Heat Gas Models)	8 ft	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16
120-150 (High Heat Gas Models Only)	None	16	139 7/16	139 13/16	143 8/16	103 12/16	97 9/16	103 7/16

Continued on next page

Table 68. Unit dimensions (in.)—TWO-PIECE unit air-cooled—WITH energy recovery wheel (continued)

Tonnage	Blank Section	Return Fan	Exhaust Fan
		J	K
90	None	N/A	17
90	4 ft	N/A	17
90	8 ft	N/A	17
105	None	N/A	17
105	4 ft	N/A	17
105	8 ft	N/A	17
120-150 (All Units Except High Heat Gas Models)	None	N/A	17
120-150 (All Units Except High Heat Gas Models)	4 ft	N/A	17
120-150 (All Units Except High Heat Gas Models)	8 ft	N/A	17
120-150 (High Heat Gas Models Only)	None	N/A	17

Table 69. Unit dimensions (in.)—TWO-PIECE unit evaporative condensing—WITHOUT energy recovery wheel

Tonnage	Blank Section	Unit Dimensions				Lifting Lug Locations Air Handler Side			
		A	B	E	F	C1	C2	C3	C4
100-118	None	475 8/16	159 15/16	330 14/16	142 10/16	66	252 14/16	N/A	N/A
100-118	4 ft	523 12/16	159 15/16	379 1/16	142 10/16	66	252 14/16	368 6/16	N/A
100-118	8 ft	571 15/16	159 15/16	427 5/16	142 10/16	66	252 14/16	416 10/16	N/A
128-162 (All Units Except High Heat Gas Models)	None	540 5/16	197 1/16	395 10/16	142 10/16	66	269 6/16	384 15/16	N/A
128-162 (All Units Except High Heat Gas Models)	4 ft	588 8/16	197 1/16	443 14/16	142 10/16	66	269 6/16	433 2/16	N/A
128-162 (All Units Except High Heat Gas Models)	8 ft	636 11/16	197 1/16	492 1/16	142 10/16	66	269 6/16	481 6/16	N/A
128-162 (High Heat Gas Models Only)	None	552 5/16	197 1/16	407 10/16	142 10/16	66	269 6/16	396 15/16	N/A

Tonnage	Blank Section	Lug Locations Condenser Side		Unit Width		Unit Height		
		D1	D2	M	N	O	P	R
100-118	None	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
100-118	4 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
100-118	8 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	None	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	4 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	8 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16

Continued on next page

Table 69. Unit dimensions (in.)—TWO-PIECE unit evaporative condensing—WITHOUT energy recovery wheel

Tonnage	Blank Section	Return Fan	Exhaust Fan
		J	K
100-118	None	29 3/16	17
100-118	4 ft	29 3/16	17
100-118	8 ft	29 3/16	17
128-162 (All Units Except High Heat Gas Models)	None	29 3/16	17
128-162 (All Units Except High Heat Gas Models)	4 ft	29 3/16	17
128-162 (All Units Except High Heat Gas Models)	8 ft	29 3/16	17
128-162 (High Heat Gas Models Only)	None	29 3/16	17

Table 70. Unit dimensions (in.)—TWO-PIECE unit evaporative condensing—WITH energy recovery wheel

Tonnage	Blank Section	Unit Dimensions				Lifting Lug Locations Air Handler Side			
		A	B	E	F	C1	C2	C3	C4
100-118	None	571 15/16	256 5/16	427 5/16	142 10/16	66	201 1/16	349 4/16	N/A
100-118	4 ft	620 3/16	256 5/16	475 8/16	142 10/16	66	201 1/16	349 4/16	464 13/16
100-118	8 ft	668 6/16	256 5/16	523 12/16	142 10/16	66	201 1/16	349 4/16	513
128-162 (All Units Except High Heat Gas Models)	None	636 11/16	293 8/16	492 1/16	142 10/16	66	238 5/16	365 5/16	480 14/16
128-162 (All Units Except High Heat Gas Models)	4 ft	684 15/16	293 8/16	540 4/16	142 10/16	66	238 5/16	365 5/16	529 2/16
128-162 (All Units Except High Heat Gas Models)	8 ft	733 2/16	293 8/16	588 8/16	142 10/16	66	238 5/16	365 5/16	577 5/16
128-162 (High Heat Gas Models Only)	None	648 11/16	293 8/16	504 1/16	142 10/16	66	238 5/16	365 5/16	492 14/16

Tonnage	Blank Section	Lug Locations Condenser Side		Unit Width		Unit Height		
		D1	D2	M	N	O	P	R
100-118	None	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
100-118	4 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
100-118	8 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	None	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	4 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	8 ft	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16
128-162 (All Units Except High Heat Gas Models)	None	16	133 11/16	139 13/16	143 8/16	103 12/16	97 9/16	102 6/16

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Table 70. Unit dimensions (in.)—TWO-PIECE unit evaporative condensing—WITH energy recovery wheel (continued)

Tonnage	Blank Section	Return Fan	Exhaust Fan
		J	K
100-118	None	N/A	17
100-118	4 ft	N/A	17
100-118	8 ft	N/A	17
128-162 (All Units Except High Heat Gas Models)	None	N/A	17
128-162 (All Units Except High Heat Gas Models)	4 ft	N/A	17
128-162 (All Units Except High Heat Gas Models)	8 ft	N/A	17
128-162 (High Heat Gas Models Only)	None	N/A	17

Table 71. Unit dimensions (in.)—THREE-PIECE unit air-cooled—WITHOUT energy recovery wheel

Tonnage	Blank Section	Unit Dimensions						Lifting Lug Locations Air Handler Side	
		A	B	E	E1	E2	F	C1	C2
90	None	473 9/16	179 3/16	350 3/16	144 15/16	205 3/16	121 6/16	11 14/16	N/A
90	4 ft	521 12/16	179 3/16	398 6/16	144 15/16	253 7/16	121 6/16	11 14/16	N/A
90	8 ft	569 15/16	179 3/16	446 9/16	144 15/16	301 10/16	121 6/16	11 14/16	N/A
105	None	491 9/16	179 3/16	350 3/16	144 15/16	205 3/16	139 6/16	11 14/16	N/A
105	4 ft	539 12/16	179 3/16	398 6/16	144 15/16	253 7/16	139 6/16	11 14/16	N/A
105	8 ft	587 15/16	179 3/16	446 9/16	144 15/16	301 10/16	139 6/16	11 14/16	N/A
120-150 (All Units Except High Heat Gas Models)	None	571 8/16	222 9/16	421 2/16	161 2/16	260	148 6/16	11 14/16	N/A
120-150 (All Units Except High Heat Gas Models)	4 ft	619 11/16	222 9/16	469 5/16	161 2/16	308 4/16	148 6/16	11 14/16	N/A
120-150 (All Units Except High Heat Gas Models)	8 ft	667 15/16	222 9/16	517 9/16	161 2/16	356 7/16	148 6/16	11 14/16	N/A
120-150 (High Heat Gas Models Only)	None	583 8/16	222 9/16	433 2/16	161 2/16	272	148 6/16	11 14/16	N/A

Tonnage	Blank Section	Lug Locations Air Handler Side				Lug Locations Condenser Side		Unit Width	
		C3	C4	C5	C6	D1	D2	M	N
90	None	138 9/16	151 6/16	272	339 11/16	16	112 7/16	139 13/16	143 8/16
90	4 ft	138 9/16	151 6/16	272	387 14/16	16	112 7/16	139 13/16	143 8/16
90	8 ft	138 9/16	151 6/16	272	436 1/16	16	112 7/16	139 13/16	143 8/16
105	None	138 9/16	151 6/16	272	339 11/16	16	130 7/16	139 13/16	143 8/16
105	4 ft	138 9/16	151 6/16	272	387 14/16	16	130 7/16	139 13/16	143 8/16
105	8 ft	138 9/16	151 6/16	272	436 1/16	16	130 7/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	None	155 2/16	167 5/16	294 14/16	410 10/16	16	139 7/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	4 ft	155 2/16	167 5/16	294 14/16	458 13/16	16	139 7/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	8 ft	155 2/16	167 5/16	294 14/16	507 1/16	16	139 7/16	139 13/16	143 8/16
120-150 (High Heat Gas Models Only)	None	155 2/16	167 5/16	294 14/16	422 10/16	16	139 7/16	139 13/16	143 8/16

Continued on next page

Table 71. Unit dimensions (in.)—THREE-PIECE unit air-cooled—WITHOUT energy recovery wheel (continued)

Tonnage	Blank Section	Unit Height			Return Fan	Exhaust Fan
		O	P	R	J	K
90	None	103 12/16	97 9/16	103 7/16	29 3/16	17
90	4 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
90	8 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
105	None	103 12/16	97 9/16	103 7/16	29 3/16	17
105	4 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
105	8 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
120-150 (All Units Except High Heat Gas Models)	None	103 12/16	97 9/16	103 7/16	29 3/16	17
120-150 (All Units Except High Heat Gas Models)	4 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
120-150 (All Units Except High Heat Gas Models)	8 ft	103 12/16	97 9/16	103 7/16	29 3/16	17
120-150 (High Heat Gas Models Only)	None	103 12/16	97 9/16	103 7/16	29 3/16	17

Table 72. Unit dimensions (in.)—THREE-PIECE unit air-cooled—WITH energy recovery wheel

Tonnage	Blank Section	Unit Dimensions						Lifting Lug Locations Air Handler Side	
		A	B	E	E1	E2	F	C1	C2
90	None	569 15/16	275 10/16	446 9/16	241 6/16	205 3/16	121 6/16	17 12/16	201 1/16
90	4 ft	618 3/16	275 10/16	494 13/16	241 6/16	253 7/16	121 6/16	17 12/16	201 1/16
90	8 ft	666 6/16	275 10/16	543	241 6/16	301 10/16	121 6/16	17 12/16	201 1/16
105	None	587 15/16	275 10/16	446 9/16	241 6/16	205 3/16	139 6/16	17 12/16	201 1/16
105	4 ft	636 3/16	275 10/16	494 13/16	241 6/16	253 7/16	139 6/16	17 12/16	201 1/16
105	8 ft	684 6/16	275 10/16	543	241 6/16	301 10/16	139 6/16	17 12/16	201 1/16
120-150 (All Units Except High Heat Gas Models)	None	667 15/16	318 15/16	517 9/16	257 8/16	260	148 6/16	17 12/16	204 7/16
120-150 (All Units Except High Heat Gas Models)	4 ft	716 2/16	318 15/16	565 12/16	257 8/16	308 4/16	148 6/16	17 12/16	204 7/16
120-150 (All Units Except High Heat Gas Models)	8 ft	764 5/16	318 15/16	613 15/16	257 8/16	356 7/16	148 6/16	17 12/16	204 7/16
120-150 (High Heat Gas Models Only)	None	679 15/16	318 15/16	529 9/16	257 8/16	272	148 6/16	17 12/16	204 7/16

Tonnage	Blank Section	Lug Locations						Unit Width	
		Air Handler Side				Condenser Side			
		C3	C4	C5	C6	D1	D2	M	N
90	None	234 13/16	247 13/16	368 7/16	436 2/16	16	112 7/16	139 13/16	143 8/16
90	4 ft	234 13/16	247 13/16	368 7/16	484 5/16	16	112 7/16	139 13/16	143 8/16
90	8 ft	234 13/16	247 13/16	368 7/16	532 8/16	16	112 7/16	139 13/16	143 8/16
105	None	234 13/16	247 13/16	368 7/16	436 2/16	16	130 7/16	139 13/16	143 8/16
105	4 ft	234 13/16	247 13/16	368 7/16	484 5/16	16	130 7/16	139 13/16	143 8/16
105	8 ft	234 13/16	247 13/16	368 7/16	532 8/16	16	130 7/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	None	252 12/16	263 12/16	391 5/16	507 1/16	16	139 7/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	4 ft	252 12/16	263 12/16	391 5/16	555 4/16	16	139 7/16	139 13/16	143 8/16
120-150 (All Units Except High Heat Gas Models)	8 ft	252 12/16	263 12/16	391 5/16	603 7/16	16	139 7/16	139 13/16	143 8/16
120-150 (High Heat Gas Models Only)	None	252 12/16	263 12/16	391 5/16	519 1/16	16	139 7/16	139 13/16	143 8/16

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Table 72. Unit dimensions (in.)—THREE-PIECE unit air-cooled—WITH energy recovery wheel (continued)

Tonnage	Blank Section	Unit Height			Return Fan	Exhaust Fan
		O	P	R	J	K
90	None	103 12/16	97 9/16	103 7/16	N/A	17
90	4 ft	103 12/16	97 9/16	103 7/16	N/A	17
90	8 ft	103 12/16	97 9/16	103 7/16	N/A	17
105	None	103 12/16	97 9/16	103 7/16	N/A	17
105	4 ft	103 12/16	97 9/16	103 7/16	N/A	17
105	8 ft	103 12/16	97 9/16	103 7/16	N/A	17
120-150 (All Units Except High Heat Gas Models)	None	103 12/16	97 9/16	103 7/16	N/A	17
120-150 (All Units Except High Heat Gas Models)	4 ft	103 12/16	97 9/16	103 7/16	N/A	17
120-150 (All Units Except High Heat Gas Models)	8 ft	103 12/16	97 9/16	103 7/16	N/A	17
120-150 (High Heat Gas Models Only)	None	103 12/16	97 9/16	103 7/16	N/A	17

Table 73. Unit dimensions (in.)—THREE-PIECE unit evaporative condensing—WITHOUT energy recovery wheel

Tonnage	Blank Section	Unit Dimensions						Lifting Lug Locations Air Handler Side	
		A	B	E	E1	E2	F	C1	C2
100/118	None	494 13/16	179 3/16	350 3/16	144 15/16	205 3/16	142 10/16	11 14/16	N/A
100/118	4 ft	543	179 3/16	398 6/16	144 15/16	253 7/16	142 10/16	11 14/16	N/A
100/118	8 ft	591 4/16	179 3/16	446 9/16	144 15/16	301 10/16	142 10/16	11 14/16	N/A
128-162 (All Units Except High Heat Gas Models)	None	565 12/16	222 9/16	421 2/16	161 2/16	260	142 10/16	11 14/16	N/A
128-162 (All Units Except High Heat Gas Models)	4 ft	613 15/16	222 9/16	469 5/16	161 2/16	308 4/16	142 10/16	11 14/16	N/A
128-162 (All Units Except High Heat Gas Models)	8 ft	662 3/16	222 9/16	517 9/16	161 2/16	356 7/16	142 10/16	11 14/16	N/A
128-162 (High Heat Gas Models Only)	None	577 12/16	222 9/16	433 2/16	161 2/16	272	142 10/16	11 14/16	N/A

