50TC
Single Package Rooftop
Cooling Only
Horizontal Air Flow Unit
with Puron® (R–410A) Refrigerant
15, 17.5, 20, 25 Tons – (Sizes 18, 21, 25, 29)

Carrier
United Technologies
turn to the experts

Product Data

WeatherMaker®

C12590

(Unit shown with economizer and power exhaust.)

Puron

ASHRAE 90.1 COMPLIANT

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The 15 to 25 ton WeatherMaker® Carrier rooftop unit (RTU) was designed by customers for customers. With “no-strip” screw collars, handled access panels, and more, we’ve made your unit easy to install, easy to maintain, easy to use and reliable.

Easy to install:

These WeatherMaker units are designed for dedicated factory-supplied horizontal air flow duct configurations. No special field kits are required. Designed to fit on pre-installed curbs by another manufacturer, these units also fit on past designed Carrier installed curbs with a new certified and authorized adapter curb. This cabinet design also integrates a large control box that gives you room to work and room to mount Carrier accessory controls.

Easy to maintain:

Easy access handles by Carrier provide quick and easy access to all normally serviced components. Our “no-strip” screw system has superior holding power and guides screws into position while preventing the screw from stripping the unit’s metal. Take accurate pressure readings by reading condenser pressure with panels in place as compressors are strategically located to eliminate any air bypass.

Easy to use:

The newly designed, central terminal board by Carrier puts all your connections and troubleshooting points in one convenient place, standard. Most low voltage connections are made to the same board and make it easy to find what you’re looking for and easy to access it.

Reliable:

Each unit comes with precision sized and tested scroll compressor that is internally protected from over temperature and pressures. In addition, each refrigerant circuit is further protected with a high-pressure and low-pressure switch as well as containing a liquid line filter drier. Each unit is factory tested prior to shipment to help ensure unit operation once properly installed.

FEATURES AND BENEFITS

- 2-stage cooling capacity with independent circuits and control.
- High performance copper tube / aluminum plate (RTPF) fin condenser and evaporator coils with optional coating.
- EER's up to 11.0
- IEER's up to 11.2 with single speed indoor fan motor and up to 12.9 with SAV™ (Staged Air Volume) 2-speed/VFD indoor fan motor
- Dedicated horizontal air flow duct configuration models. No field kits required.
- Utility connections through the side or bottom. Bottom connections are also in an enclosed environment to help prevent water entry. Field supplied couplings are required.
- Standardized components and control box layout. Standardized components and controls make stocking parts and service easier.
- Scroll compressors on all units. This makes service, stocking parts, replacement, and troubleshooting easier.
- Proven TXV refrigerant metering system.
- Easy-adjust, belt-drive motor available. Motor assembly also contains a fan belt break protection system on all models and reliable pillow block bearing system that allows lubrication thru front of the unit.
- Capable of thru-the-base electrical routing.
- Full range of electric heaters and single point electric kits – pre-engineered and approved for field installation.
- Single-point electrical connection.
- Sloped, composite drain pan sheds water; and won't rust.
- Standardized controls and control box layout. Standardized components and controls make stocking parts and service easier.
- Clean, large, easy to use control box.
- Color-coded wiring.
- Large, laminated wiring and power wiring drawings which are affixed to unit make troubleshooting easy.
- Single, central terminal board for test and wiring connections.
- Fast-access, handled, panels for easy access on normally accessed service panels.
- "No-strip" screw system guides screws into the panel and captures them tightly without stripping the screw, the panel, or the unit.
- Mechanical cooling (115°F to 35°F / 46°C to 2°C) standard on all models. Low ambient controller allows operation down to -20°F (-29°C).
- 2-in (51mm) disposable filters on all units, with 4-in (102mm) filter track - field-installed.
- Refrigerant filter-drier on each circuit.
- High and low pressure switches. Added reliability with high pressure switch and low pressure switch.
- Many factory-installed options ranging from air management economizers, 2 position dampers, manual outdoor air dampers, plus convenience outlets, disconnect switch and smoke detectors.
- Factory-installed Humidi-MiZer® adaptive dehumidification system.
- Standard Parts Warranty: 10 year aluminized heat exchanger, 5 year compressor, condenser coil, 1 year others.
- Optional SAV system utilizes a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed between cooling stages. Available on 2-stage cooling models with electro-mechanical controls or RTU Open controller. SAV system is standard on size 29 units.

MODEL NUMBER NOMENCLATURE

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Example:	5	0	T	C	-	D	2	5	A	5	A	5	-	0	A	0	A	0

Unit Heat Type
50 - Electric Heat Packaged Rooftop

Model Series - WeatherMaker®
TC - Standard Efficiency

Heat Options
– = Standard, No Electric Heat

Refrig. Systems Options
D = Two stage cooling model
E = Two stage cooling models with Humidi-MiZer® System

Cooling Tons
18 = 15 tons
21 = 17.5 tons
25 = 20 tons
29 = 25 tons

Sensor Options
A = None
B = RA Smoke Detector
C = SA Smoke Detector
D = RA + SA Smoke Detector
E = CO_2
F = RA Smoke Detector and CO_2
G = SA Smoke Detector and CO_2
H = RA + SA Smoke Detector and CO_2
J = Condensate Overflow Switch (electro-mechanical controls only)
K = Condensate Overflow Switch and RA Smoke Detectors
L = Condensate Overflow Switch and RA and SA Smoke Detectors

Indoor Fan Options & Air Flow Configuration
5 = Standard Static/Horizontal Supply, Return Air Flow (except 29 size models)
6 = Medium Static/Horizontal Supply, Return Air Flow (Standard on 29 size models)
7 = High Static/Horizontal Supply, Return Air Flow
F = Medium Static High Efficiency Motor/HorizontalSupply, Return Air Flow
G = High Static High Efficiency Motor/Horizontal Supply, Return Air Flow

Coil Options – RTPF (Outdoor - Indoor - Hail Guard)
A = Al/Cu - Al/Cu
B = Precoat Al/Cu - Al/Cu
C = E-coat Al/Cu - Al/Cu
D = E-coat Al/Cu - E-coat Al/Cu
E = Cu/Cu - Al/Cu
F = Cu/Cu - Cu/Cu
M = Al/Cu -Al/Cu — Louvered Hail Guard
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
R = Cu/Cu - Al/Cu — Louvered Hail Guard
S = Cu/Cu - Cu/Cu — Louvered Hail Guard

Voltage
1 = 575/3/60
5 = 208-230/3/60
6 = 460/3/60

Design Revision
- = Factory Design Revision

Base Unit Controls
0 = Electro-mechanical controls. Can be used with W7212 EconoMi$er® IV (Non-Fault Detection and Diagnostic)
1 = PremierLink™ Controller
2 = RTU Open Multi-Protocol Controller
6 = Electro-mechanical controls. Can be used with W7220 EconoMi$er X (with Fault Detection and Diagnostic)
D = ComfortLink Controls

Intake / Exhaust Options
A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
K = 2-Position Damper
U = Temp Ultra Low Leak Economizer w/ Baro Relief
W = Enthalpy Ultra Low Leak Economizer w/ Baro Relief

Service Options
0 = None
1 = Unpowered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Panels
4 = Hinged Panels and Unpowered Convenience Outlet
5 = Hinged Panels and Powered Convenience Outlet

Electrical Options
A = None
C = Non-Fused Disconnect
G = 2-Speed Indoor Fan (VFD) Controller (Standard on 29 size models)
J = 2 Speed Fan Controller (VFD) and Non-Fused Disconnect

Packaging & Seismic Complience
0 = Standard

NOTE:
Not all possible options are displayed. See the current 50TC Horizontal 15 to 25 Ton Price Pages for more details.