Tonnage	Blank Section	Lug Locations						Unit Width	
		Air Handler Side				Condenser Side			
		C3	C4	C5	C6	D1	D2	M	N
100/118	None	138 9/16	151 6/16	272	339 11/16	16	133 11/16	139 13/16	143 8/16
100/118	4 ft	138 9/16	151 6/16	272	387 14/16	16	133 11/16	139 13/16	143 8/16
100/118	8 ft	138 9/16	151 6/16	272	436 1/16	16	133 11/16	139 13/16	143 8/16
128-162 (All Units Except High Heat Gas Models)	None	155 2/16	167 5/16	294 14/16	410 10/16	16	133 11/16	139 13/16	143 8/16
128-162 (All Units Except High Heat Gas Models)	4 ft	155 2/16	167 5/16	294 14/16	458 13/16	16	133 11/16	139 13/16	143 8/16
128-162 (All Units Except High Heat Gas Models)	8 ft	155 2/16	167 5/16	294 14/16	507 1/16	16	133 11/16	139 13/16	143 8/16
128-162 (High Heat Gas Models Only)	None	155 2/16	167 5/16	294 14/16	422 10/16	16	133 11/16	139 13/16	143 8/16

Continued on next page

Table 73. Unit dimensions (in.)—THREE-PIECE unit evaporative condensing—WITHOUT energy recovery wheel

Tonnage	Blank Section	Unit Height			Return Fan	Exhaust Fan
		O	P	R	J	K
100/118	None	103 12/16	97 9/16	102 12/16	29 3/16	17
100/118	4 ft	103 12/16	97 9/16	102 12/16	29 3/16	17
100/118	8 ft	103 12/16	97 9/16	102 12/16	29 3/16	17
128-162 (All Units Except High Heat Gas Models)	None	103 12/16	97 9/16	102 6/16	29 3/16	17
128-162 (All Units Except High Heat Gas Models)	4 ft	103 12/16	97 9/16	102 6/16	29 3/16	17
128-162 (All Units Except High Heat Gas Models)	8 ft	103 12/16	97 9/16	102 6/16	29 3/16	17
128-162 (High Heat Gas Models Only)	None	103 12/16	97 9/16	102 6/16	29 3/16	17

Table 74. Unit dimensions (in.)—THREE-PIECE unit evaporative condensing—WITH energy recovery wheel

Tonnage	Blank Section	Unit Dimensions						Lifting Lug Locations Air Handler Side	
		A	B	E	E1	E2	F	C1	C2
100/118	None	591 4/16	275 10/16	446 9/16	241 6/16	205 3/16	142 10/16	17 12/16	201 1/16
100/118	4 ft	639 7/16	275 10/16	494 13/16	241 6/16	253 7/16	142 10/16	17 12/16	201 1/16
100/118	8 ft	687 10/16	275 10/16	543	241 6/16	301 10/16	142 10/16	17 12/16	201 1/16
128-162 (All Units Except High Heat Gas Models)	None	662 3/16	318 15/16	517 9/16	257 8/16	260	142 10/16	17 12/16	204 7/16
128-162 (All Units Except High Heat Gas Models)	4 ft	710 6/16	318 15/16	565 12/16	257 8/16	308 4/16	142 10/16	17 12/16	204 7/16
128-162 (All Units Except High Heat Gas Models)	8 ft	758 10/16	318 15/16	613 15/16	257 8/16	356 7/16	142 10/16	17 12/16	204 7/16
128-162 (High Heat Gas Models Only)	None	674 3/16	318 15/16	529 9/16	257 8/16	272	142 10/16	17 12/16	204 7/16

Tonnage	Blank Section	Lug Locations						Unit Width	
		Air Handler Side				Condenser Side			
		C3	C4	C5	C6	D1	D2	M	N
100/118	None	234 13/16	247 13/16	368 7/16	436 2/16	16	133 11/16	139 13/16	143 8/16
100/118	4 ft	234 13/16	247 13/16	368 7/16	484 5/16	16	133 11/16	139 13/16	143 8/16
100/118	8 ft	234 13/16	247 13/16	368 7/16	532 8/16	16	133 11/16	139 13/16	143 8/16
128-162 (All Units Except High Heat Gas Models)	None	252 12/16	263 12/16	391 5/16	519 1/16	16	133 11/16	139 13/16	143 8/16
128-162 (All Units Except High Heat Gas Models)	4 ft	252 12/16	263 12/16	391 5/16	507 1/16	16	133 11/16	139 13/16	143 8/16
128-162 (All Units Except High Heat Gas Models)	8 ft	252 12/16	263 12/16	391 5/16	555 4/16	16	133 11/16	139 13/16	143 8/16
128-162 (High Heat Gas Models Only)	None	252 12/16	263 12/16	391 5/16	603 7/16	16	133 11/16	139 13/16	143 8/16

Tonnage	Blank Section	Unit Height			Return Fan	Exhaust Fan
		O	P	R	J	K
100-162	None	103 12/16	97 9/16	102 6/16	N/A	17
100-162	4 ft	103 12/16	97 9/16	102 6/16	N/A	17
100-162	8 ft	103 12/16	97 9/16	102 6/16	N/A	17

Table 75. Downflow/horizontal airflow configuration dimensions (in.) air-cooled (AC) and evaporative condensing (EC) without energy recovery wheel (ERW)

Tonnage AC/EC	Blank Section	Gas Heat	DOWNFLOW Opening Dimensions							
			Return Opening—with or without Exhaust Fan				Return Opening—with Return Fan			
			X1	Y1	W1	L1	X1	Y1	W1	L1
90-105/100-118	None	None	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
90-105/100-118	4 ft	None	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
90-105/100-118	8 ft	None	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
120-150/128-162	None	None	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
120-150/128-162	4 ft	None	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
120-150/128-162	8 ft	None	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
90-105/100-118	None	Low/Med	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
90-105/100-118	8 ft	Low/Med	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
120-150/128-162	None	Low/Med	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
120-150/128-162	8 ft	Low/Med	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16
120-150/128-162	None	High	14 13/16	8 14/16	48 3/16	121 15/16	14 13/16	42 14/16	48 3/16	53 14/16

Tonnage AC/EC	Blank Section	Gas Heat	DOWNFLOW Opening Dimensions				
			Supply Opening				
			X2 (One or Two-Piece Models)	X2 (Three-Piece Mocels)	Y2	W2	L2
90-105/100-118	None	None	256 1/16	275 6/16	13	47 14/16	102 8/16
90-105/100-118	4 ft	None	304 4/16	323 9/16	13	47 14/16	102 8/16
90-105/100-118	8 ft	None	352 8/16	371 12/16	13	47 14/16	102 8/16
120-150/128-162	None	None	320 13/16	346 4/16	13	47 14/16	102 8/16
120-150/128-162	4 ft	None	369	394 8/16	13	47 14/16	102 8/16
120-150/128-162	8 ft	None	417 3/16	442 11/16	13	47 14/16	102 8/16
90-105/100-118	None	Low/Med/High	256 1/16	275 6/16	13	47 14/16	102 8/16
90-105/100-118	8 ft	Low/Med/High	352 8/16	371 12/16	13	47 14/16	102 8/16
120-150/128-162	None	Low/Med	320 13/16	346 4/16	13	47 14/16	102 8/16
120-150/128-162	8 ft	Low/Med	417 3/16	442 11/16	13	47 14/16	102 8/16
120-150/128-162	None	High	320 13/16	346 4/16	13	59 14/16	102 8/16

Tonnage AC/EC	Blank Section	Gas Heat	HORIZONTAL Opening Dimensions							
			Return Side Opening				Return End Opening			
			X3	Y3	W3	H1	Y1	Y3	H3	L1
90-105/100-118	None	None	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
90-105/100-118	4 ft	None	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
90-105/100-118	8 ft	None	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
120-150/128-162	8 ft	None	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
90-105/100-118	None	Low/Med	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
90-105/100-118	8 ft	Low/Med	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
120-150/128-162	None	Low/Med	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
120-150/128-162	8 ft	Low/Med	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16
120-150/128-162	None	High	9 5/16	10 10/16	54 12/16	84 15/16	6 5/16	8 3/16	35 3/16	127 2/16

Continued on next page

Table 75. Downflow/horizontal airflow configuration dimensions (in.) air-cooled (AC) and evaporative condensing (EC) without energy recovery wheel (ERW) (continued)

Tonnage AC/EC	Blank Section	Gas Heat	HORIZONTAL Opening Dimensions				
			Supply Opening				
			X4 (One or Two-Piece Models)	X4 (Three-Piece Models)	Y4	W4	H2
90-105/100-118	None	None	254 12/16	274	10 10/16	54 12/16	84 15/16
90-105/100-118	4 ft	None	302 15/16	322 4/16	10 10/16	54 12/16	84 15/16
90-105/100-118	8 ft	None	351 2/16	370 7/16	10 10/16	54 12/16	84 15/16
120-150/128-162	None	None	319 8/16	345	10 10/16	54 12/16	84 15/16
120-150/128-162	4 ft	None	367 11/16	393 3/16	10 10/16	54 12/16	84 15/16
120-150/128-162	8 ft	None	415 15/16	441 6/16	10 10/16	54 12/16	84 15/16
90-105/100-118	None	Low/Med	254 12/16	274	10 10/16	54 12/16	66 11/16
90-105/100-118	8 ft	Low/Med	351 2/16	370 7/16	10 10/16	54 12/16	84 15/16
120-150/128-162	None	Low/Med	319 8/16	345	10 10/16	54 12/16	66 11/16
120-150/128-162	8 ft	Low/Med	415 15/16	441 6/16	10 10/16	54 12/16	84 15/16
120-150/128-162	None	High	319 8/16	345	10 10/16	66 12/16	66 11/16

Table 76. Downflow/horizontal airflow configuration dimensions (in.) air-cooled (AC) and evaporative condensing (EC) with energy recovery wheel

Tonnage AC/EC	Blank Section	Gas Heat	DOWNFLOW Opening Dimensions							
			Return Opening—with or without Exhaust Fan				Return Opening—with Return Fan			
			X1	Y1	W1	L1	X1	Y1	W1	L1
90-105/100-118	None	None	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
90-105/100-118	4 ft	None	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
90-105/100-118	8 ft	None	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
120-150/128-162	None	None	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
120-150/128-162	4 ft	None	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
120-150/128-162	8 ft	None	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
90-105/100-118	None	Low/Med	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
90-105/100-118	8 ft	Low/Med	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
120-150/128-162	None	Low/Med	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
120-150/128-162	8 ft	Low/Med	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A
120-150/128-162	None	High	82 3/16	8 14/16	49 10/16	121 15/16	N/A	N/A	N/A	N/A

Tonnage AC/EC	Blank Section	Gas Heat	DOWNFLOW Opening Dimensions				
			Supply Opening				
			X2 (One or Two-Piece Models)	X2 (Three-Piece Models)	Y2	W2	L2
90-105/100-118	None	None	352 8/16	371 12/16	13	47 14/16	102 8/16
90-105/100-118	4 ft	None	400 11/16	420	13	47 14/16	102 8/16
90-105/100-118	8 ft	None	448 15/16	468 3/16	13	47 14/16	102 8/16
120-150/128-162	None	None	417 4/16	442 11/16	13	47 14/16	102 8/16
120-150/128-162	4 ft	None	465 7/16	490 14/16	13	47 14/16	102 8/16
120-150/128-162	8 ft	None	513 10/16	539 2/16	13	47 14/16	102 8/16
90-105/100-118	None	Low/Med	352 8/16	371 12/16	13	47 14/16	102 8/16
90-105/100-118	8 ft	Low/Med	448 15/16	468 3/16	13	47 14/16	102 8/16
120-150/128-162	None	Low/Med	417 4/16	442 11/16	13	47 14/16	102 8/16
120-150/128-162	8 ft	Low/Med	513 10/16	539 2/16	13	47 14/16	102 8/16
120-150/128-162	None	High	417 4/16	442 11/16	13	59 14/16	102 8/16

Table 76. Downflow/horizontal airflow configuration dimensions (in.) air-cooled (AC) and evaporative condensing (EC) with energy recovery wheel (continued)

Tonnage	Blank Section	Gas Heat	HORIZONTAL Opening Dimensions[a][b]			
			Return Side Opening			
			X3	Y3	W3	H1
90-105/100-118	None	None	71 8/16	10 10/16	54 12/16	43 6/16
90-105/100-118	4 ft	None	71 8/16	10 10/16	54 12/16	43 6/16
90-105/100-118	8 ft	None	71 8/16	10 10/16	54 12/16	43 6/16
120-150/128-162	None	None	71 8/16	10 10/16	54 12/16	43 6/16
120-150/128-162	4 ft	None	71 8/16	10 10/16	54 12/16	43 6/16
120-150/128-162	8 ft	None	71 8/16	10 10/16	54 12/16	43 6/16
90-105/100-118	None	Low/Med	71 8/16	10 10/16	54 12/16	43 6/16
90-105/100-118	8 ft	Low/Med	71 8/16	10 10/16	54 12/16	43 6/16
120-150/128-162	None	Low/Med	71 8/16	10 10/16	54 12/16	43 6/16
120-150/128-162	8 ft	Low/Med	71 8/16	10 10/16	54 12/16	43 6/16
120-150/128-162	None	High	71 8/16	10 10/16	54 12/16	43 6/16

Tonnage AC/EC	Blank Section	Gas Heat	HORIZONTAL Opening Dimensions				
			Supply Opening				
			X4 (One or Two-Piece Models)	X4 (Three-Piece Models)	Y4	W4	H2
90-105/100-118	None	None	351 3/16	370 7/16	10 10/16	54 12/16	84 15/16
90-105/100-118	4 ft	None	399 6/16	418 11/16	10 10/16	54 12/16	84 15/16
90-105/100-118	8 ft	None	447 10/16	466 14/16	10 10/16	54 12/16	84 15/16
120-150/128-162	None	None	415 15/16	441 6/16	10 10/16	54 12/16	84 15/16
120-150/128-162	4 ft	None	464 2/16	489 10/16	10 10/16	54 12/16	84 15/16
120-150/128-162	8 ft	None	512 6/16	537 13/16	10 10/16	54 12/16	84 15/16
90-105/100-118	None	Low/Med	351 3/16	370 7/16	10 10/16	54 12/16	66 11/16
90-105/100-118	8 ft	Low/Med	447 10/16	466 14/16	10 10/16	54 12/16	84 15/16
120-150/128-162	None	Low/Med	415 15/16	441 6/16	10 10/16	54 12/16	66 11/16
120-150/128-162	8 ft	Low/Med	512 6/16	537 13/16	10 10/16	54 12/16	84 15/16
120-150/128-162	None	High	415 15/16	441 6/16	10 10/16	66 12/16	66 11/16

(a) On horizontal return with ERW units, the return end opening can be on the front, rear, or both sides of the unit and must be specified.
(b) ERW is not allowed w/ end return

Figure 38. Evaporative condenser water connection locations

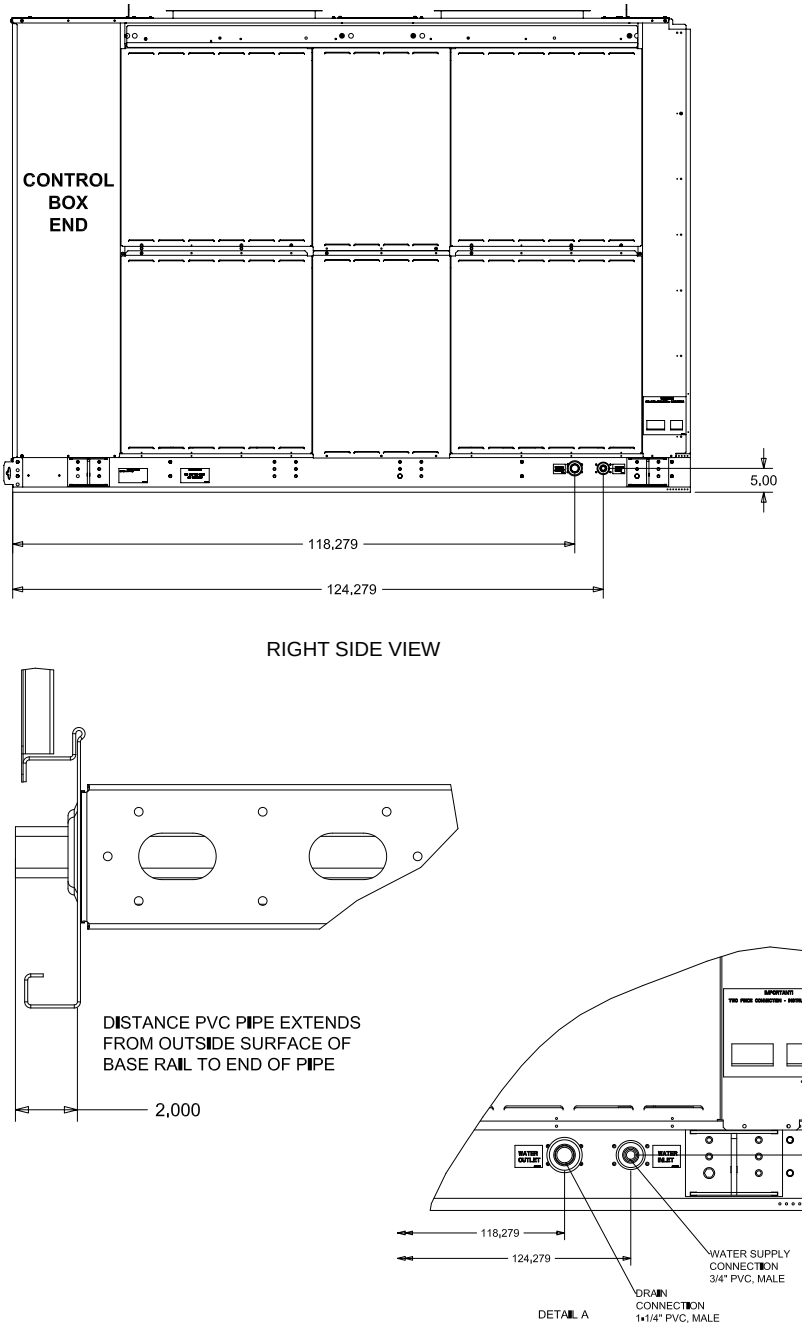
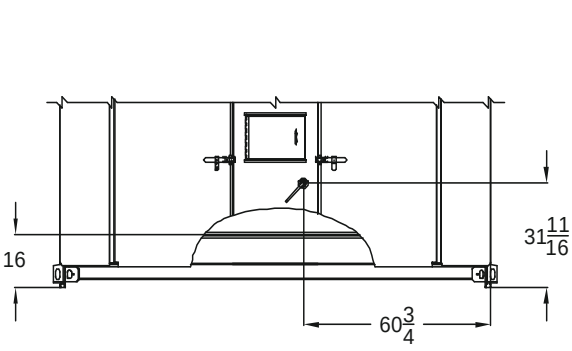
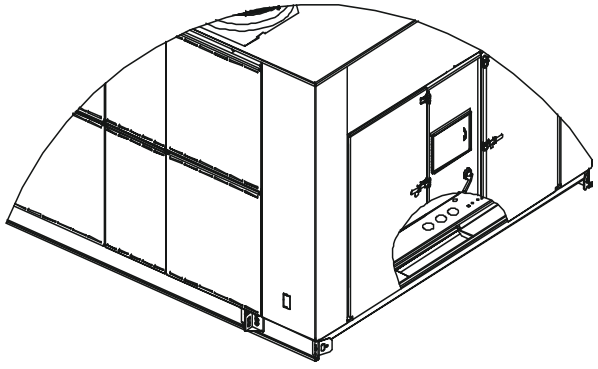


Figure 39. Electrical entry details/bottom view





Bottom View

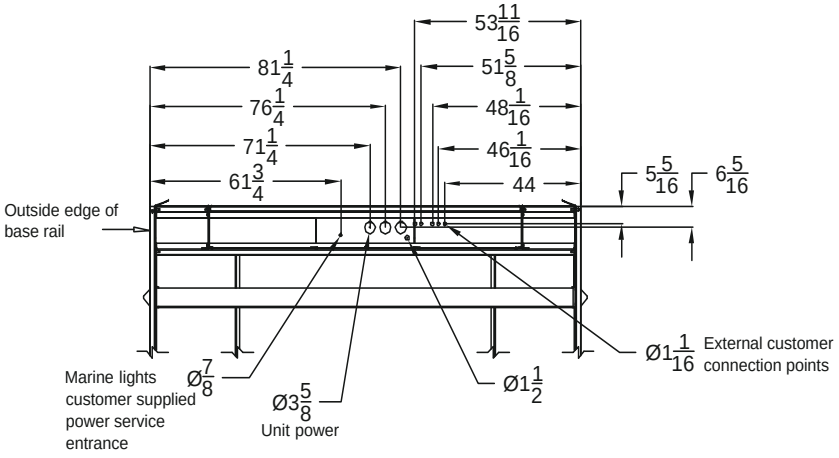
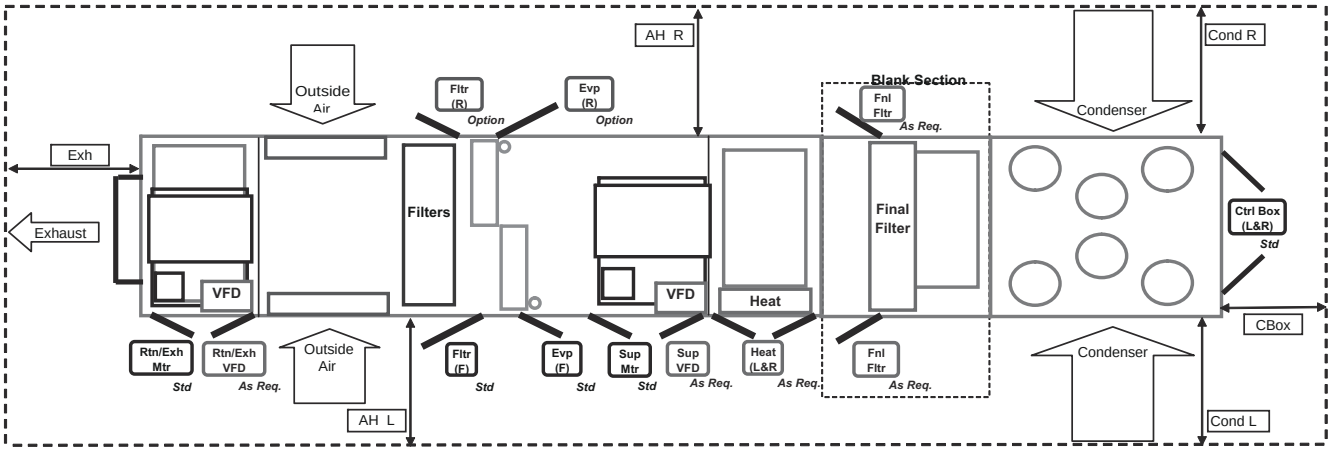


Figure 40. Minimum required clearance[a]



(a) Unit drawing is representative only and may not accurately depict all models.

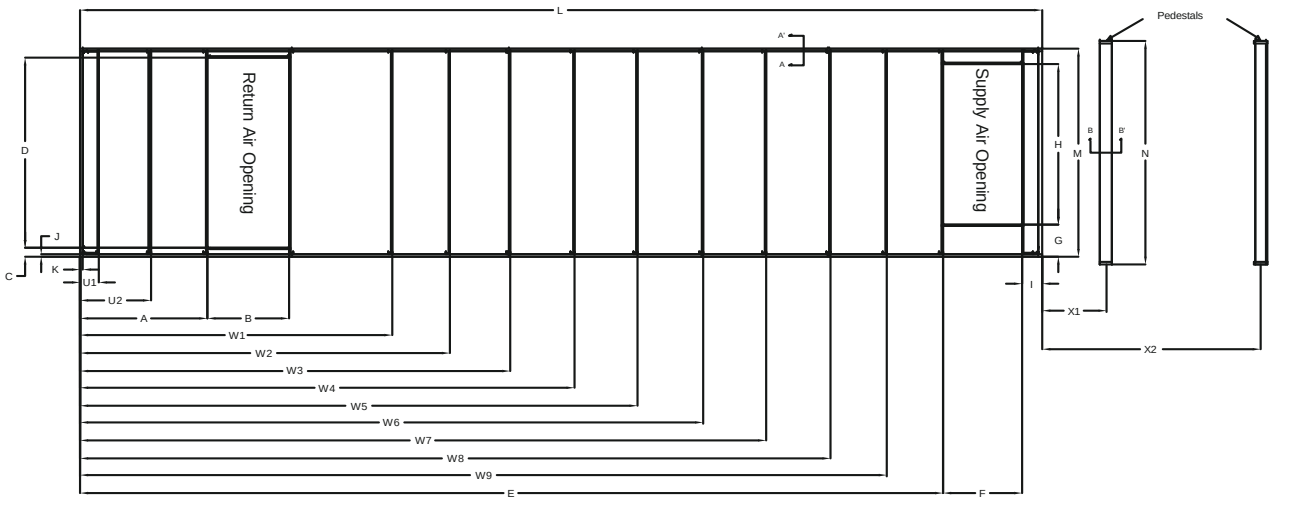
Table 77. Minimum required clearance

		Unit Option Selection (Door Swing Ft. and In.)									
		Standard		VFD		Heat		Two-side Access			
Door Location	Availability	90-118	120-162	Return / Exhaust	Supply	Electric / Hot Water / Steam	Reheat	90-118	120-162	Final Filter	Energy Recovery
Exhaust/Ret Motor	Std	2' 2"	2' 2"	*	*	*	*	*	*	*	
Exhaust/Ret VFD	As Req.	*	*	2' 2"	*	*	*	*	*	*	
ERW Fltr[a] (L & R) (F)	Option	*	*	*	*	*	*	*	*	*	2' 2"
ERW Fltr(a) (L & R) (R)	Option	*	*	*	*	*	*	*	*	*	2' 2"
Filter (Front)	Std	2' 8"	2' 8"	*	*	*	*	*	*	*	
Filter (Rear)	Option	*	*	*	*	*	*	2' 2"	2' 8"	*	
Evap (Front)	Std	2' 2"	2' 2"	*	*	*	*	*	*	*	
Evap (Rear)	Std	2' 8"	*	*	*	*	*	*	*	*	
or Evap (Rear)	Option	*	*	*	*	*	2' 2	*	2' 2"	*	
Supply Motor	Std	2' 8"	2' 8"	*	*	*	*	*	*	*	
Supply VFD	As Req.	*	*	*	2' 2"	*	*	*	*	*	
Heat (Left & Right)	As Req.	*	*	*	*	2' 2"	*	*	*	*	
Final Filter (Front)	As Req.	*	*	*	*	*	*	*	*	2' 2"	
Final Filter (Rear)	As Req.	*	*	*	*	*	*	*	*	2' 2"	
Control Box (L & R)	Std	3' 2"	3' 2"	*	*	*	*	*	*	*	

Minimum Required Clearance (Ft.)					
AH_L	AH_R	Exh	Cond_L	Cond_R	Control Box
8'	8'	8'	8'	8'	6'

(a) See Unit Dimensions for Energy Recovery Wheel location.

Figure 41. Optional roof curb (downflow)



Note: All dimensions measured from top flange of roof curb

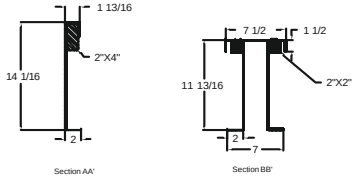


Table 78. Downflow roof curb dimensions ONE- or TWO-PIECE unit without energy recovery wheel (in.)