C13798D

Fig. 1 - Model Number Nomenclature (Example)

Table 1 – FACTORY-INSTALLED OPTIONS AND FIELD-INSTALLED ACCESSORIES

CATEGORY	ITEM	FACTORY–INSTALLED OPTION	FIELD–INSTALLED ACCESSORY
Cabinet	Hinged Access Panels	X	
Coil Options	Cu/Cu indoor & outdoor coils	X	
	E–coated indoor & outdoor coils	X	
	Pre–coated outdoor coils	X	
Humidity Control	Humidi–MiZer® Adaptive Dehumidification System	X	
Condenser Protection	Condenser coil hail guard (louvered design)	X	X
Controls	Thermostats, temperature sensors, and subbases		X
	PremierLink™ DDC communicating controller	X	X
	RTU Open multi–protocol controller	X	
	Smoke detector (supply and/or return air)	X	X
	Horn/Strobe Annunciator[7]		X
	Time Guard II compressor delay control circuit		X
	Phase Monitor		X
	Condensate Overflow switch – for electro–mechanical controls only	X	X
	Carrier Energy Demand System (EDS)		X
Economizers & Outdoor Air Dampers	EconoMi$er IV® for electro–mechanical controls – Non FDD (Standard air leak damper models)[5]	X	X
	EconoMi$er2 for DDC controls, complies with FDD (Standard and Ultra Low Leak air damper models)[5, 6]	X	X
	EconoMi$er X for electro–mechanical controls, complies with FDD. (Standard and Ultra Low Leak air damper models)[5]		X
	Motorized 2 position outdoor–air damper	X	X
	Manual outdoor–air damper (25%)		X
	Barometric relief[1]	X	X
	Barometric hood (Horizontal economizer)		X
	Power exhaust		X
Economizer Sensors & IAQ Devices	Single dry bulb temperature sensors[2]	X	X
	Differential dry bulb temperature sensors[2]		X
	Single enthalpy sensors[2]	X	X
	Differential enthalpy sensors[2]		X
	CO_2 sensor (wall, duct, or unit mounted)[2]	X	X
Electric Heat	Electric Resistance Heaters		X
	Single Point Kit[8]		X
Indoor Motor & Drive	Multiple motor and drive packages	X	
	Staged Air Volume (SAV™) system w/VFD controller (2–stage cool only with electro–mechanical and RTU Open controls)	X	
	Display Kit for SAV system with VFD		X
Low Ambient Control	Winter start kit[3]		X
	Motormaster® head pressure controller to –20°F (–29°C)[3]		X
Power Options	Convenience outlet (powered)	X	
	Convenience outlet (unpowered)	X	
	Non–fused disconnect[4]	X	
Roof Curbs	Roof curb 14–in (356mm)		X
	Roof curb 24–in (610mm)		X

NOTES:

1. Included with economizer.
2. Sensors for optimizing economizer.
3. See application data for assistance.
4. Non–fused disconnect switch cannot be used when FLA electrical rating exceeds 100 amps at 460/575 volt and 200 amps at 208/230 volt. Carrier RTUBuilder selects this automatically.
5. FDD – (Fault Detection and Diagnostic) capability per California Title 24 section 120.2.
6. Models with RTU Open DDC controls comply with California Title 24 Fault Detection and Diagnostic (FDD). PremierLink is non FDD.
7. Requires a field–supplied 24V transformer for each application. See price pages for details.
8. See Tables 23–24 for single point kit requirements.

FACTORY OPTIONS AND/OR ACCESSORIES

Economizer (dry-bulb or enthalpy)

Economizers can reduce operating costs. They bring in fresh, outside air for ventilation; and provide cool outside air to cool your building. This also is the preferred method of low ambient cooling. When coupled to CO_2 sensors, economizers can limit the ventilation air to only that amount required.

Economizers are available, installed and tested by the factory, with either enthalpy or temperature dry-bulb inputs. There are also models for electro-mechanical, direct digital controllers and single speed fan or 2-speed indoor fan motors. Additional sensors are available as accessories to optimize the economizer.

Economizers include gravity controlled barometric relief that helps equalize building pressure and ambient air pressures. This can be a cost effective solution to prevent building pressurization. Economizers are available in Ultra Low Leak and standard low leak versions.

CO_2 Sensor

The CO_2 sensor works with the economizer to intake only the correct amount of outside air for ventilation. As occupants fill your building, the CO_2 sensor detects their presence through increasing CO_2 levels, and opens the economizer appropriately.

When the occupants leave, the CO_2 levels decrease, and the sensor appropriately closes the economizer. This intelligent control of the ventilation air, called Demand Controlled Ventilation (DCV) reduces the overall load on the rooftop, saving money.

Smoke Detectors

Trust the experts. Smoke detectors make your application safer and your job easier. Carrier smoke detectors immediately shut down the rooftop unit when smoke is detected. They are available, installed by the factory, for supply air, return air, or both.

Louvered Hail Guards

Sleek, louvered panels protect the condenser coil from hail damage, foreign objects, and incidental contact.

Convenience Outlet (powered or unpowered)

Reduce service and/or installation costs by including a convenience outlet in your specification. Carrier will install this service feature at our factory. Provides a convenient, 15 amp, 115v GFCI receptacle with “Wet in Use” cover. The “powered” option allows the installer to power the outlet from the line side of the disconnect as required by code. The “unpowered” option is to be powered from a separate 115/120v power source.

Non-Fused Disconnect

This OSHA-compliant, factory-installed, safety switch allows a service technician to locally secure power to the rooftop.

When selecting a factory-installed non-fused disconnect, note they are sized for unit as ordered from the factory. The sizing of these does not accommodate any power exhaust devices, etc.

Power Exhaust with Barometric Relief

Superior internal building pressure control. This field-installed accessory or factory-installed option may eliminate the need for costly, external pressure control fans.

PremierLink™, DDC Controller

This CCN controller regulates your rooftop’s performance to tighter tolerances and expanded limits, as well as facilitates zoning systems and digital accessories. It also unites your Carrier HVAC equipment together on one, coherent CCN network. The PremierLink Controller can be factory-installed, or easily field-installed. Not available with 2-speed indoor fan motor.

RTU Open Protocol Controller

Connect the rooftop to an existing BAS without needing complicated translators or adapter modules using the RTU Open controller. This new controller speaks the 4 most common building automation system languages (BACnet*, Modbus†, N2, and LonWorks**). Use this controller when you have an existing BAS.

Time Guard II Control Circuit

This accessory protects your compressor by preventing short-cycling in the event of some other failure prevents the compressor from restarting for 30 seconds after stopping. Not required with PremierLink controller, RTU Open controller, or authorized commercial thermostats.

Filter or Fan Status Switches

Use these differential pressure switches to detect a filter clog or indoor fan motor failure. When used in conjunction with a compatible unit controller/thermostat, the switches will activate an alarm to warn the appropriate personnel.

Motorized 2-Position Damper

The Carrier 2-position, motorized outdoor air damper admits up to 100% outside air. Using reliable, gear-driven technology, the 2-position damper opens to allow ventilation air and closes when the rooftop stops, stopping unwanted infiltration.

Manual OA Damper

Manual outdoor air dampers are an economical way to bring in ventilation air. The dampers are available in 25% versions.

* BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air–Conditioning Engineers).

† Modbus is a registered trademark of Schneider Electric.

** LonWorks is a registered trademark of Echelon Corporation.

FACTORY OPTIONS AND/OR ACCESSORIES (cont)

Optional Humidi-MiZer® Adaptive Dehumidification System

Carrier's Humidi-MiZer adaptive dehumidification system is an all-inclusive factory-installed option that can be ordered with any WeatherMaker® 50TC 18-29 rooftop unit.

This system expands the envelope of operation of Carrier's WeatherMaker rooftop products to provide unprecedented flexibility to meet year round comfort conditions.

The Humidi-MiZer adaptive dehumidification system has a unique dual operational mode setting. The Humidi-MiZer system provides greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode.

The WeatherMaker 50TC 18-29 rooftop coupled with the Humidi-MiZer system is capable of operating in normal design cooling mode, subcooling mode, and hot gas reheat mode. Normal design cooling mode is when the unit will operate under its normal sequence of operation by cycling compressors to maintain comfort conditions.

Subcooling mode will operate to satisfy part load type conditions when the space requires combined sensible and a higher proportion of latent load control. Hot Gas Reheat mode will operate when outdoor temperatures diminish and the need for latent capacity is required for sole humidity control. Hot Gas Reheat mode will provide neutral air for maximum dehumidification operation.

Staged Air Volume (SAV™) Indoor Fan Speed System

Carrier's Staged Air Volume (SAV) system saves energy and installation time by utilizing a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the units cooling operation. Per ASHRAE 90.1-2016 and IECC*-2015 standards, during the first stage of cooling operation the VFD will adjust the fan motor to provide 66% of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%). During the heating mode the VFD will allow total design cfm (100%) operation and during the ventilation mode the VFD will allow operation to 66% of total cfm.

Compared to single speed indoor fan motor systems, Carrier's SAV system can save substantial energy, 25%+, versus single speed indoor fan motor systems.