Tonnage AC/EC	Blank Section	Dimensions									
		A	B	C	D	E	F	G	H	I	J
90-105/100-118	None	11 15/16	49 8/16	5 15/16	123	253 2/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	4 ft	11 15/16	49 8/16	5 15/16	123	301 5/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	8 ft	11 15/16	49 8/16	5 15/16	123	349 9/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (All Except High Heat Gas Models)	None	11 15/16	49 8/16	5 15/16	123	317 14/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	4 ft	11 15/16	49 8/16	5 15/16	123	366 2/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	8 ft	11 15/16	49 8/16	5 15/16	123	414 5/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (High Heat Gas Models Only)	None	11 15/16	49 8/16	5 15/16	123	317 14/16	61 8/16	20 15/16	104	11 15/16	1 13/16

Tonnage AC/EC	Blank Section	Dimensions		
		K	L	M
90-105/100-118	None	1 13/16	314 9/16	134 14/16
90-105/100-118	4 ft	1 13/16	362 12/16	134 14/16
90-105/100-118	8 ft	1 13/16	411	134 14/16
120-150/128-162 (All Except High Heat Gas Models)	None	1 13/16	379 5/16	134 14/16
120-150/128-162	4 ft	1 13/16	427 8/16	134 14/16
120-150/128-16	8 ft	1 13/16	475 12/16	134 14/16
120-150/128-162 (High Heat Gas Models Only)	None	1 13/16	391 5/16	134 14/16

Tonnage AC/EC	Blank Section	Cross Member Location							
		W1	W2	W3	W4	W5	W6	W7	W8
90-105/100-118	None	103 6/16	145 11/16	183 6/16	218 4/16	N/A	N/A	N/A	N/A
90-105/100-118	4 ft	103 6/16	145 11/16	187 15/16	231 10/16	266 8/16	N/A	N/A	N/A
90-105/100-118	8 ft	103 6/16	145 11/16	189 15/16	234 3/16	279 13/16	314 11/16	N/A	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	103 6/16	145 11/16	179 6/16	213 1/16	248 2/16	289	N/A	N/A
120-150/128-162	4 ft	103 6/16	145 11/16	181 11/16	217 12/16	255 3/16	296 6/16	331 4/16	N/A
120-150/128-162	8 ft	103 6/16	145 11/16	185 4/16	224 13/16	265 12/16	304 7/16	344 9/16	379 7/16
120-150/128-162 (High Heat Gas Models Only)	None	103 6/16	145 11/16	179 5/16	213 1/16	248 2/16	289	N/A	N/A

Table 79. Downflow roof curb dimensions ONE or TWO-piece unit with energy recovery wheel (in.)

Tonnage AC/EC	Blank Section	Dimensions									
		A	B	C	D	E	F	G	H	I	J
90-105/100-118	None	79 5/16	50 12/16	5 15/16	123	349 9/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	4 ft	79 5/16	50 12/16	5 15/16	123	397 12/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	8 ft	79 5/16	50 12/16	5 15/16	123	446	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (All Except High Heat Gas Models)	None	79 5/16	50 12/16	5 15/16	123	414 5/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	4 ft	79 5/16	50 12/16	5 15/16	123	462 8/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	8 ft	79 5/16	50 12/16	5 15/16	123	510 12/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (High Heat Gas Models Only)	None	79 5/16	50 12/16	5 15/16	123	414 5/16	49 8/16	20 15/16	104	11 15/16	1 13/16

Tonnage AC/EC	Blank Section	Dimensions		
		K	L	M
90-105/100-118	None	1 13/16	411	134 14/16
90-105/100-118	4 ft	1 13/16	459 3/16	134 14/16
90-105/100-118	8 ft	1 13/16	507 6/16	134 14/16
120-150/128-162 (All Except High Heat Gas Models)	None	1 13/16	476 1/16	134 14/16
120-150/128-162	4 ft	1 13/16	524 4/16	134 14/16
120-150/128-162	8 ft	1 13/16	572 8/16	134 14/16
120-150/128-162 (High Heat Gas Models Only)	None	1 13/16	488 1/16	134 14/16

Tonnage AC/EC	Blank Section	Cross Member Location									
		U1	U2	W1	W2	W3	W4	W5	W6	W7	W8
90-105/100-118	None	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	279 13/16	314 11/16	N/A	N/A	N/A
90-105/100-118	4 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	284 6/16	328	362 14/16	N/A	N/A
90-105/100-118	8 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	286 5/16	330 9/16	376 4/16	411 2/16	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	275 12/16	309 8/16	344 9/16	385 7/16	N/A
120-150/128-162	4 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	278 2/16	314 3/16	351 9/16	392 12/16	427 10/16
120-150/128-162	8 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	281 10/16	321 3/16	362 3/16	400 14/16	441
120-150/128-162 (High Heat Gas Models Only)	None	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	275 12/16	309 8/16	344 9/16	385 7/16	N/A

Tonnage AC/EC	Blank Section	W9
90-105/100-118	None	N/A
90-105/100-118	4 ft	N/A
90-105/100-118	8 ft	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	N/A
120-150/128-162	4 ft	N/A
120-150/128-162	8 ft	475 14/16
120-150/128-162 (High Heat Gas Models Only)	None	N/A

Table 80. Downflow roof curb dimensions THREE-piece unit without energy recovery wheel (in.)

Tonnage AC/EC	Blank Section	Dimensions									
		A	B	C	D	E	F	G	H	I	J
90-105/100-118	None	11 15/16	49 8/16	5 15/16	123	272 7/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	4 ft	11 15/16	49 8/16	5 15/16	123	320 10/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	8 ft	11 15/16	49 8/16	5 15/16	123	368 13/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (All Except High Heat Gas Models)	None	11 15/16	49 8/16	5 15/16	123	343 6/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	4 ft	11 15/16	49 8/16	5 15/16	123	391 9/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	8 ft	11 15/16	49 8/16	5 15/16	123	439 13/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (High Heat Gas Models Only)	None	11 15/16	49 8/16	5 15/16	123	343 6/16	61 8/16	20 15/16	104	11 15/16	1 13/16

Tonnage AC/EC	Blank Section	Dimensions		
		K	L	M
90-105/100-118	None	1 13/16	333 13/16	134 14/16
90-105/100-118	4 ft	1 13/16	382 1/16	134 14/16
90-105/100-118	8 ft	1 13/16	430 4/16	134 14/16
120-150/128-162 (All Except High Heat Gas Models)	None	1 13/16	404 13/16	134 14/16
120-150/128-162	4 ft	1 13/16	453	134 14/16
120-150/128-162	8 ft	1 13/16	501 3/16	134 14/16
120-150/128-162 (High Heat Gas Models Only)	None	1 13/16	416 13/16	134 14/16

Tonnage AC/EC	Blank Section	Cross Member Location									
		U1	U2	W1	W2	W3	W4	W5	W6	W7	W8
90-105/100-118	None	N/A	N/A	103 6/16	145 11/16	202 11/16	237 9/16	N/A	N/A	N/A	N/A
90-105/100-118	4 ft	N/A	N/A	103 6/16	145 11/16	187 15/16	250 14/16	285 12/16	N/A	N/A	N/A
90-105/100-118	8 ft	N/A	N/A	103 6/16	145 11/16	189 15/16	234 3/16	299 1/16	333 15/16	N/A	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	N/A	N/A	103 6/16	145 11/16	179 6/16	213 1/16	273 10/16	314 8/16	N/A	N/A
120-150/128-162	4 ft	N/A	N/A	103 6/16	145 11/16	181 11/16	217 12/16	255 3/16	321 13/16	356 11/16	N/A
120-150/128-162	8 ft	N/A	N/A	103 6/16	145 11/16	185 4/16	224 13/16	265 12/16	304 7/16	370 1/16	404 15/16
120-150/128-162 (High Heat Gas Models Only)	None	N/A	N/A	103 6/16	145 11/16	179 6/16	213 1/16	273 10/16	314 8/16	N/A	N/A

Tonnage AC/EC	Blank Section	W9
90-105/100-118	None	N/A
90-105/100-118	4 ft	N/A
90-105/100-118	8 ft	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	N/A
120-150/128-162	4 ft	N/A
120-150/128-162	8 ft	N/A
120-150/128-162 (High Heat Gas Models Only)	None	N/A

Table 81. Downflow roof curb dimensions THREE-piece unit with energy recovery wheel (in.)

Tonnage AC/EC	Blank Section	Dimensions									
		A	B	C	D	E	F	G	H	I	J
90-105/100-118	None	79 5/16	50 12/16	5 15/16	123	368 13/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	4 ft	79 5/16	50 12/16	5 15/16	123	417 1/16	49 8/16	20 15/16	104	11 15/16	1 13/16
90-105/100-118	8 ft	79 5/16	50 12/16	5 15/16	123	465 4/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (All Except High Heat Gas Models)	None	79 5/16	50 12/16	5 15/16	123	439 12/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	4 ft	79 5/16	50 12/16	5 15/16	123	488	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162	8 ft	79 5/16	50 12/16	5 15/16	123	536 3/16	49 8/16	20 15/16	104	11 15/16	1 13/16
120-150/128-162 (High Heat Gas Models Only)	None	79 5/16	50 12/16	5 15/16	123	439 12/16	61 8/16	20 15/16	104	11 15/16	1 13/16

Tonnage AC/EC	Blank Section	Dimensions		
		K	L	M
90-105/100-118	None	1 13/16	430 4/16	134 14/16
90-105/100-118	4 ft	1 13/16	478 8/16	134 14/16
90-105/100-118	8 ft	1 13/16	526 11/16	134 14/16
120-150/128-162 (All Except High Heat Gas Models)	None	1 13/16	501 8/16	134 14/16
120-150/128-162	4 ft	1 13/16	549 12/16	134 14/16
120-150/128-162	8 ft	1 13/16	597 15/16	134 14/16
120-150 (High Heat Gas Models Only)	None	1 13/16	513 8/16	134 14/16

Tonnage AC/EC	Blank Section	Cross Member Location									
		U1	U2	W1	W2	W3	W4	W5	W6	W7	W8
90-105/100-118	None	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	299 1/16	333 15/16	N/A	N/A	N/A
90-105/100-118	4 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	284 6/16	347 5/16	382 3/16	N/A6	N/A
90-105/100-118	8 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	286 5/16	330 9/16	395 8/16	430 6/16	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	275 12/16	309 8/16	370 1/16	410 15/16	N/A
120-150/128-162	4 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	278 2/16	314 3/16	351 9/16	418 4/16	453 2/16
120-150/128-162	8 ft	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	281 10/16	321 3/16	362 3/16	400 14/16	466 7/16
120-150 (High Heat Gas Models Only)	None	11 15/16	43 15/16	168 10/16	204 11/16	242 1/16	275 12/16	309 8/16	370 1/16	410 15/16	N/A

Tonnage AC/EC	Blank Section	W9
90-105/100-118	None	N/A
90-105/100-118	4 ft	N/A
90-105/100-118	8 ft	N/A
120-150/128-162 (All Except High Heat Gas Models)	None	N/A
120-150/128-162	4 ft	N/A
120-150/128-162	8 ft	501 5/16
120-150 (High Heat Gas Models Only)	None	N/A

Table 82. Pedestal dimensions

Tonnage	One-, Two-, Three-Piece Unit	Condenser Type	Pedestal Dimensions		
			N	X1	X2
90	1	Air-Cooled	145 4/16	N/A	93 1/16
90	2 or 3	Air-Cooled	145 4/16	36 3/16	111 3/16
105	1	Air-Cooled	145 4/16	N/A	111 1/16
105	2 or 3	Air-Cooled	145 4/16	36 3/16	129 3/16
120-150	1	Air-Cooled	145 4/16	N/A	117 1/16
120-150	2 or 3	Air-Cooled	145 4/16	40 3/16	136 3/16
100-162	2 or 3	Evaporative Condensing	145 4/16	36 3/16	129 3/16

Figure 42. Field installed zone sensor—programmable night setback sensor (BAYSENS119*)

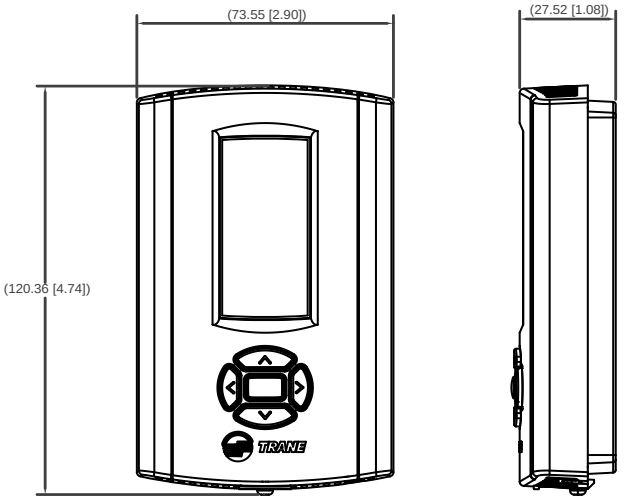


Figure 43. Field installed zone sensor—dual setpoint, manual/automatic changeover with system function lights (BAYSENS110*), without LED function lights (BAYSENS108*), single setpoint without LED function lights (BAYSENS106)

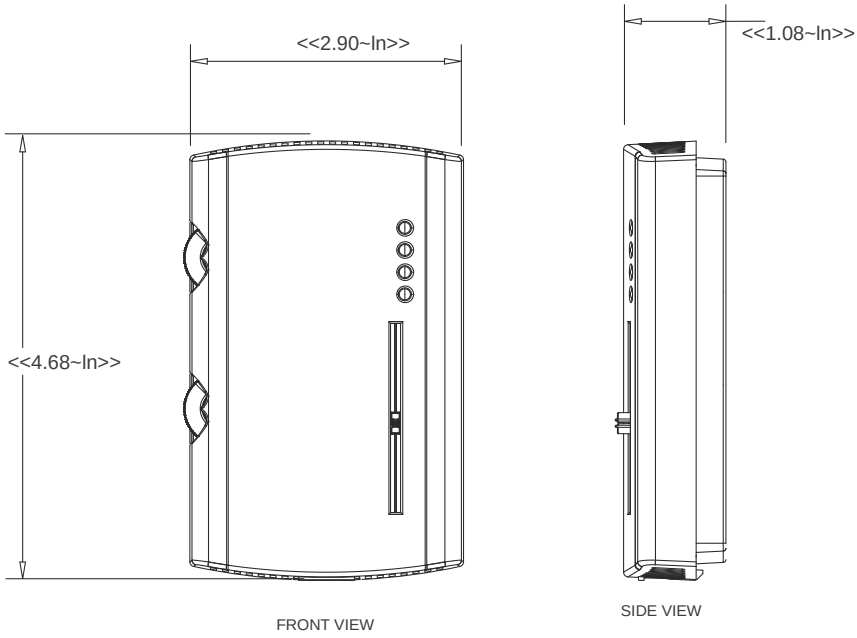
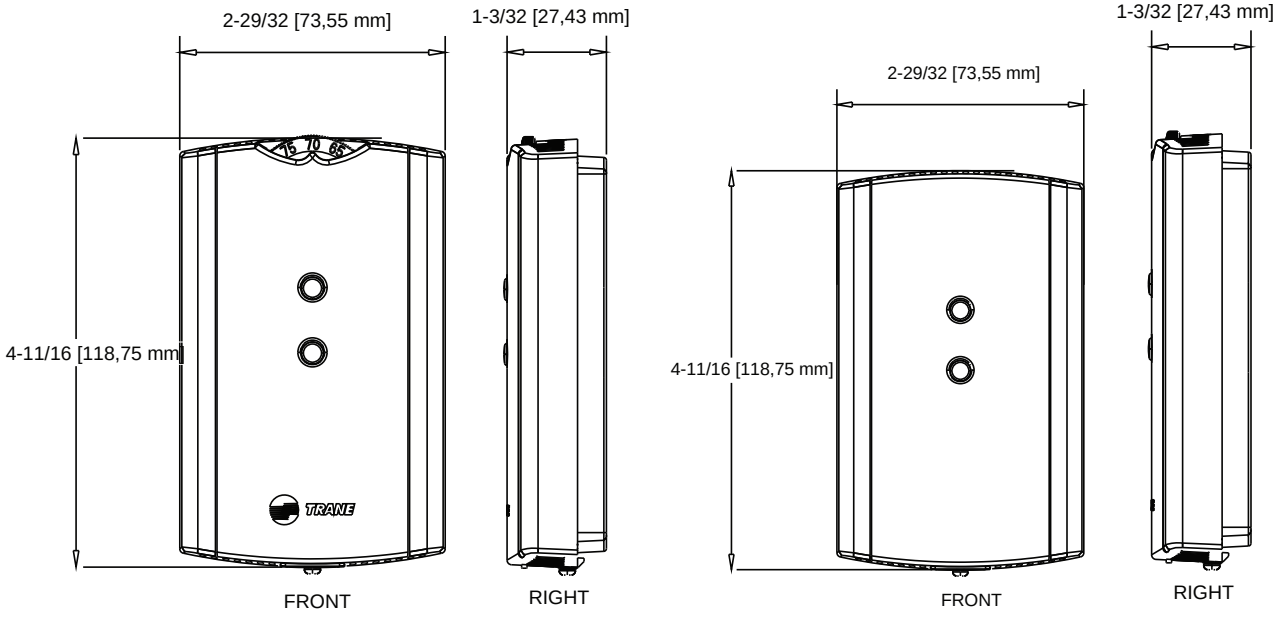


Figure 44. Field installed zone sensor—with timed override button and local setpoint adjustment (BAYSENS074*), with timed override only (BAYSENS073*), sensor only (BAYSENS077*)



Note: *Remote sensors are available for use with all zone sensors to provide remote sensing capabilities.*

Figure 45. Field installed temperature sensor (BAYSENS016*)

Figure 46. Field installed remote minimum position potentiometer control (BAYSTAT023*)

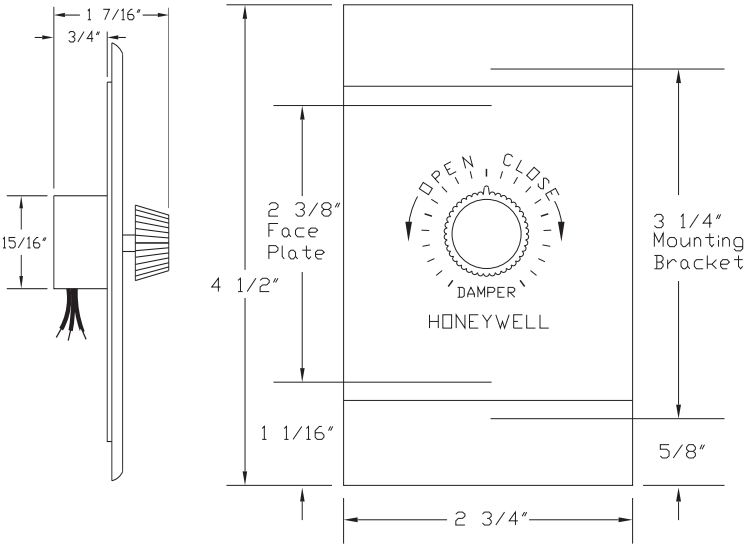
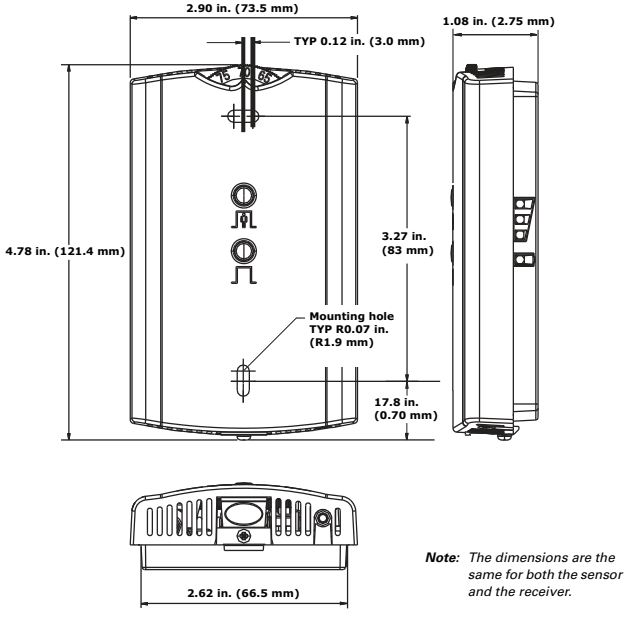


Figure 47. Field installed zone sensor—wireless



Note: *The dimensions are the same for both the sensor and the receiver.*

Weights

Table 83. Approximate operating weights (lbs.)

Air-Cooled Units			Evaporative Condensing Units		
Nominal Tons	Unit (Minimum)	Roof Curb (Minimum)	Nominal Tons	Unit (Minimum)	Roof Curb (Minimum)
90	13731	907	100	18430	1055
105	14792	907	118	18941	1055
120	16939	1040	128	21362	1194
130	17241	1040	140	21348	1194
150	17923	1040	162	21470	1194

Notes:
1. Weights shown for air-cooled units include the following features: standard coils, 0-25% Outside Air, throwaway filters, low CFM supply fan, minimum motor sizes, constant volume, 460 XL, No heat. Weights shown for Evaporative-condensing units include high-capacity evaporator coil and the weight of the extra structure associated with a two piece unit. Add 1300 lbs for installed sump base water weight for evaporative condenser total operating weight.
2. Weights shown represent approximate operating weights and have a + 5% accuracy. To calculate weight for a specific unit configuration, utilize TOPSS or contact the local Trane sales representative. ACTUAL WEIGHTS ARE STAMPED ON THE UNIT NAMEPLATE.

Table 84. Component weights (lbs)

	90/100		105/118		120/128		130/140		150/162	
	Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight
Refrigeration										
Compressor Assy.	-	1126	-	1344	-	1562	-	1616	-	1670
Air-Cooled Condensing Coil (Al)	-	623	-	722	-	1049	-	1224	-	924
Evaporative Condensing Coil[(a)]		4566		4329		4129		4109		4029
Evap Coil - Std. Cap	-	1034	-	1300	-	1664	-	1892	-	2564
Evap Coil - Hi. Cap.	-	1382	-	1462	-	2564	-	2496	-	N/A
Reheat Coil & Tubing	-	292	-	294	-	367	-	367	-	367
Replacable Core Filter Driers	-	26	-	25	-	35	-	35	-	35
HGBP	-	46	-	49	-	53	-	53	-	53
Supply Fan Assembly										
Supply Fan & Fan Board Assy. - Low CFM	25"	1159	32"	1361	32"	1361	32"	1361	32"	1361
Supply Fan & Fan Board Assy. - Std. CFM	36"	1490	36"	1490	40"	1653	40"	1653	40"	1653
Belt Guard	-	116	-	116	-	116	-	116	-	116
Supply VFD (50 hp and below)	-	233	-	233	-	233	-	233	-	233
Supply VFD (60-100 hp)	-	284	-	284	-	284	-	284	-	284
Supply-Exh Fan Motor - 15 hp	-	181	-	181	-	181	-	181	-	181
Supply-Exh Fan Motor - 20 hp	-	206	-	206	-	206	-	206	-	206
Supply-Exh Fan Motor - 25 hp	-	358	-	358	-	358	-	358	-	358
Supply-Exh Fan Motor - 30 hp	-	413	-	413	-	413	-	413	-	413
Supply-Exh Fan Motor - 40 hp	-	495	-	495	-	495	-	495	-	495
Supply-Exh Fan Motor - 50 hp	-	604	-	604	-	604	-	604	-	604
Supply-Exh Fan Motor - 60 hp	-	776	-	776	-	776	-	776	-	776
Supply-Exh Fan Motor - 75 hp	-	879	-	879	-	879	-	879	-	879
Supply-Exh Fan Motor - 100 hp	-	1102	-	1102	-	1102	-	1102	-	1102

continued on next page

Table 84. Component weights (lbs) (continued)

	90/100		105/118		120/128		130/140		150/162	
	Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight
Return/Exhaust Fan Assembly										
Return Fan & Dampers - Low CFM	36"	2294	36"	2294	36"	2294	36"	2294	36"	2294
Return Fan & Dampers - Std. CFM	40"	2343	40"	2343	44"	2445	44"	2445	44"	2445
Exhaust Fan & Dampers - Low CFM	25"	889	28"	979	28"	979	28"	979	28"	979
Exhaust Fan & Dampers - Std. CFM	28"	979	32"	1429	32"	1429	32"	1429	32"	1429
Belt Guard	-	119	-	119	-	119	-	119	-	119
Exhaust VFD (50 hp and below)	-	244	-	244	-	244	-	244	-	244
Exhaust VFD (60-100 hp)	-	295	-	295	-	295	-	295	-	295
Exh Fan Motor - 7.5 hp	-	160		160	-	160	-	160	-	160
Exh Fan Motor - 10 hp	-	181	-	181	-	181	-	181	-	181
Exh Fan Motor - 15 hp	-	206	-	206	-	206	-	206	-	206
Exh Fan Motor - 20 hp	-	206	-	206	-	206	-	206	-	206
Exh Fan Motor - 25 hp	-	358	-	358	-	358	-	358	-	358
Exh Fan Motor - 30 hp	-	413	-	413	-	413	-	413	-	413
Exh Fan Motor - 40 hp	-	495	-	495	-	495	-	495	-	495
Exh Fan Motor - 50 hp	-	604	-	604	-	604	-	604	-	604
Exh Fan Motor - 60 hp	-	776	-	776	-	776	-	776	-	776
Heat										
Gas Heat Low	0.85 M	690	0.85M	690	1.1M	840	1.1M	840	1.1M	840
Gas Heat Med	1.1 M	840	1.1M	840	1.8M	1150	1.8M	1150	1.8M	1150
Gas Heat High	1.8 M	1150	1.8M	1150	2.5M	1398[b]	2.5M	1398 [2]	2.5M	1398 [2]
Electric Heat	-	485	-	485	-	485	-	485	-	485
Steam Heat Low	-	753	-	753	-	802	-	802	-	802
Steam Heat High	-	821	-	821	-	886	-	886	-	886
Hot Water Heat Low	-	773	-	773	-	841	-	841	-	841
Hot Water Heat High	-	818	-	818	-	897	-	897	-	897
Filters										
Filter Rack - Throwaway Filters	-	181	-	181	-	191	-	191	-	191
Filter Rack - Bag Filters	-	395	-	395	-	395	-	395	-	395
Filter Rack - Cartridge Filters	-	662	-	662	-	662	-	662	-	662
Final Filters - Bag Filters	-	392	-	392	-	392	-	392	-	392
Final Filters - Cartridge Filters w/ 2" pre-filter	-	607	-	607	-	607	-	607	-	607
Final Filters - Cartridge Filters w/ 4" pre-filter	-	638	-	638	-	638	-	638	-	638
Final Filters - High Temp. Cartridge	-	669	-	669	-	669	-	669	-	669
Final Filters - HEPA	-	1777	-	1777	-	1777	-	1777	-	1777
Final Filters - HEPA High Temp.	-	1839	-	1839	-	1839	-	1839	-	1839

Continued on next page

Table 84. Component weights (lbs) (continued)

	90/100		105/118		120/128		130/140		150/162	
	Size	Weight	Size	Weight	Size	Weight	Size	Weight	Size	Weight
Outside Air										
0-25% Damper	-	637	-	637	-	699	-	699	-	699
Econ	-	760	-	760	-	865	-	865	-	865
Econ w/ Air Measure	-	724	-	724	-	807	-	807	-	807
ERW, Low CFM w/ Econ(c)	-	3307	-	3307	-	3518	-	3681	-	3681
ERW, High CFM w/ Econ(3)	-	3545	-	3514	-	3756	-	3756	-	3756
ERW, Low CFM w/ Econ & Air Measure(3)	-	3487	-	3487	-	3727	-	3890	-	3890
ERW, High CFM w/ Econ & Air Measure(3)	-	3725	-	3694	-	3965	-	3965	-	3965
Cabinet										
Cabinet	-	8097	-	8315	-	9473	-	9473	-	9473
Cabinet - 4' Blank Section	-	935	-	935	-	901	-	901	-	901
Cabinet - 8' Blank Section	-	1709	-	1709	-	1682	-	1682	-	1682
Control Box - Main										
Control Box - Main	-	519	-	519	-	519	-	519	-	519
Convenience Outlet	-	36	-	36	-	36	-	36	-	36
Low Ambient VFD	-	57	-	57	-	57	-	57	-	57
2/3 Piece Unit Adder										
2 Piece Adder	-	406	-	406	-	406	-	406	-	406
3 Piece Adder	-	1157	-	1157	-	1236	-	1236	-	1236
Air-Cooled Condenser										
Total Weight of Condenser Section	-	4637	-	5201	-	6015	-	6075	-	6092

(a) Evaporative Condenser weight includes the additional weight in the cabinet structure. coil weight and additional refrigerant charge. Add 1300 lbs for operating sump base water weight.
(b) 2.5M includes weight associated with 12" of cabinet length.
(c) Energy Recovery includes weight associated w/ 96" of cabinet length.

Table 85. Roof curb weights — air-cooled (AC) and evaporative condensing (EC)

Tonnage AC/EC	Energy Recovery Wheel	Blank Section	One-Piece Unit(a)	Two/Three-Piece Unit
90-105/100-118	No	None	907	1055
90-105/100-118	No	4 ft	988	1136
90-105/100-118	No	8 ft	1069	1217
90-105/100-118	Yes	None	1093	1240
90-105/100-118	Yes	4 ft	1174	1321
90-105/100-118	Yes	8 ft	N/A	1401
120-150/128-162 (All Units Except High Heat Gas models)	No	None	1040	1194
120-150/128-162 (All Units Except High Heat Gas models)	No	4 ft	1122	1275
120-150/128-162 (All Units Except High Heat Gas models)	No	8 ft	N/A	1357
120-150/128-162 (High Heat Gas Models Only)	No	None	1055	1209
120-150/128-162 (All Units Except High Heat Gas models)	Yes	None	N/A	1378
120-150/128-162 (All Units Except High Heat Gas models)	Yes	4 ft	N/A	1459
120-150/128-162 (All Units Except High Heat Gas models)	Yes	8 ft	N/A	1540
120-150/128-162 (High Heat Gas Models Only)	Yes	None	N/A	1393

(a) One-piece available with air-cooled condenser only.