IMPORTANT: Data based on .10 ($/kWh) in an office application utilizing Carrier's HAP 4.6 simulation software program.

The VFD used in Carrier's SAV system has soft start capabilities to slowly ramp up the speeds, thus eliminating any high inrush air volume during initial start-up. It also has internal over current protection for the fan motor and a field-installed display kit that allows adjustment and in depth diagnostics of the VFD.

This SAV system is available on models with 2-stage cooling operation with electro-mechanical or RTU Open, Multi Protocol controls. Both space sensor and conventional thermostats controls can be used to provide accurate control in any application.

The SAV system is very flexible for initial fan performance set up and adjustment. The standard factory shipped VFD is pre-programmed to automatically stage the fan speed between the first and second stage of cooling. The unit fan performance static pressure and cfm can be easily adjusted using the traditional means of pulley adjustments. The other means to adjust the unit static and cfm performance is to utilize the field-installed Display Kit and adjust the frequency and voltage in the VFD to required performance requirements. In either case, once set up, the VFD will automatically adjust the speed between the cooling stage operations.

Motormaster® Head Pressure Controller

The Motormaster motor controller is a low ambient, head pressure controller kit that is designed to maintain the unit's condenser head pressure during periods of low ambient cooling operation. This device should be used as an alternative to economizer free cooling when economizer usage is either not appropriate or desired. The Motormaster controller will either cycle the outdoor-fan motors or operate them at reduced speed to maintain the unit operation, depending on the model.

The Motormaster controller allows cooling operation down to -20°F (-29°C) ambient conditions.

Winter Start Kit

The winter start kit by Carrier extends the low ambient limit of your rooftop to 25°F (-4°C). The kit bypasses the low-pressure switch, preventing nuisance tripping of the low-pressure switch. Other low ambient precautions may still be prudent.

Alternate Motors and Drives

Some applications need larger horsepower motors, some need more airflow, and some need both. Regardless of the case, your Carrier expert has a factory-installed combination to meet your application. A wide selection of motors and pulleys (drives) are available, factory-installed, to handle nearly any application.

Thru-the-Base Connections

Thru-the-base provisions/connection points are available as standard with every unit. When bottom connections are required, field furnished couplings are required.

Hinged Access Panels

Allows access to unit's major components with specifically designed hinged access panels. Panels are: filter, control box and fan motor.

* IECC is a registered trademark of International Code Council, Inc.

FACTORY OPTIONS AND/OR ACCESSORIES (cont)

Electric Heaters / Single Point Kit

Carrier offers a full-line of field-installed accessory heaters and single point kits when required. The heaters are very easy to use and install, and are all pre-engineered and certified.

Barometric Hood

For Horizontal Economizer applications where relief damper is installed in duct work. This kit provides the needed protection.

Condensate Overflow Switch (Factory-Installed Option)

This sensor and related controller monitors the condensate level in the drain pan and shuts down compression operation when overflow conditions occur. It includes:

- Indicator light - solid red (more than 10 seconds on water contact - compressors disabled), blinking red (sensor disconnected)
- 10 second delay to break - eliminates nuisance trips from splashing or waves in pan (sensor needs 10 seconds of constant water contact before tripping)
- Disables the compressor(s) operation when condensate plug is detected, but still allows fans to run for Economizer.

NOTE: The Condensate Overflow switch FIOP is only available for units with electro-mechanical controls.

Carrier Energy Demand System (EDS)

Carrier's wireless automated demand management and demand response controllers can be easily installed onto any packaged rooftop unit. Once installed, the controllers work together like a swarm of bees, intelligently communicating and managing the duty cycles of the units being controlled.

Utilizing patented intelligence, the controllers dramatically reduce peak electrical demand by up to 30 percent in commercial and light industrial properties and allow for effective scheduling of overnight and weekend loads. This platform can easily be installed when a full building automation system is not required.

The Energy Demand System is as easy to install as thermostats, and requires no special training. Every controller has a built-in self-configuring wireless network. The controllers work together to establish a wireless network, eliminating the need for expensive wiring. The secure web portal allows property managers to easily access multiple sites from any internet connection to monitor building performance and reconfigure controllers for demand response or the scheduling of loads.

- Simple, affordable, wireless electrical demand management
- Automated demand response, including OpenADR
- Energy consumption reduction through efficient schedule-based control
- Intelligent, adaptive energy management
- Web-based interface
- Electrical demand reductions
- Reduce energy costs, not comfort

Table 2 – AHRI COOLING RATING TABLE 2-STAGE COOLING

50TC UNIT SIZE	COOLING STAGES	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	EER	IEER WITH SINGLE SPEED INDOOR MOTOR	IEER WITH 2–SPEED INDOOR MOTOR
18	2	15	174.0	15.8	11.0	11.2	12.9
21	2	17.5	202.0	18.4	11.0	11.2	12.9
25	2	20	232.0	21.1	11.0	11.2	12.9
29	2	25	282.0	28.2	10.0	N/A*	12.4

LEGEND

AHRI – Air–Conditioning, Heating and Refrigeration Institute
ASHRAE – American Society of Heating, Refrigerating and Air–Conditioning Engineers
EER – Energy Efficiency Ratio
IECC – International Energy Conservation Code
IEER – Integrated Energy Efficiency Ratio
* – Model only available with 2–Speed indoor Fan Motor

NOTES

1. Rated and certified under AHRI Standard 340/360, as appropriate.
2. Ratings are based on:
   Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temp and 95°F db outdoor air temp.
   IEER Standard: A measure that expresses cooling part–load EER efficiency for commercial unitary air conditioning and heat pump equipment on the basis of weighted operation at various load capacities.
3. The 50TC 18–29 rooftops meet ASHRAE 90.1–2016 and IECC–2015 minimum efficiency requirements when equipped with the SAV™ (staged air volume) option.
4. Where appropriate, 50TC units comply with US Energy Policy Act. Refer to state and local codes or visit the following website: http://bcap–energy. org to determine if compliance with this standard pertains to your state, territory, or municipality.

Table 3 – MINIMUM - MAXIMUM AIRFLOWS (CFM) COOLING AND ELECTRIC HEAT

50TC Unit Size	Nominal kW	COOLING				ELECTRIC HEATERS	
		Minimum Single Speed Fan Motor	Minimum 2–Speed Fan Motor (at high speed)	Minimum 2–Speed Fan Motor (at low speed)	Maximum	Minimum	Maximum
18	25	4500	5070	3380	7500	4500	7500
	50						
	75						
21	25	5250	5915	3943	9000	5200	9000
	50						
	75						
25	25	6000	7500	5000	10000	6000	10000
	50						
	75						
29	25	7500	8450	5633	12500	7000	12500
	50						
	75						

Table 4 – SOUND PERFORMANCE TABLE

50TC Unit Size	Cooling Stages	OUTDOOR SOUND (dB)									
		A–Weighted	AHRI 370 Rating	63	125	250	500	1000	2000	4000	8000
18	2	84.1	84	92.2	83.9	80.4	81.8	78.7	76.5	72.2	65.4
21	2	84.1	84	92.2	83.9	80.4	81.8	78.7	76.5	72.2	65.4
25	2	86.5	87	95.6	87.5	84.2	84.2	81.7	77.9	73.2	66.3
29	2	85.9	86	97.1	88.3	84.4	83.3	80.7	77.4	73.4	67.3

LEGEND

dB – Decibel

NOTES:

1. Outdoor sound data is measured in accordance with AHRI standard 270–2008.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A–weighted sound ratings filter out very high and very low frequencies, to better approximate the response of “average” human ear. A–weighted measurements for Carrier units are taken in accordance with AHRI standard 270–2008.