Table 86. Design Specials

Cabinet
4' or 8' blank in Pre DX or Return Position
Economizer
Title 24 Rated Ultra Low Leak Economizer w FDD
Efficiency
Hybrid High and Hybrid Ultra High Efficiency (120T)
Electrical
50Hz Exhuast/Return VFD
Dual Power
Energy Recovery
Energy recovery with Horizontal Return
Fans
Direct Drive Plenum Supply Fan
Propeller Exhaust Fan
Piezometer Rings
Heat
LP Gas heat
Seismic
OSHPD

Mechanical Specs

General

Units shall be specifically designed for outdoor rooftop installation on a roof curb and be completely factory assembled and tested, piped, internally wired, fully charged with compressor oil and shipped in one, two or three-pieces for field reassembly into a single unit. Single piece units shall be fully charged.

Units shall be available for direct expansion cooling only, or direct expansion cooling with natural gas, electric, hot water or steam heating. Filters, outside air system, exhaust air system, optional nonfused disconnect switches and all operating and safety controls shall be furnished factory installed.

All units shall be cULus approved and factory run tested. Select configurations shall also be compliant with IBC Seismic requirements. In select configurations, cooling capacity shall be rated in accordance with ARI Standard 360. All units shall have decals and tags to aid in service and indicate caution areas. Electrical diagrams shall be printed on long life water resistant material and shall ship attached to control panel doors.

Casing

Exterior panels shall be zinc coated galvanized steel, phosphatized and painted with a slate grey air-dry finish durable enough to withstand a minimum of 500 hours consecutive salt spray application in accordance with standard ASTM B117. Screws shall be magnigard coated.

Refrigeration components and compressor shall be accessible through removable louvered panels as standard. Unit air handling section shall be laminated double-wall construction with polyurethane foam core injected between sheet metal panels and liners. Insulation value shall be R8. All interior surfaces shall be suitable for cleaning per ASHRAE 62. All access doors and panels shall have neoprene gaskets. Unit base shall be watertight with heavy gauge formed load bearing members and curb overhang. Unit lifting lugs shall accept chains or cables for rigging. Lifting lugs shall also serve as unit tie down points.

Access Doors

Access doors shall be hinged with a single, exterior mounted, height and tension adjustable, handle to provide positive latching at three points. Access doors shall provide a door stop mechanism to latch the door in the open position to prevent unsafe door closure by wind.

Doors of laminated double wall construction with a polyurethane foam core between the exterior sheet metal pane and the interior liner, with an insulating value of R8 shall be provided on the air handlers serviceable compartments such as return/exhaust fan, filters, evaporator coil, and blank sections. Two single wall doors shall be provided for access to the control panel.

Blank Sections

A four or eight foot blank section of laminated double wall construction with a polyurethane foam core between the exterior sheet metal panel and the interior liner, with an insulating value of R8 shall be provided with similarly built, hinged, access doors on either side

Two- or Three-Piece Construction

In order to facilitate lifting and rigging a two- or three-piece option is available. The condenser section contains the refrigerant charge and associated valving to make recoupling the unit on the roof curb easy. An electrical box is provided on the condenser to seamlessly and quickly reconnect the electrical power and control systems. Transition panels are provided for the integrity on the recoupled unit.

Note: *Multi-piece units are shipped with nitrogen and must be field charged with R-410A.*

Airflow Path

Unit shall have downflow discharge conditioned air path or horizontal discharge. Return airflow path shall be either upflow or horizontal through the side or the end.

Burglar Bars

A grate system shall be installed in supply and return air duct connection areas on non-horizontal airflow path units to minimize unwanted intrusion into duct systems.

Belt Guard

Supply and exhaust fans shall have a universal size belt guard to accommodate any applicable drive configuration. The guard totally encloses the drive system and is provided with a two-piece removable front panel for servicing. Return fan guards shall be individually sized with a single piece removable panel for servicing.

Refrigeration System

Compressors

Compressors shall be direct-drive, hermetic, scroll-type compressors with centrifugal-type oil pumps. Each compressor has a crankcase heater to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Discharge and liquid line service valves are standard on each refrigerant circuit, as well as liquid moisture indicator/sight glass.

Supply Fan

Standard or low airflow supply fan shall have a single fan assembly with double width, double inlet, airfoil fan, motor and fixed pitch sheave drive. All fans shall be statically and dynamically balanced for the operating envelop. It shall be tested in the factory. Supply fans shall be test run in unit as part of the unit test. Fan operating envelop rpm shall be below first critical speed. Fan shafts shall be mounted on two grease lubricated ball bearings designed for 200,000 hours average life.

Extended grease lines shall allow greasing of bearings from section base rail. Fan motor and fan assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. Entire assemblies shall be completely isolated from unit by two-inch deflection spring isolators.

Evaporator Coil

Internally enhanced copper tubing of ½-inch O.D. shall be mechanically bonded to heavy-duty aluminum fins of configured design. All coils shall be equipped with thermal expansion valves and factory pressure and leak tested. A double sloped galvanized or stainless steel drain pan shall be provided to drain condensate to both sides of the unit.

Stainless Steel Drain Pans

In order to enhance longevity and cleaning ease, optional Stainless Steel Drain Pans are available under the evaporator coil area.

Hot Gas Bypass

The hot gas bypass option shall consist of valves, piping and controls that are all included on circuit 2 to allow operation at low airflow, avoiding coil frosting and damage to compressor. When suction pressure falls below valve adjustable setpoint, the valves modulate hot gas to the inlet of the evaporator.

Filter Drier

Removable core filter driers are optionally available and installed on each refrigeration circuit. For easy access, the filter driers are conveniently located in the condenser section close to the periphery of the unit.

Suction Service Valves

Each compressor is optionally equipped with a suction service valve in order to facilitate compressor servicing.

Air-Cooled Condensing

Air-Cooled Condenser Coil

Condenser coils shall have all-aluminum, Microchannel coils. All coils shall be leak tested at the factory to ensure pressure integrity. The condenser coil is pressure tested to 650 psig. Subcooling circuit(s) shall be provided as standard.

Air-Cooled Condenser Fans and Motors

All condenser fans shall be vertical discharge, direct drive fans, statically balanced, with steel blades and zinc plated steel hubs. Condenser fan motors shall be totally enclosed three-phase motors with permanently lubricated ball bearings, built-in current and thermal overload protection and weather tight slingers over motor bearings.

Corrosion Protected Condenser Coil

All aluminum Microchannel condenser coil protection shall consist of a corrosion resistant coating that shall withstand ASTM B117 Salt Spray test for 6,000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2,400 hours. This coating shall be added after coil construction covering all tubes, headers and fin edges, therefore providing optimum protection in more corrosive environments

Evaporative Condensing

Evaporative Condensing-Housing

The water basin, corner posts and roof shall be constructed with 304 Stainless Steel. Water basin shall be lined with FRP coating to make it watertight. The side panels and sliding access doors shall be constructed of corrosion and UV resistant, low density fiber glass. Housing shall also have 4 lifting holes, one in each corner to handle the unit with crane.

Evaporative Condensing - Condenser Coils

Durable copper 5/16" OD, 0.022 wall thickness serpentine tubing provides strength and resilience for expansion.

Evaporative Condensing - Condenser Fan

The fan motors have variable speed capability which shall be controlled by factory-installed unit controller.

Evaporative Condensing - Pump

Minimal maintenance sump pump is fully accessible through the evaporative-condenser access panel. Water is pumped at min 80 GPM. The pump shall be powered by 460 V / 3 Phase.

Evaporative Condensing- Sump Float Level Switch

The minimum level float switch shall protect the pump from running dry by turning the fill valve ON and allowing the sump to fill to a predefined minimum level. The maximum level float switch shall prevent the overfilling of the sump and water wastage by turning the fill valve OFF when a predefined maximum level is reached in the sump. Minimum and maximum float switched shall be permanently affixed to the water basin and shall not need any field adjustment.

Water Treatment

To simplify field installation, unit shall have hookups for water treatment devices. Water treatment by a water treatment expert is required for all evaporative condenser units to ensure proper equipment life, product performance and operation. If a Dolphin WaterCare System is used water must be maintained by a water treatment professional throughout the unit life of the Air Handling System.

Dolphin WaterCare System

The Dolphin WaterCare System focuses on minimizing scale build up and managing biological agents with no chemicals. An electronic signal is sent through a PVC pipe at a constant rate, inducing electromagnetic fields. The electromagnetic fields interact with colloidal particles causing precipitation, which does not adhere to the pipe, and is removed through the sump purge. Bacteria and corrosion in the water system is controlled and kept to minimal levels by their incorporation into the precipitate and low frequency radiation generated through the electronic pulsing.

Controls

Unit shall be completely factory wired with necessary control and contactor pressure lugs or terminal block for power wiring. Units shall provide an internal location for a non-fused disconnect with external handle for safety. Unit mounted microprocessor controls shall provide anti-short cycle timing for compressors to provide a high level of machine protection.

Unit Controller

DDC microprocessor controls shall be provided to control all unit functions. The control system shall be suitable to control CV or VAV applications. The controls shall be factory installed and mounted in the main control panel. All factory installed controls shall be fully commissioned (run tested) at the factory. The unit shall have a Human Interface Panel with a 16 key keypad, a 2 line X 40 character clear English display as standard to provide the operator with full adjustment and display of control data functions. The unit controls shall be used as a stand-alone controller, or as part of a building management system involving multiple units.

1. The unit shall be equipped with a complete microprocessor control system. This system shall consist of temperature and pressure (thermistor and transducer) sensors, printed circuit boards (modules), and a unit mounted Human Interface Panel. Modules (boards) shall be individually replaceable for ease of service. All microprocessors, boards and sensors shall be factory mounted, wired and tested.

   The microprocessor boards shall be standalone DDC controls not dependent on communications with an on-site PC or a Building Management Network. The microprocessors shall be equipped with onboard diagnostics, indicating that all hardware, software and interconnected wiring are in proper operating condition.

   The modules (boards) shall be protected to prevent RFI and voltage transients from affecting the board circuits. All field wiring shall be terminated at separate, clearly marked terminal strip. Direct field wiring to the I/O boards is not acceptable. The microprocessor's memory shall be non-volatile EEPROM type requiring no battery or capacitive backup, while maintaining all data.
2. Zone sensors shall be available in several combinations with selectable features depending on sensor.
3. The Human Interface Panel keypad display character format shall be 40 characters x 2 lines. The character font shall be 5 x 7 dot matrix plus cursor. The display shall be Supertwist Liquid Crystal Display (LCD) with blue characters on a gray/green background which provides high visibility and ease of interface. The display format shall be in clear English.
4. The keypad shall be equipped with 16 individual touch-sensitive membrane key switches. The switches shall be divided into four separate sections and be password protected from change by unauthorized personnel. The six main menus shall be STATUS, SETPOINTS, DIAGNOSTICS, SETUP, CONFIGURATION and SERVICE MODE.
5. Microprocessor control system shall provide Loss of Refrigerant Charge diagnostics to warn of a slightly undercharged situation followed by a warning and a lock out of an undercharged circuit for overall unit performance and compressor protection.
6. The Human Interface Panel shall provide refrigerant superheat reading for each circuit to assist the service technician in troubleshooting.

Control Options

Remote Human Interface Panel

Remote Human Interface Panel (RHI) option can perform all the same functions as unit mounted Human Interface Panel, except for the Service Mode. Up to 4 rooftop units can be monitored and controlled with a single RHI Panel. This panel uses the same attractive enclosure as the Tracker building control panel. With features such as a 2 line X 40 character clear English display, a red LED light to indicate an alarm condition (alarm also shown on the two line display), a simple 16 key keypad that is used in conjunction with the display to prompt the infrequent user when making desired changes and an attractive hinged door makes the RHI very suitable for mounting on any wall. The RHI can be mounted inside a building, up to 5000 feet from the unit. The RHI is wired to the IPCB mounted in the rooftop with twisted wire pair communication wiring and 24V control wiring.

Trane LonTalk Communication Interface Module (LCI-I)

The LCI-I provides an interface to a Tracer Summit system or other control system that supports LonTalk and shall be factory installed, allowing for control and monitoring of the unit through a RS485, two-wire communication link.

Trane BACnet Communication Interface Module (BCI-I)

The BCI-I provides an interface to Tracer SC or a 3rd party control system that supports BACnet and shall be factory or field installed, allowing for control and monitoring of the unit through a RS485, two-wire communication link.

Wireless Comm Interface - Field Installed

Trane Wireless Comm interface – Provides wireless communication between the Tracer SC, Tracer Unit Controllers and BACnet Communication Interface (BCI) modules.

Low Ambient Unit Operation-Variable Frequency Drives VFDs

The low ambient option allows the unit to operate down to 0°F. The VFDs will be located in an enclosure inside the service side corner post that is adjacent to the main control box. The VFD keypads and displays will be accessible through a standard door that will allow "touch-safe" access to the VFDs. VFD protection fuses will be accessible through a second door below the VFD access door.

Low Ambient Unit Operation-575 Volt Units

The low ambient option allows the unit to operate down to 0°F. Units configured with a 575V power requirement and low ambient unit operation will require the use of step-down transformers. Additional 3-phase transformers and transformer fuses will be required to step the voltage down to a 460V operating voltage. The VFDs and the condenser fan motors controlled by the VFDs will all be 460V operating devices

Generic Building Automation System Module (GBAS 0-5 VDC)

Provided for those cases where non-Tracer building management system is used. The GBAS module option provides a binary input for Demand Limiting, four (4) analog inputs for setpoint adjustment and five (5) relay outputs for diagnostic reporting. Inputs can use a potentiometer or 0-5 VDC signal.

Generic Building Automation System Module (GBAS 0-10 VDC)

Option used to provide broad control capabilities for building automation systems other than Trane's Tracer system. The GBAS module provides a binary input for Demand Limiting, four (4) analog inputs for setpoint adjustment and four (4) analog outputs as well as one (1) relay output for diagnostic reporting. Inputs can use a potentiometer or 0-10 VDC signal.

Inter-Processor Communication Bridge (IPCB)

This optional module provides an amplified and filtered version of the IPC link for connection to a Remote Human Interface Panel. Each rooftop that is tied into a Remote Human Interface Panel must have an IPCB installed into it.

Rapid Restart

Option shall provide immediate start up upon power failure. A backup generator is required on site before unit start up. Rapid Restart will begin immediately after recovery from a power loss and work by restarting the compressors and supply fan quickly to provide full cooling within two to three minutes.

System Control Options

Constant Volume (CV)

Provided with all the necessary controls to operate rooftop from a zone sensor, including CV microprocessor unit control module, a microprocessor compressor controller and a unit mounted Human Interface Panel.

Variable Air Volume (VAV) Supply Air Temperature control

Provided with all the necessary controls to operate a VAV rooftop from the discharge air temperature, including discharge air microprocessor controller and discharge air sensor. The microprocessor controller coordinates the economizer control and the stages of cooling with zone or outdoor air reset capabilities and an adjustable control band to fine-tune the control to specific applications.

VAV Supply Air Temperature Control with Variable Frequency Drives w/o Bypass

Provided with all necessary controls to operate a VAV rooftop from the discharge air temperature, including discharge air microprocessor controller and discharge air sensor. The microprocessor controller coordinates the economizer control and the stages of cooling with discharge air temperature reset capabilities. Includes factory installed and tested VFDs to provide supply fan motor speed modulation. VFD receives 0-10 VDC from the unit microprocessor based upon supply static pressure and causes the drive to accelerate or decelerate as required to maintain the supply static pressure setpoint.

VAV Supply Air Temperature Control with Variable Frequency Drives and Bypass

Bypass control provides full nominal airflow in the event of drive failure.

Single Zone Variable Air Volume

Single zone VAV option shall be provided with all necessary controls to operate a rooftop unit based on maintaining two temperature setpoints; the discharge air and zone. Option shall include factory-installed variable frequency drive (VFD) to provide supply fan motor speed modulation. During One Zone VAV cooling, the unit will maintain zone cooling setpoint by modulating the supply fan speed more or less to meet zone load demand, and the unit will maintain discharge temperature to the discharge cooling setpoint by modulating economizer if available and staging dx cooling.

Electrical System

Power Supply

Air-cooled rooftops are available with 460 or 575 voltage, 3 phase 60 hertz power supply and 380 voltage, 3 phase 50 hertz power supply (Evaporative Condenser models available in 460 voltage, 3 phase, 60 hertz power supply only).

Convenience Outlet

A 15A, 115V Ground Fault Interrupter convenience outlet shall be factory installed and wired and powered from a factory mounted transformer. A unit mounted, non-fused disconnect with internal handle is furnished with the factory powered convenience outlet.

Non-Fused Disconnect Switch

An external handle mounted on the control box door shall be provided to disconnect unit power with the control box door closed for safety.

Phase and Voltage Monitor

Phase monitor is standard on all IntelliPak II units. Protects 3-phase equipment from phase loss, phase reversal, phase imbalance, high operating temperatures and low voltage. Any fault condition will produce a Failure Indicator LED, and send the unit into an emergency stop condition. cULus approved.

Unit Interrupt Rating (Short Circuit Current Rating-SCCR)

An optional 65,000 Amp rating (480V) and 25,000 Amp rating (600V) shall be applied to the unit enclosure using a non-fused circuit breaker for disconnect switch purposes. Fan motors, compressors, and electric heat circuits shall be provided with series rated circuit breakers that will provide the unit rated level of protection.The unit shall be marked with approved cULus markings and will adhere to cULus regulations.

Marine Lights (Customer Powered)

A 120V master light switch shall be factory installed in the main unit control box for lighting control. The master switch shall be wired into an isolated terminal block with access for customer provided service. Marine light fixtures shall be supplied with 150W incandescent bulbs. Marine light fixtures shall be placed in the Supply Section (2), Outside Air Section (1), Return Section (1), and Extended Casing Section (1) for units without Heat.

Supply/Exhaust/Return Motors

Supply, exhaust/return motors are either open drip-proof or totally enclosed fan cooled (TEFC). All 60 Hz motors meet the Energy Independence and Security Act of 2007 (EISA). All 50 Hz supply, exhaust/ return motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Motors with internal Shaft grounding rings can be selected for use with VFD applications to provide a conductive discharge path away from the motor bearings to ground.

Filters

General

Filter options shall mount integral within the unit and be accessible by a hinged access door with a single point latching device.

Pre-evaporator Coil Filter Options

No Filters (Two-inch Nominal Thickness Throwaway Filter Rack Only)

Shall provide a galvanized steel filter rack (less filter media) with filter channels to handle a complete set of two-inch nominal thickness throwaway filters to accommodate applications which require field supplied filters.

No Filters (Bag or Cartridge Filter Rack with Throwaway Prefilter Rack Only)

Shall provide a galvanized steel filter rack (less filter media) to handle a complete set of two-inch or four-inch (depending on airflow) nominal thickness throwaway prefilters and 7/8" actual header thickness bag or cartridge filters to accommodate applications which require field supplied filters.

MERV 8 Throwaway Filters (Standard)

Shall be provided as standard-U.L. Class 2, two-inch nominal thickness, high efficiency pleated media filters rated MERV 8 per ASHRAE 52.2. Filters shall be provided mounted in a galvanized steel filter rack.

MERV 15, 90-95 Percent Bag Filters Option

Nineteen-inch deep bag filters shall be U.L. Class 2 and have synthetic media mounted to a 7/8" nominal thickness header frame. These bag filters shall have an efficiency rating of MERV 15 per ASHRAE 52.2. To ensure maximum bag filter life two-inch prefilters shall be included with the bag filters. Filters shall be mounted in a galvanized steel filter rack.

MERV 14, 90-95 Percent Cartridge Filters Option

Twelve-inch deep cartridge filters shall be U.L. Class 1 and be mounted with a 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch (or four-inch, depending on the application) prefilters shall be included with the cartridge filters. Filters shall be mounted in a galvanized steel filter rack.

MERV 14, 90-95 Percent, Low Pressure Drop, Totally Incinerable, Cartridge

Twelve-inch deep cartridge filter shall be U.L. Class 2 and mounted with a rigid 7/8" nominal thickness header frame. These low pressure drop cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life two-inch or four-inch prefilters (depending on airflow) shall be included with the high-flow, cartridge filters. Filters shall be mounted in a galvanized steel filter rack.

Final Filters Options (Available Only on Units with Blank Section)

Final filter section filter options shall mount integral within the blank section unit casing and be accessible by hinged access doors.

MERV 15, 90-95 Percent, Bag, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Nineteen-inch deep bag filters shall be U.L. Class 2 and have synthetic media mounted to a 7/8" nominal thickness header frame. These bag filters shall have an efficiency rating of MERV 15 per ASHRAE 52.2. To ensure maximum bag final filter life two-inch, MERV 8 prefilters shall be included with the bag filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 14, 90-95 Percent, Cartridge, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Twelve-inch deep cartridge filters shall be U.L. Class 1 and be mounted with a 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge filter life, two-inch, MERV 8 prefilters shall be included with the cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 14, 90-95 Percent, Low Pressure Drop, Totally Incinerable, Cartridge,

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Twelve-inch deep cartridge filter shall be U.L. Class 2 and mounted with a rigid 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge final filter life four-inch, MERV 8 prefilters shall be included with these cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 14, 90-95 Percent, High Temperature Rated, Cartridge, Final Filter Option

Note: *Available on gas and electric heat units with eight-foot blank section casing only.*

Twelve-inch deep cartridge filters shall be U.L. Class 1 and be mounted in a galvanized steel casing with a 7/8" nominal thickness header frame. These cartridge filters shall have an efficiency rating of MERV 14 per ASHRAE 52.2. To ensure maximum cartridge final filter life high temperature rated two-inch, MERV 8 prefilters shall be included with the cartridge filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 17, 99.97 Percent, Standard Temperature Rated, HEPA, Final Filter Option

Note: *Available on cooling only units with four or eight-foot blank section, as well as steam and hot water units with eight-foot blank section, unit casing only.*

Twelve-inch deep HEPA filters shall be U.L. Class 1 and be mounted in a galvanized steel casing. These filters have an efficiency rating of MERV 17 per ASHRAE 52.2 and an efficiency of 99.97% on a 0.3 micron DOP particle size. To ensure maximum HEPA final filter life two-inch, MERV 8 prefilters shall be included with the HEPA final filters. Filters shall be mounted in a galvanized steel filter frame bank.

MERV 17, 99.97 Percent, High Temperature Rated, HEPA, Final Filter Option

Note: *Available on gas and electric heat units with eight-foot blank section casing only.*

Twelve-inch deep HEPA filters shall be U.L. Class 1 and be mounted in a galvanized steel casing. These filters have an efficiency rating of MERV 17 per ASHRAE 52.2 and an efficiency of 99.97% on a 0.3 micron DOP particle size. To ensure maximum HEPA final filter life high temperature rated two-inch, MERV 8 prefilters shall be included with the HEPA final filters. Filters shall be mounted in a galvanized steel filter frame bank.

Exhaust Air

General

Exhaust air options shall include no relief, 100 percent modulating exhaust fan and 100 percent modulating exhaust fan with direct space building pressurization control. Exhaust fans shall be either standard or low airflow

No Relief (Standard)

Relief air opening shall be sealed with panel and made watertight.

100 Percent Modulating Exhaust Fan Option

Fan design shall be double width, double inlet forward-curved type. Fan shall be mounted on a shaft with fixed sheave drive. All fans shall be dynamically balanced and tested in factory before being installed in unit. It shall be test run in unit as part of unit test.

Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings as applicable designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail.

Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts. The entire assembly shall be completely isolated from unit with 2-inch spring isolation. Discharge dampers at unit outlet shall modulate exhaust airflow in response to OA damper position.

The fan shall operate when economizer damper is open greater than minimum position. Discharge dampers at fan outlet shall modulate in response to economizer damper position on Constant Volume (CV) rooftops.

100 Percent Modulating Exhaust Fan with Statitrac Control Option

Fan design shall be double width, double inlet forward-curved type. Fan shall be mounted on a shaft with fixed sheave drive. All fans shall be dynamically balanced and tested in factory before being installed in unit. Exhaust fan shall be test run as part of unit final run test.

Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail.

Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts.The entire assembly shall be completely isolated from unit with 2-inch spring isolators. For both CV and VAV rooftops, the 100 percent modulating exhaust discharge damper (or VFD) shall be modulated in response to building pressure.

A differential pressure control system, (Statitrac), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure.The FC exhaust fan shall be turned on when required to lower building static pressure setpoint.

The (Statitrac) control system shall then modulate the discharge dampers (or VFD) to control the building pressure to within the adjustable, specified deadband that shall be adjustable at the Human Interface Panel. Optional bypass can be factory installed to provide full nominal airflow in the event of a drive failure.

Return Air

General

Return air options shall include 100 percent modulating return fan and 100 percent modulating return with direct space building pressurization control. Return fans shall be either standard or low airflow.

100 Percent Modulating Return Fan

A single width plenum fan with airfoil blade shall be mounted on a shaft with fixed sheave drive. The fan shall be dynamically balanced for the operating envelop and tested in factory before being installed in unit.The plenum fan shall be test run in unit as part of unit test. Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail.

Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts.The entire assembly shall be completely isolated from unit with 2-inch spring isolators. Discharge dampers at unit outlet shall modulate relief airflow in response to OA / return air damper position.The return fan VFD shall operate in conjunction with the supply fan.

100 Percent Modulating Return Fan with Statitrac Control Option

A single width plenum fan with airfoil blade shall be mounted on a shaft with fixed sheave drive. The fan shall be dynamically balanced for the operating envelop and tested in factory before being installed in unit.The plenum fan shall be test run as part of unit final run test. Fan operating envelop rpm shall be below first critical speed. Fan shaft shall be mounted on two grease lubricated ball or roller bearings designed for 200,000-hour average life. Extended grease lines shall be provided to allow greasing of bearings from section base rail.

Fan motor and assembly shall be mounted on common base to allow consistent belt tension with no relative motion between fan and motor shafts.The entire assembly shall be completely isolated from unit with 2-inch spring isolators. The 100 percent modulating relief damper shall be modulated in response to building pressure. A differential pressure control system, (Statitrac), shall use a differential pressure transducer to compare indoor building pressure to outdoor ambient atmospheric pressure.

The Statitrac control system shall modulate the discharge dampers to control the building pressure to within the adjustable, specified deadband that shall be adjustable at the Human Interface Panel. The return fan VFD shall modulate in response to return duct static pressure. Optional bypass can be factory installed to provide full nominal airflow in the event of a drive failure.

Outside Air

General

Three outside air options: 0 to 25 percent motorized controlled outside air, 0-100 percent fully modulating economizer, and 0-100 percent fully modulating economizer with outside air measurement.

0-25 Percent Motorized Outside Air Damper Option

0-25 percent motorized outside air damper option shall include an outside air opening with moisture eliminator and motorized position damper for drawing up to 25 percent outside air. The damper position will be adjustable at the Human Interface Panel.

0-100 Percent Modulating Economizer Option

Operated through the primary temperature controls to automatically utilize OA for "free" cooling. Automatically modulated return and OA dampers shall maintain proper temperature in the conditioned space. Economizer shall be equipped with an automatic lockout when the outdoor high ambient temperature is too high for proper cooling. Minimum position control shall be standard and adjustable at the Human Interface Panel or with a remote potentiometer or through the building management system. A spring return motor shall ensure closure of OA dampers during unit shutdown or power interruption. Mechanical cooling shall be available to aid the economizer mode at any ambient. Standard economizer dampers shall have a leakage rate of 20 CFM/ft^2 at 1.0 in W.C. pressure difference.

Low Leak, Standard Ultra Low Leak, and AMCA 1A Ultra Low Leak Economizer Dampers Options

Low leak dampers shall be provided with chlorinated polyvinyl chloride gasketing added to the damper blades and rolled stainless steel jamb seals to the sides of the damper assembly. The low leak dampers shall have a leakage rate of 10 CFM/ft^2 (AMCA Class 2) at 1.0 in W.C. pressure difference.

Standard ultra low leak damper will have added sealing under the jam seals and in the frame. The ultra low leak dampers shall have a leakage rate of 4 CFM/ft^2 (AMCA Class 1) at 1.0 in W.C. pressure difference.

Note: *Based on testing completed in accordance with AMCA Standard 500D.*

Ultra Low Leak, AMCA 1A Economizer

The AMCA 1A rated Ultra Low Leak Economizer option shall be provided with parallel operating, horizontal airfoil blades and spring-return actuators (to the fresh air closed, return air open position). The economizer, including linkages, actuators, and if ordered the optional Traq, shall have a 5 year limited warranty and functional life of 60,000 opening and closed cycles. Dampers shall be AMCA 511 Class 1A certified with a maximum leakage rate of 3 CFM/sq-ft at 1.0 in WC pressure differential.