Table 5 – PHYSICAL DATA (COOLING) 15-25 TONS
RTPF (Round Tube/Plate Fin Coil Design)

		50TC–D18	50TC–E18	50TC–D21	50TC–E21
Refrigeration System					
	# Circuits / # Comp. / Type	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll
	R–410A charge A/B (lbs)	17/16.4	24.5/25.7	17.5/16.8	25.5/25.5
	Metering device	TXV	TXV	TXV	TXV
	High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low–press. Trip / Reset (psig)	54 / 117	27 / 44	54 / 117	27 / 44
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Tube Diameter	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF
	Rows / FPI	4 / 15	4 / 15	4 / 15	4 / 15
	total face area (ft^2)	22	22	22	22
	Condensate drain conn. size	3/4”	3/4”	3/4”	3/4”
Humidi–MiZer® Coil					
	Material	n/a	Cu / Al	n/a	Cu / Al
	Tube Diameter	n/a	3/8” RTPF	n/a	3/8” RTPF
	Rows / FPI	n/a	1 / 17	n/a	1 / 17
	total face area (ft^2)	n/a	22	n/a	22
Evap. fan and motor					
Standard Static	Motor Qty / Belt Qty / Driver Type	1/1/ Belt	1/1/ Belt	1/1/ Belt	1/1/ Belt
	Max BHP	2.9	2.9	3.7	3.7
	RPM range	514–680	514–680	622–822	622–822
	motor frame size	56	56	56	56
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11
Medium Static	Motor Qty / Belt Qty / Driver Type	1/1/ Belt	1/1/ Belt	1/1/ Belt	1/1/ Belt
	Max BHP	3.7	3.7	4.9	4.9
	RPM range	614–780	614–780	713–879	713–879
	motor frame size	56	56	56	56
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11
High Static	Motor Qty / Belt Qty / Driver Type	1/1/ Belt	1/1/ Belt	n/a	n/a
	Max BHP	4.9	4.9	n/a	n/a
	RPM range	746–912	746–912	n/a	n/a
	motor frame size	56	56	n/a	n/a
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal	n/a	n/a
	Fan Diameter (in)	18 x 15/15 X 11	18 x 15/15 X 11	n/a	n/a
High Static–High–Efficiency	Motor Qty / Belt Qty / Driver Type	n/a	n/a	1/1/ Belt	1/1/ Belt
	Max BHP	n/a	n/a	6.5/ 6.9/ 7.0/ 8.3	6.5/ 6.9/ 7.0/ 8.3
	RPM range	n/a	n/a	882–1078	882–1078
	motor frame size	n/a	n/a	184T	184T
	Fan Qty / Type	n/a	n/a	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	n/a	n/a	18 x 15/15 X 11	18 x 15/15 X 11

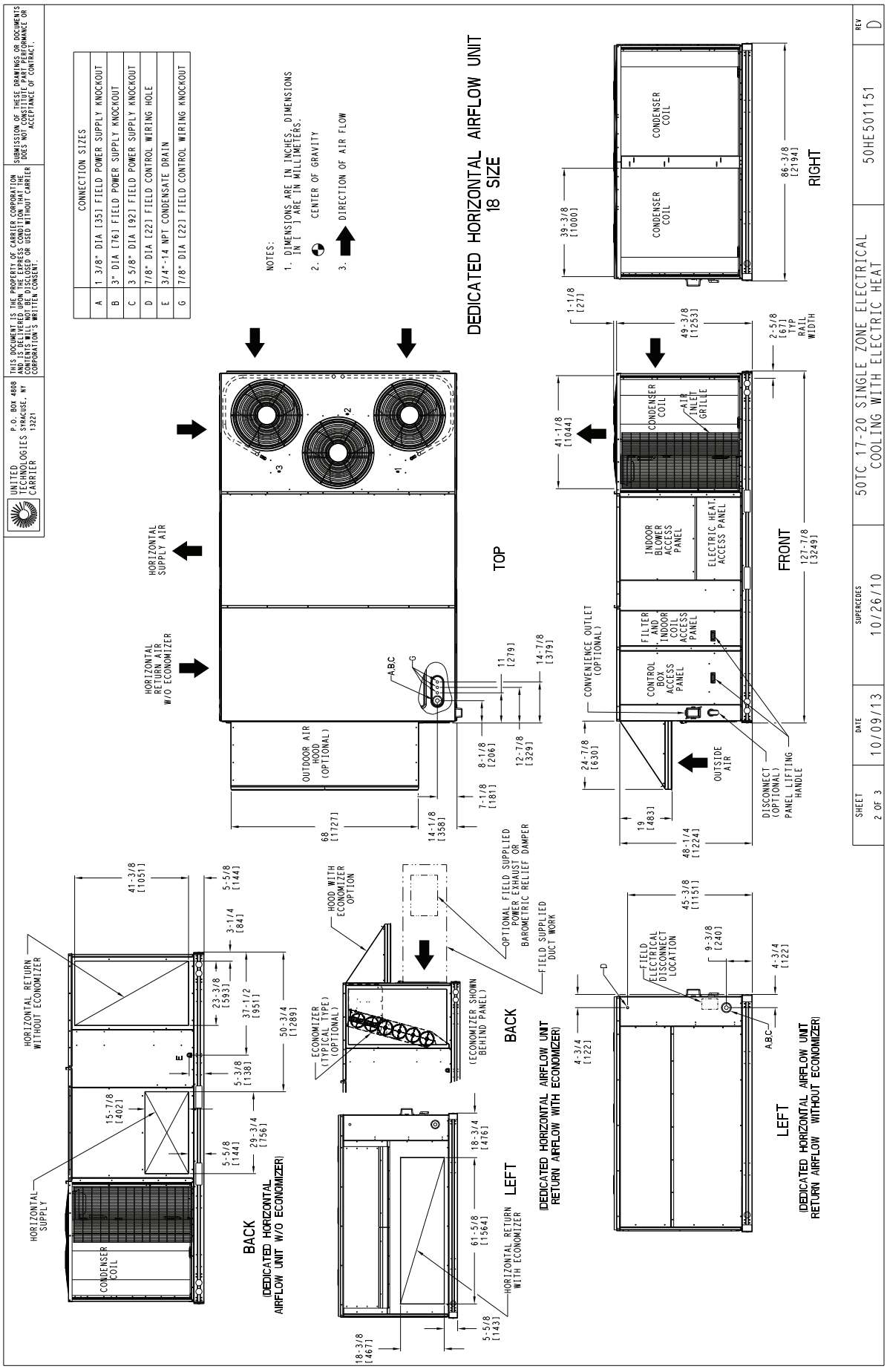
Table 5 PHYSICAL DATA (cont) **(COOLING)** **15-25 TONS**
RTPF (Round Tube/Plate Fin Coil Design)

		50TC–D25	50TC–E25	50TC–D29	50TC–E29
Refrigeration System					
	# Circuits / # Comp. / Type	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll
	R–410A charge A/B (lbs)	23.8/23.1	30.0/30.7	24.9/27.7	35.1/35.4
	Metering device	TXV	TXV	TXV	TXV
	High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low–press. Trip / Reset (psig)	54 / 117	27 / 44	54 / 117	27 / 44
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Tube Diameter	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF
	Rows / FPI	4 / 15	4 / 15	4 / 15	4 / 15
	total face area (ft^2)	26	26	26	26
	Condensate drain conn. size	3/4”	3/4”	3/4”	3/4”
Humidi–MiZer® Coil					
	Material	n/a	Cu / Al	n/a	Cu / Al
	Tube Diameter	n/a	3/8” RTPF	n/a	3/8” RTPF
	Rows / FPI	n/a	1 / 17	n/a	1 / 17
	total face area (ft^2)	n/a	26	n/a	26
Evap. fan and motor					
Standard Static	Motor Qty / Belt Qty / Driver Type	1/1/ Belt	1/1/ Belt	1/1/ Belt	1/1/ Belt
	Max BHP	4.9	4.9	4.9	4.9
	RPM range	690–863	690–863	647–791	647–791
	motor frame size	56	56	56	56
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11
Medium Static – High–Efficiency	Motor Qty / Belt Qty / Driver Type	1/1/ Belt	1/1/ Belt	1/1/ Belt	1/1/ Belt
	Max BHP	6.5/ 6.9/ 7.0/ 8.3	6.5/ 6.9/ 7.0/ 8.3	6.5/ 6.9/ 7.0/ 8.3	6.5/ 6.9/ 7.0/ 8.3
	RPM range	835–1021	835–1021	755–923	755–923
	motor frame size	184T	184T	184T	184T
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11
High Static– High–Efficiency	Motor Qty / Belt Qty / Driver Type	1/1/ Belt	1/1/ Belt	1/1/ Belt	1/1/ Belt
	Max BHP	10.5/11.9/11.9/11	10.5/11.9/11.9/11	10.5/11.9/11.9/11	10.5/11.9/11.9/11
	RPM range	941–1100	941–1100	906–1100	906–1100
	motor frame size	213T	213T	213T	213T
	Fan Qty / Type	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal	2 / Centrifugal
	Fan Diameter (in)	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11	18 x 15/15 X 11

Table 5 PHYSICAL DATA (cont) (COOLING) 15-25 TONS
RTPF (Round Tube/Plate Fin Coil Design)

	50TC–D18	50TC–E18	50TC–D21	50TC–E21	50TC–D25	50TC–E25	50TC–D29	50TC–E29
Cond. Coil (Circuit A)								
Coil type	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF
Coil Length (in)	70	70	72	72	82	82	95	95
Coil Height (in)	44	44	44	44	52	52	52	52
Rows / FPI	2 /17	2 /17	2 /17	2 /17	2 /17	2 /17	2 /17	2 /17
total face area (ft^2)	21.4	21.4	22.0	22.0	29.6	29.6	34.3	34.3
Cond. Coil (Circuit B)								
Coil type	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF
Coil Length (in)	70	70	64	64	80	80	95	95
Coil Height (in)	44	44	44	44	52	52	52	52
Rows / FPI	2 /17	2 /17	2 /17	2 /17	2 /17	2 /17	2 /17	2 /17
total face area (ft^2)	21.4	21.4	19.5	19.5	29.6	29.6	34.3	34.3
Cond. fan / motor								
Qty / Motor drive type	3 / direct	3 / direct	4 / direct	4 / direct	4/ direct	4/ direct	6 / direct	6 / direct
Motor HP / RPM	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan diameter (in)	22	22	22	22	22	22	22	22
Filters								
RA Filter # / size (in)	6 / 20 x 25 x 2	6 / 20 x 25 x 2	6 / 20 x 25 x 2	6 / 20 x 25 x 2	9 / 16 x 25 x 2	9 / 16 x 25 x 2	9 / 16 x 25 x 2	9 / 16 x 25 x 2
OA inlet screen # / size (in)	4 / 16 x 25 x 1	4 / 16 x 25 x 1	4 / 16 x 25 x 1	4 / 16 x 25 x 1	4 / 16 x 25 x 1	4 / 16 x 25 x 1	4 / 16 x 25 x 1	4 / 16 x 25 x 1

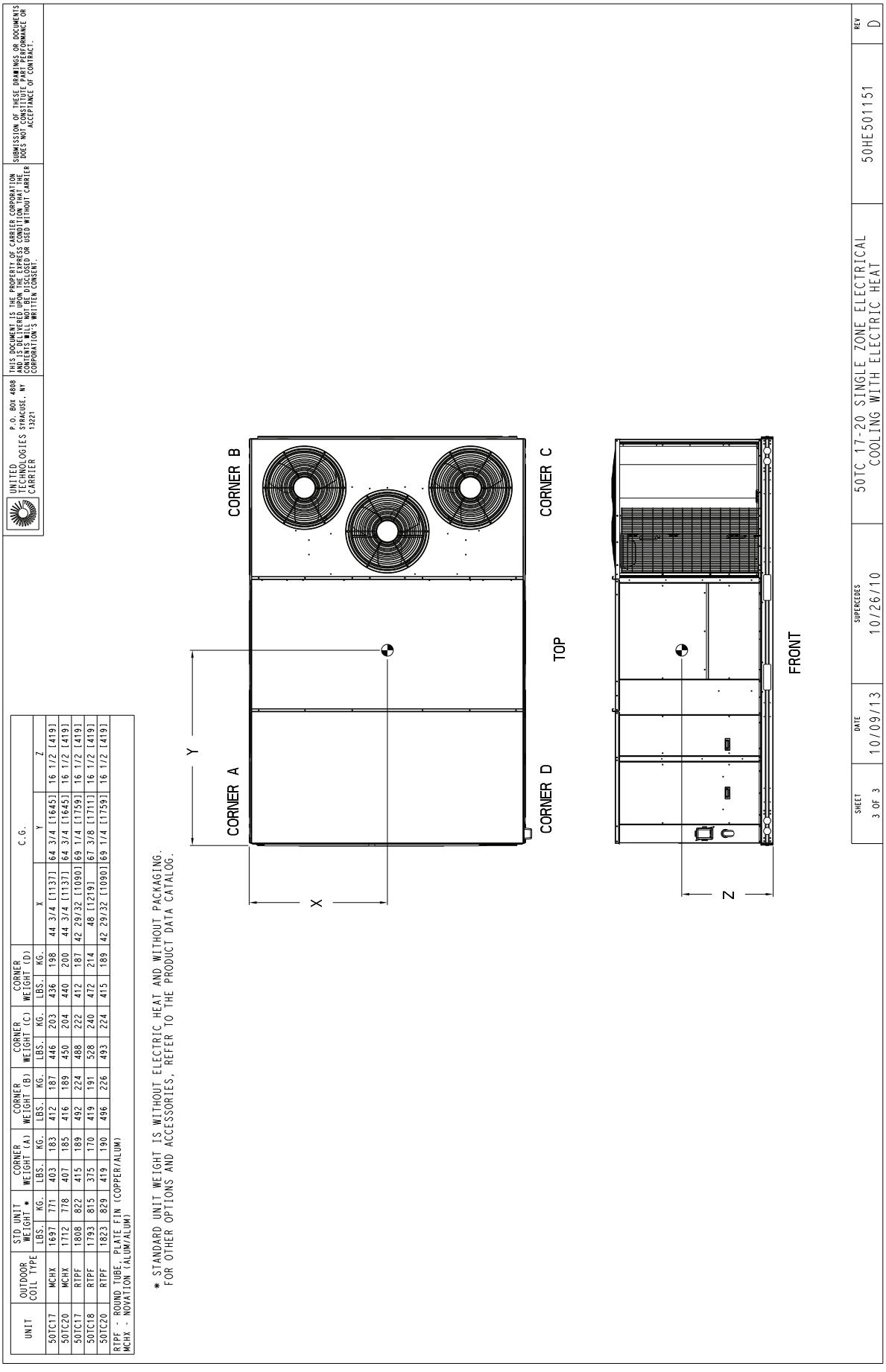
DIMENSIONS



C13731

Fig. 2 - Unit Dimensional Drawing – 18 Size Unit

DIMENSIONS (cont)



UNIT	OUTDOOR COIL TYPE	STD UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.			
		LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X		Y	Z
50TC17	MCHX	1697	771	403	183	412	187	446	203	436	198	44 3/4	[1137]	64 3/4 [1645]	16 1/2 [419]
50TC20	MCHX	1712	778	407	185	416	189	450	204	440	200	44 3/4	[1137]	64 3/4 [1645]	16 1/2 [419]
50TC17	RTPF	1808	822	415	189	492	224	488	222	412	187	42 29/32	[1090]	69 1/4 [1759]	16 1/2 [419]
50TC18	RTPF	1793	815	375	170	419	191	528	240	472	214	48	[1219]	67 3/8 [1711]	16 1/2 [419]
50TC20	RTPF	1823	829	419	190	496	226	493	224	415	189	42 29/32	[1090]	69 1/4 [1759]	16 1/2 [419]