Economizer frame and 6" wide blades shall be galvanized steel. Blade edge seals shall be Ruskiprene (-72°F to + 275°F) and jamb seals shall be compressible, flexible metal.

The economizer fresh air damper shall include an adjustable linkage to allow for field damper balance of pressure drop between 100% fresh and 100% return airflow paths. The adjustable linkage is used to limit the fresh air damper maximum wide open stroke.

Fault Detection and Diagnostic

Fault Detection and Diagnostic (FDD) control will also be provided with Ultra Low Leak Economizers. FDD control monitors the commanded position of the economizer compared to the feedback position of the damper. If the damper position is outside +/- 10% of the commanded position, a diagnostic is generated.

Intellipak units ordered with Ultra Low Leak Economizers will be listed on the California Energy Commission Registry for factory compliance with Title 24 Economizer and FDD requirements. A label will be applied to the unit identifying construction with the Ultra Low Leak Economizer and FDD controls.

Economizer Control with Comparative Enthalpy

Used with the outside air economizer, two enthalpy sensors are provided to compare total heat content of the indoor air and outdoor air to determine the most efficient air source when economizing.

Economizer Control with Reference Enthalpy

Used with the outside air economizer, an outdoor enthalpy sensor is provided to compare the total heat content of outdoor air to a locally adjustable setpoint. The setpoint is programmed at the human interface, or remote human interface, to determine if the outdoor enthalpy condition is suitable for economizer operation.

Economizer Control with Dry Bulb

Used with the outside air economizer, an outdoor temperature sensor is included for comparing the outdoor dry bulb temperature to a locally adjustable temperature setpoint. The setpoint is programmed at the human interface, or remote human interface, to determine if outdoor air temperature is suitable for economizer operation.

Outside Air Measurement (Traq)

A factory mounted airflow measurement station (Traq) shall be provided in the outside air opening to measure airflow. The airflow measurement station shall measure from 15 to 100 percent of unit airflow. The airflow measurement station shall adjust for temperature variations

Demand Control Ventilation

When equipped with a CO_2 sensor and the (VCM) module, the outside air damper position shall modulate in response to a CO_2 sensor in the conditioned space, in order to minimize the unit energy consumption, yet simultaneously meet the ventilation requirements of ASHRAE Std 62.1. The Traq airflow monitoring solution augments the system, allowing for measurement and control of outside airflow.

Note: *CO_2 sensor used with Demand Control Ventilation must be powered from an external power source or separate 24 VAC transformer.*

Ventilation Override Module

With the optional Ventilation Override Module (VOM) installed, the unit can be programmed to transition to up to 5 different programmed sequences for Smoke Purge, Evacuation, Pressurization, Purge, Purge with duct control sequence and Unit off. The transition occurs when a binary input on the VOM is closed (shorted); this would typically be a hard wired relay output from a smoke detector or fire control panel.

Heating System

Electric Heating Option

All electric heat models shall be completely assembled and have wired electric heating system integral within the rooftop unit. Heavy duty nickel chromium elements internally wired with a maximum density of 40 watts per square inch shall be provided. Heater circuits shall be 48 amps

or less, each individually fused. Automatic reset high limit control shall operate through heater backup contactors. The 460 and 575 volt electric units shall have optional factory mounted non-fused disconnect switch located in the main control panel to serve the entire unit.

Gas Fired Heating Option

All gas fired units shall be completely assembled and have a wired gas fired heating system integral within unit. Units shall be cULus approved specifically for outdoor applications downstream from refrigerant cooling coils. All gas piping shall be threaded connection with a pipe cap provided. Gas supply connection shall be provided through the side on horizontal discharge units, and through the bottom and side for downflow discharge units. All units shall be fire tested prior to shipment.

- Heat Exchanger shall be tubular two pass design with stainless steel primary and secondary surfaces. Free floating design shall eliminate expansion and contraction stresses and noises. Gasketed cleanout plate shall be provided for cleaning of tubes/ turbulators. Heat exchanger shall be factory pressure and leak tested.
- Burner shall be a stainless steel industrial type with an air proving switch to prevent burner operation if the burner is open for maintenance or inspection. Ceramic cone shall be provided to shape the flame to prevent impingement on sides of heat exchanger drum. Burner assembly shall house ignition and monitoring electrode.
- Combustion Blower shall be centrifugal type fan to provide air required for combustion. Fan motor shall have built-in thermal overload protection.
- Gas Safety Controls shall include electronic flame safety controls to require proving of combustion air prior to ignition sequence which shall include a 60 second pre-purge cycle. Pilot ignition shall be provided on 850, 1100, 1800 and 2500 MBh heat exchanger units. Sixty second delay shall be provided between first and second stage gas valve operation on two-stage heaters. Continuous electronic flame supervision shall be provided as standard.
- Full Modulation Gas Heaters shall be made from grades of stainless steel suitable for condensing conditions. The heater shall have a turn down ratio of at least 10 to 1 on the 850 and 20 to 1 on the 1100, 1800 and 2500 MBh

Steam Heating Option

Steam coils shall be Type NS with non-freeze steam distribution circuits. Distributor tubes shall be located concentrically within condensing tubes to assure even steam distribution. Coils shall be pitched to provide complete drainage. Steam modulating valve with actuator shall be provided.

Hot Water Heating Option

Hot water coils shall be Type 5W and factory mounted in the rooftop unit to provide complete drainage of coil. Hot water modulating valve with actuator shall be provided

Energy Saving Options

Energy Recovery Wheel

The energy recovery option improves humidity control while using energy that is normally exhausted from the space. The option shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor, and drive belt. Two wheel size options shall be available for each unit. The standard size option shall be capable of treating 50% of maximum unit outside airflow, while the low CFM shall be able to treat only 30%. An exhaust fan shall be required in conjunction with the energy recovery option. A return fan option is incompatible with the energy recovery wheel option.

A total energy recovery wheel is required to recover both sensible and latent energy. The factory installed wheel shall be coated with a silica gel desiccant. The desiccant shall be permanently bonded without the use of binders or adhesives or other means which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments.

Desiccant shall not dissolve or deliquesce in the presence of water or high humidity. The coated wheel segments shall be washable with non-acid coil cleaner or alkaline detergent and warm water. Wheel segments shall be removable without specialized tools or compartment modifications to facilitate maintenance and cleaning.

Hot Gas Reheat Option

The hot gas reheat option shall be applied to circuit 1 and consist of a hot gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited. This option allows for increased outdoor air ventilation. It reduces humidity levels while increasing comfort level in the space. Cooling can operate without a demand for dehumidification.

Evaporative Condensing Option

The evaporative condenser module is located in the outdoor section of the unit. The module consists of two serpentine copper coils enclosed in a fiber glass and stainless steel cabinet, a sump to hold the water, and water and air movement devices. The water movement devices consist of a sump pump for water distribution on the coils, float switches to maintain the water level in the sump, fill and drain valves to fill and drain the sump as required. The air movement devices are condenser fans that are modulated to control air flow through the coils.

Accessories

Roof Mounting Curb

Roof mounting curb shall be heavy gauge zinc coated steel with nominal two-inch by four-inch nailer setup. Supply/return air opening gasketing shall be provided. Curb shall ship knocked down for easy assembly. Channel shall be provided to allow for adjustment of return air opening location. Curb shall be manufactured to National Roofing Contractors Association guidelines.

Electronic Zone Sensors

- Zone Sensor shall provide two temperature setpoint levers, Heat, Auto, Off, or Cool system switch, Fan Auto or Fan On switch. Optional status indication LED lights, System On, Heat, Cool, and Service shall be available. This sensor shall be used with CV & SZVAV units.
- Programmable Night Setback Sensor shall be electronic programmable with auto or manual changeover with 7 day programming. Keyboard shall provide selection of Heat, Cool, Fan Auto or On. All programmable sensors shall have System On, Heat, Cool, Service LED/ indicators as standard. Night setback sensors shall have (1) Occupied, (1) Unoccupied and (1) Override program per day. Sensors shall be available for CV zone temperature control and VAV Supply Air temperature control.
- VAV Zone Sensor shall be provided with supply air single temperature setpoint and AUTO/ OFF system switch. Status indication LED lights shall include: System On, Heat, Cool and Service. Sensor shall be provided for zone temperature control with VAV units. VAV units are not compatible with SZVAV units.
- Remote Sensor shall be available to be used for remote zone temperature sensing capabilities when zone sensors are used as Remote panels.
- Fast Warm-Up Sensor shall be used as Morning warm-up sensor with VAV units.
- Integrated Comfort System sensors shall be available with sensor only, sensor with timed override, and sensor with local temperature setpoint adjustment with timed override.
- Remote Minimum Position Potentiometer shall be available to remotely adjust the minimum position setting of the unit economizer.
- Wireless Zone Sensor shall be available with a RF wireless zone temperature, setpoint and timed override transmitter and a RF receiver that connects directly to the IntelliPak II controller and uses spread spectrum technology. Option includes sensor, receiver wiring harness and (2) AA lithium batteries. Sensor battery life shall provide at least 5 years life under normal operating conditions and shall provide a readily visual indication of battery condition.

CO_2 (Carbon Dioxide) Sensing

The CO_2 sensor shall have the ability to monitor space occupancy levels within the building by measuring the parts per million of CO_2 in the air. As the CO_2 levels increase, the outside air damper modulates to meet the CO_2 space ventilation requirements.

Humidity Sensor

This wall or duct-mounted humidity sensor shall be used to control activation of the hot gas reheat dehumidification option. The humidity sensor can be set for humidity levels between 40% and 60% relative humidity

High Duct Temperature Thermostats

Two manual reset thermostats are provided with one located in the discharge section of the unit set at 240°F and the other in the return section set at 135°F. The rooftop will shut down if the thermostats are tripped.

Trane Startup

A Trane technician will provide unit startup after the unit is properly installed. The installation must include:

- Unit and all ship-with items installed
- All utilities and drain pipes connected
- All refrigerant piping reconnected and all refrigerant charge adequately distributed throughout the system
- All ductwork attached to the unit

Prior to Trane unit startup

Prior to Trane startup, the following work should be inspected and verified:

Evaporative Condenser

Review the Multi-piece units section for refrigeration hookup. Review the water system to ensure that the fill valve is properly set and the drain timing is set properly for the given application. Verify the condenser fan shipping supports have been removed.

Unit inspection - cabinet

Review the overall unit for exterior damage (dents, bends, missing panels, doors working properly, etc). Verify the unit interior is free from debris/obstructions, the panels and doors are secured properly, the unit clearances are adequate to avoid air recirculation, and that the unit drain lines and traps are properly installed.

Wiring

Review the unit main power to ensure that the unit is properly grounded, the main power feed wire gauge is adequately sized, the correct voltage is supplied to the unit and electric heaters (if applicable), and the incoming voltage is phase balanced. Verify that all wiring connections are tight, all field installed control wiring is landed on correct terminals, and that all automation and remote controls, along with control wiring for CV and VAV controls, are correctly installed/wired.

Refrigeration system

Review the refrigeration system to ensure the coil fins are straightened, shipping hardware and plastic covers for compressors have been removed, compressors contain the correct oil level, service valves are in the correct position, and the crankcase heaters have been operational for at least 12 hours prior to Trane startup.

Fans

Check the unit fans to ensure the condenser fan blade set-screws to the motor shaft are tight, hold down bolts and channels from fan sections have been removed, proper adjustment of fan section spring isolators, proper fan belts tension, adequate fan bearings greased, alignment of fan sheaves, adequate tightness of supply and exhaust fan pulley bolts, proper fan rotation, and proper fan motor amperage.

Multi-piece units

Check to ensure both piping to the condenser and air handler side of the system have been completed and interconnecting refrigerant tubing has been evacuated. Verify base rail connection points. Inspect and verify wiring connection points related to multi-piece units.

Economizer

Check all damper linkages for proper adjustment. Verify proper damper operation and outside air pressure sensors.

Electric Heat

On units equipped with electric heaters, check to ensure the heating system matches the unit nameplate and verify that the correct voltage is supplied to the heaters.

Hot Water/ Steam

On units equipped with hot water heat, check and verify the following: hot water pipes are properly routed, sized and leak free; the presence of swing joints or flexible connectors next to the hot water coil; proper gate valve installation in the supply and return branch line; proper three way modulating valve installation, and proper coil venting. On units equipped with steam heat, check and verify the following: hot water pipes are properly routed, sized and leak free; proper swing check vacuum breaker installation; proper 2-way modulating valve installation; and proper steam trap installation.

Gas Heat

On units equipped with gas heaters, check to ensure that the flue assembly is secure and properly installed, sufficient gas pressure exists at the unit, no leaks exist in gas supply line, the gas heat piping includes a drip leg, and condensate line is run if required.

Trane Unit Startup

After the unit installation has been fully completed, a Trane technician will do the following:

- Verify and log supply fan operation, proper compressor operation, and condenser fan operation, as well as correct levels of superheat and subcooling.
- Verify operation of all VAV modes per job requirements, which include: Supply Air Cooling and Heating, Daytime Warmup, Morning Warmup, and Supply Air Tempering.

Evaporative Condenser

Verify the sump fill level, set blow-down interval and duration per customer requirement.

Return Fan

Establish the return fan maximum setpoint based on the required building pressure setpoint.

Space pressure control

Verify that unit is sensing field installed building pressure input.

GBAS 0-5 &0-10 VDC

Verify that inputs are set up and functional per customer requirement.

Ventilation override

Verify that sequences are set up and functional per customer requirement.

Economizer

Adjust outside air travel and verify all sensor inputs.

Dehumidification

Verify that dehumidification mode operates correctly and is set up per job requirements.

Outside Air Measurement

Verify that there is correctTraq damper linkage and actuator operation, as well as matched left and right air flow. Verify that Demand Flow Ventilation function is correct.

Gas Heat

Startup gas heat per the unit Installation, Operation, Maintenance Manual (IOM) and record CO_2 and O_2 levels.

Energy Recovery

Check to ensure proper rotation and operation of the wheel. Use the service test guide in the unit Installation, Operation, Maintenance Manual (IOM) to operate unit components.

All units

Verify Human Interface programming, including setpoints and sensor sources per customer requirements. Leave the unit in a running state or off per customer requirement. Once the IntelliPak II unit startup is complete, provide a startup activities communication and the associated operating log.

TRANE

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