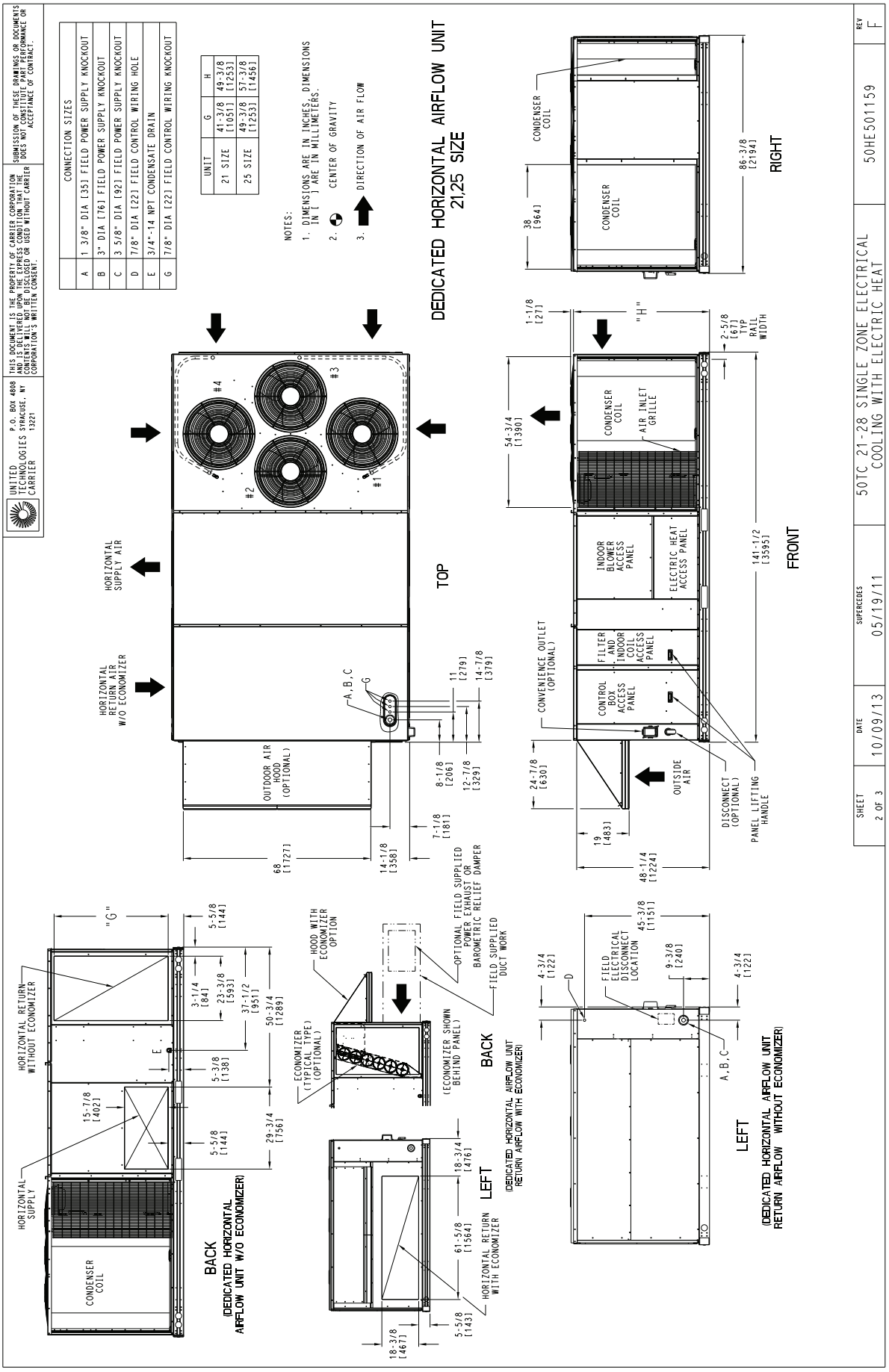
RTPF - ROUND TUBE, PLATE FIN (COPPER/ALUM)
MCHX - NOVATION (ALUM/ALUM)

* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.

C13732

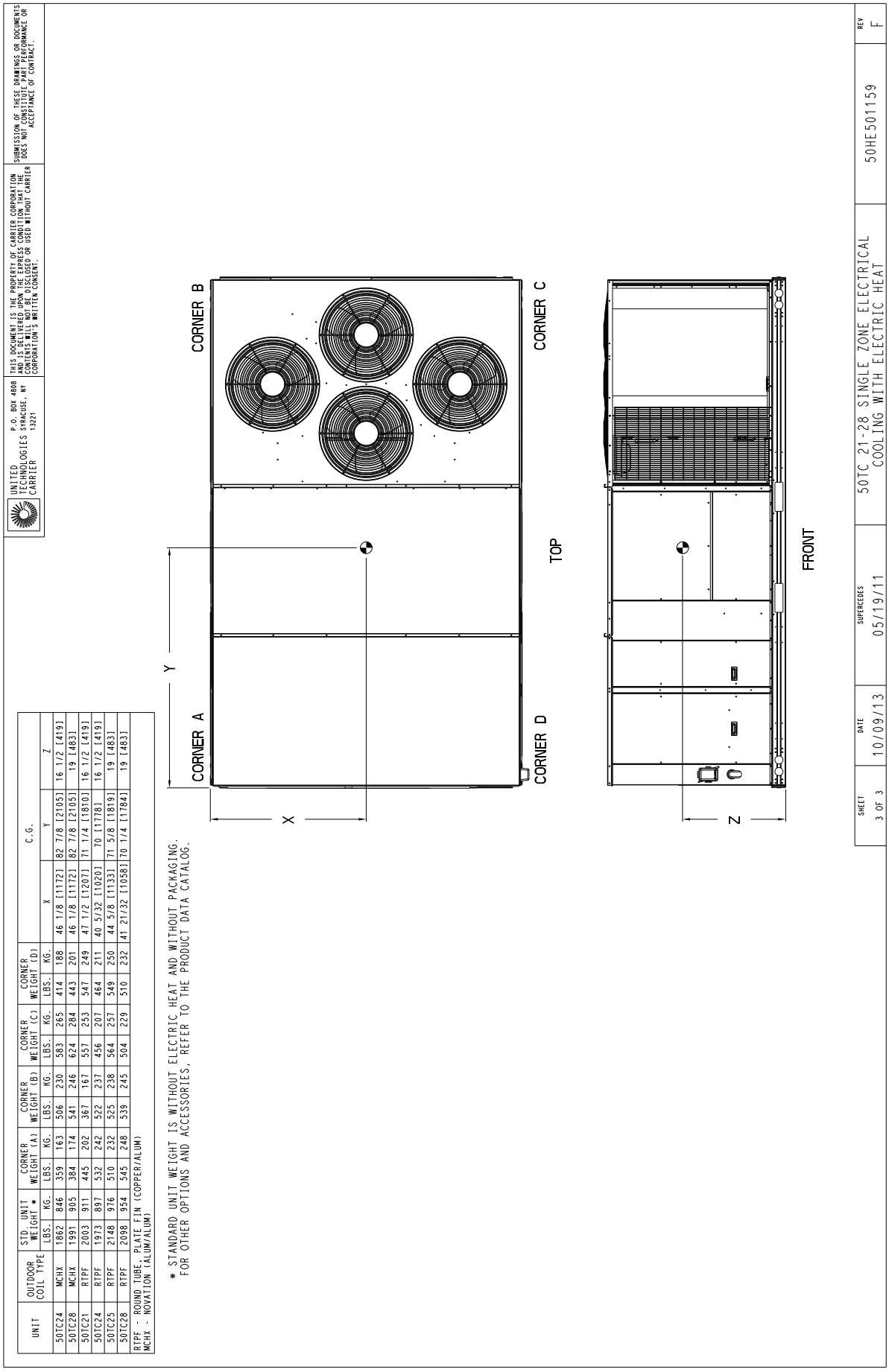
Fig. 2 - Unit Dimensional Drawing – 18 Size Unit (cont)

DIMENSIONS (cont)



C13727

Fig. 3 - Unit Dimensional Drawing – 21 and 25 Size Units



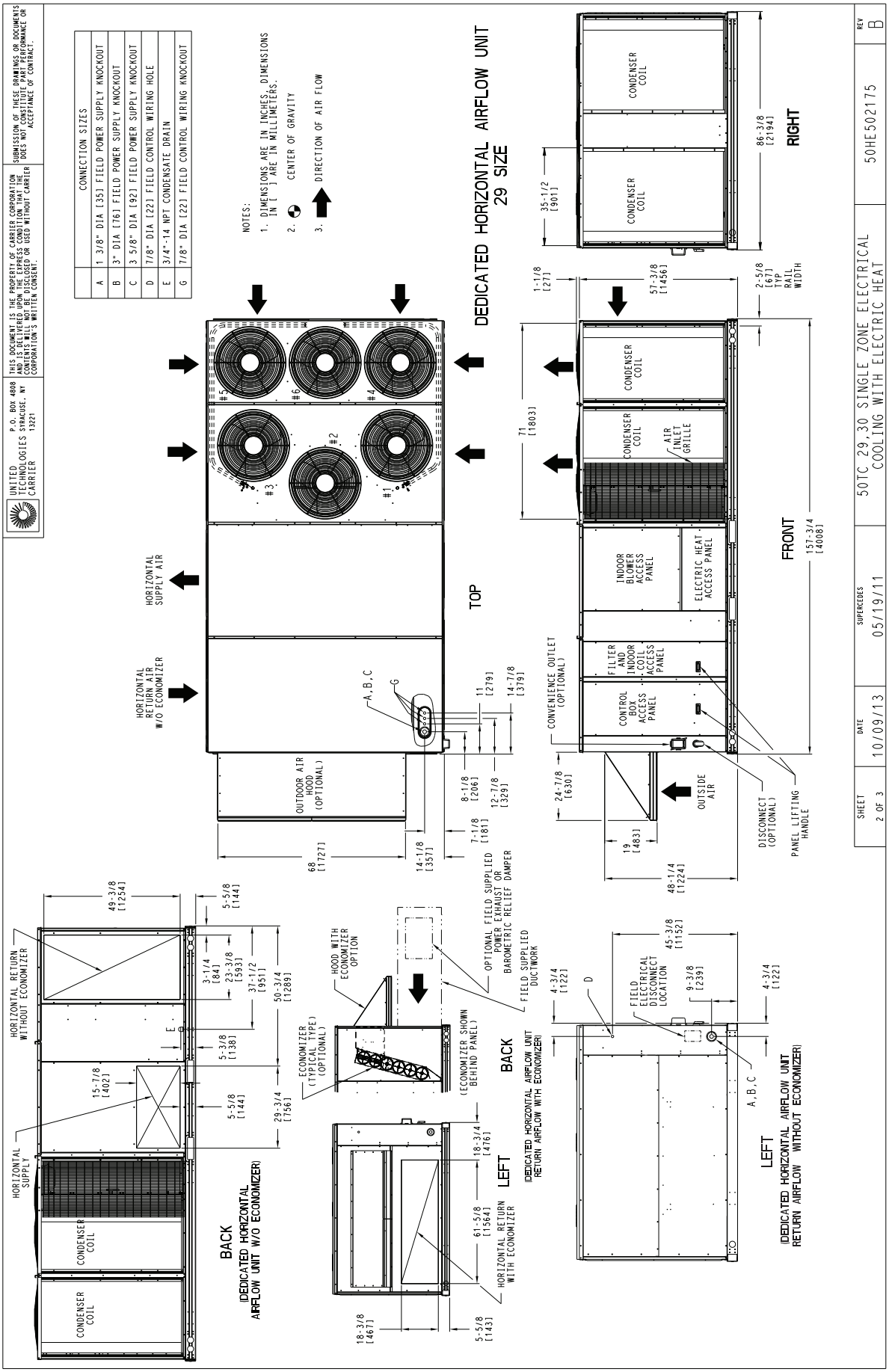
UNIT	OUTDOOR COIL TYPE	STD. UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
		LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
50TC24	MCHX	1862	846	359	163	506	230	583	265	414	188	46 1/8 [1172]	82 7/8 [2105]	16 1/2 [419]
50TC28	MCHX	1991	905	384	174	541	246	624	284	443	201	46 1/8 [1172]	82 7/8 [2105]	19 [483]
50TC21	RTPF	2003	911	445	202	367	167	557	253	547	249	47 1/2 [1207]	71 1/4 [1810]	16 1/2 [419]
50TC24	RTPF	1973	897	532	242	522	237	456	207	464	211	40 5/32 [1020]	70 [1778]	16 1/2 [419]
50TC25	RTPF	2148	976	510	232	525	238	564	257	549	250	44 5/8 [1133]	71 5/8 [1819]	19 [483]
50TC28	RTPF	2098	954	545	248	539	245	504	229	510	232	41 21/32 [1058]	70 1/4 [1784]	19 [483]

RTPF - ROUND TUBE, PLATE FIN (COPPER/ALUM)
MCHX - NOVATION (ALUM/ALUM)

* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.

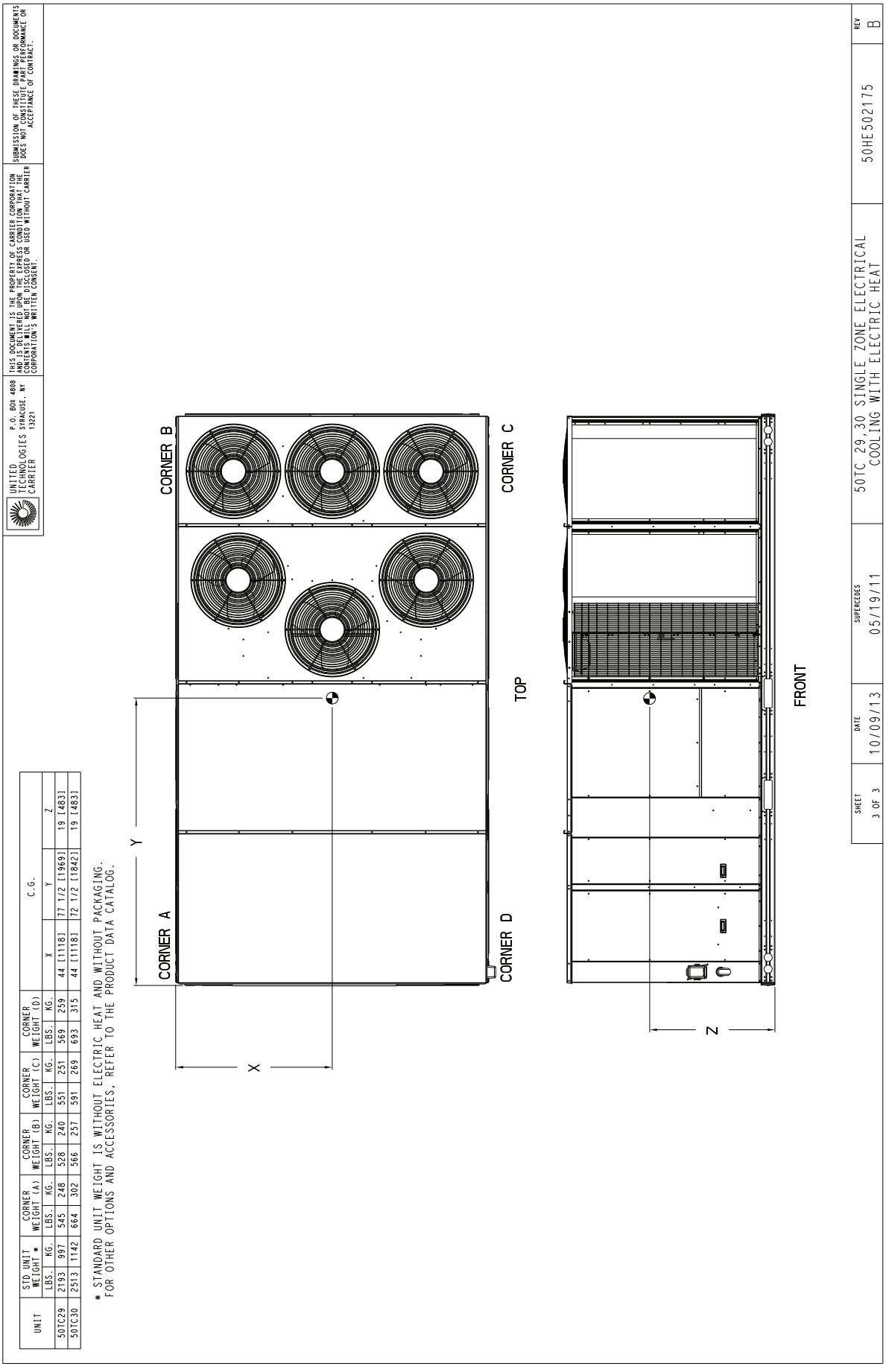
C13738

Fig. 3 - Unit Dimensional Drawing – 21 and 25 Size Units (cont)



C13743

Fig. 4 - Unit Dimensional Drawing – 29 Size Unit



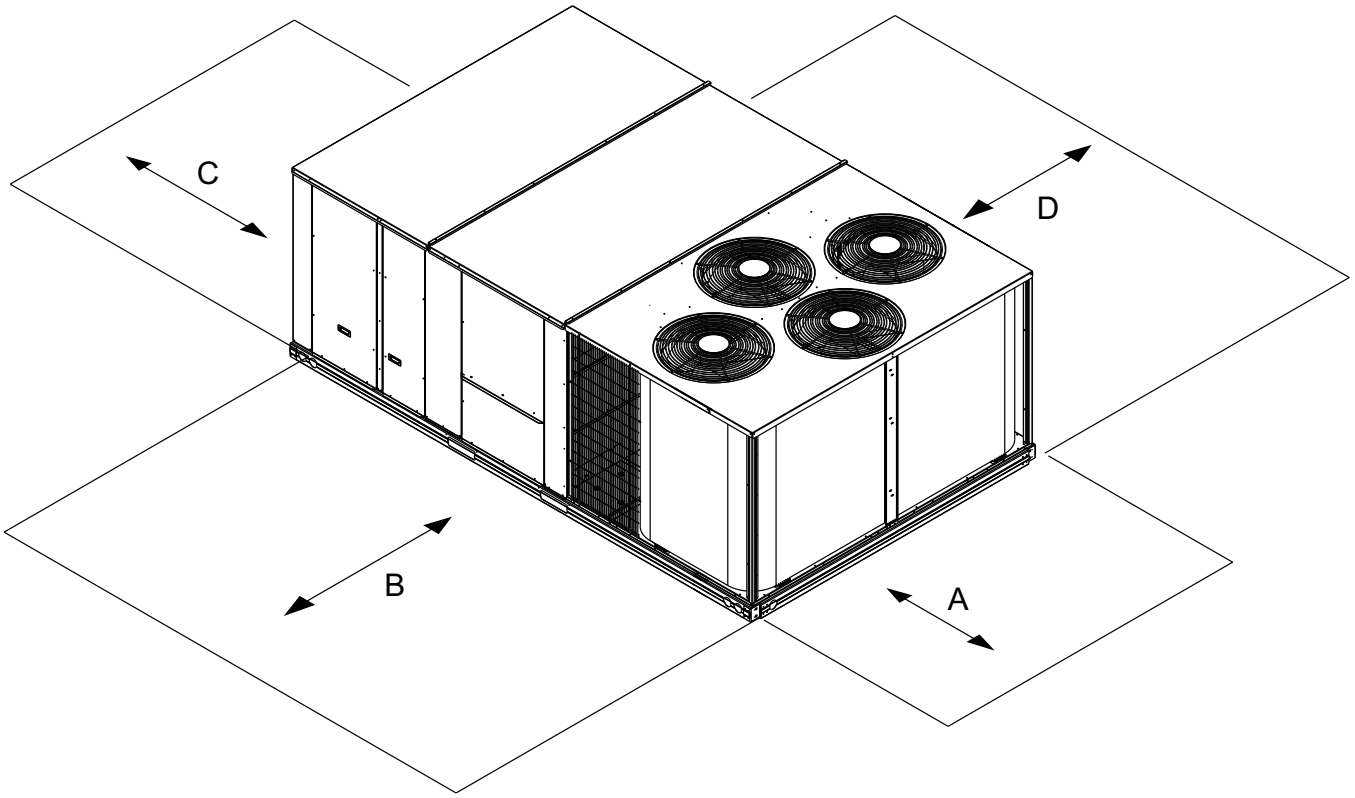
UNIT	STD UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
50TC29	2193	997	545	248	528	240	551	251	569	259	44 [1118]	77 1/2 [1969]	19 [483]
50TC30	2513	1142	664	302	566	257	591	269	693	315	44 [1118]	72 1/2 [1842]	19 [483]

* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.

C13744

Fig. 4 - Unit Dimensional Drawing – 29 Size Unit (cont)

DIMENSIONS (cont)



C12392

LOCATION	DIMENSION	CONDITION
A	36–in (914 mm)	• Recommended clearance for air flow and service
B	42–in (1067 mm)	• Recommended clearance for air flow and service
C	18–in (457 mm)	• No Convenience Outlet • No Economizer • No field–installed disconnect on economizer hood side (Factory–installed disconnect installed).
	36–in (914 mm)	• Convenience Outlet installed. • Vertical surface behind servicer is electrically non–conductive (e.g.: wood, fiberglass).
	42–in (1067 mm)	• Convenience Outlet installed. • Vertical surface behind servicer is electrically conductive (e.g.: metal, masonry).
	96–in (2438 mm)	• Economizer and/or Power Exhaust installed. • Check for sources of flue products with 10 feet (3 meters) of economizer fresh air intake.
D	42–in (1067 mm)	• Recommended clearance for service.

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

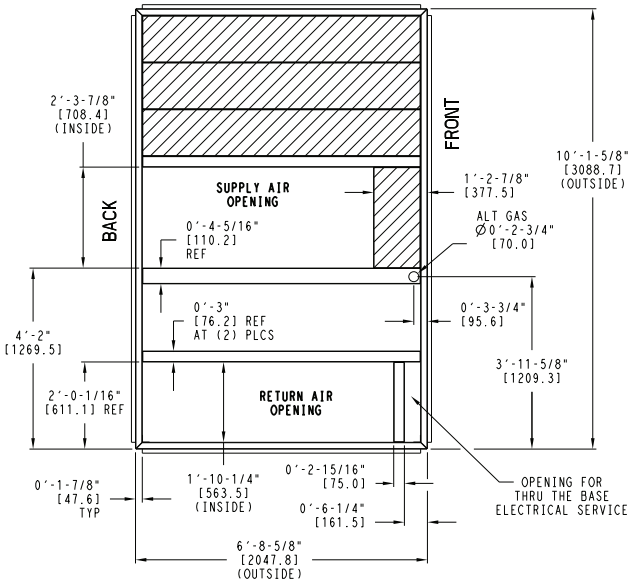
Fig. 5 - Service Clearance Dimensional Drawing

Table 6 – Operating Weights

50TC–*	UNIT LB (KG)			
	18	21	25	29
Base Unit	1793 (815)	2003 (911)	2148 (976)	2193 (997)
Economizer	246 (112)	246 (112)	246 (112)	246 (112)
Powered Outlet	35 (16)	35 (16)	35 (16)	35 (16)
Humidi–MiZer® System	110 (50)	120 (54)	120 (54)	120 (54)
Curb				
14–in/356 mm	240 (109)	255 (116)	255 (116)	255 (116)
24–in/610 mm	340 (154)	355 (161)	355 (161)	355 (161)

DIMENSIONS (cont)

UNIT SIZE	"A"	ROOF CURB ACCESSORY
18	1′-2" [356.0] 2′-0" [610.0]	CRRFCURB045A00 CRRFCURB046A00



NOTES:

1 ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.

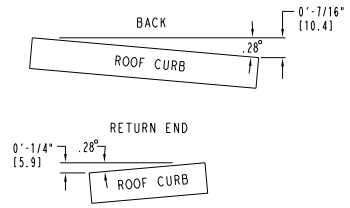
2 DIMENSIONS IN [ ] ARE IN MILLIMETERS.

3 ROOF CURB GALVANIZED STEEL.

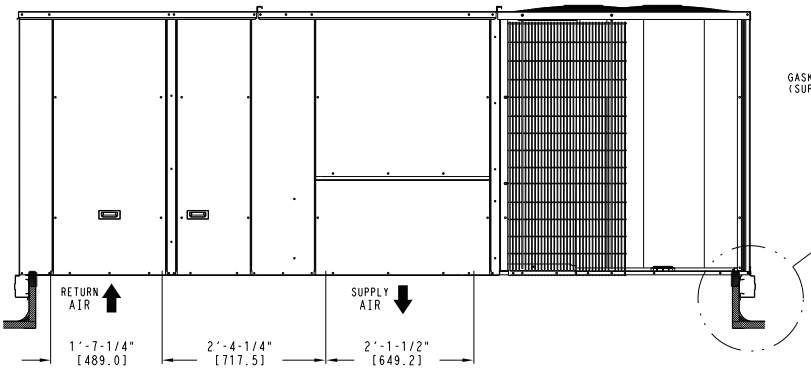
4 ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB)

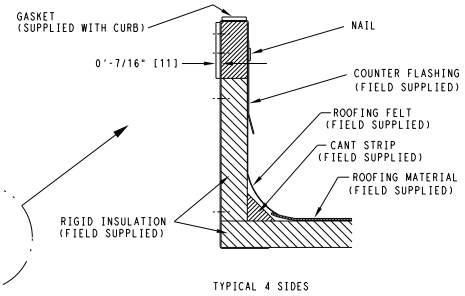
5 SERVICE CLEARANCE 4 ft ON EACH SIDE

DIRECTION OF AIR FLOW

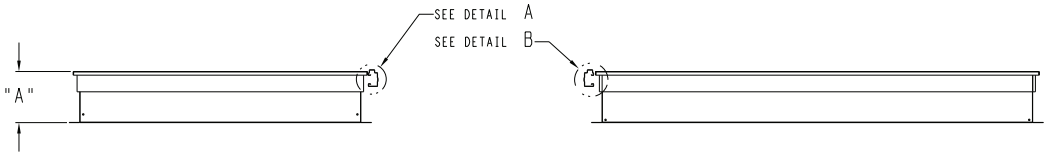


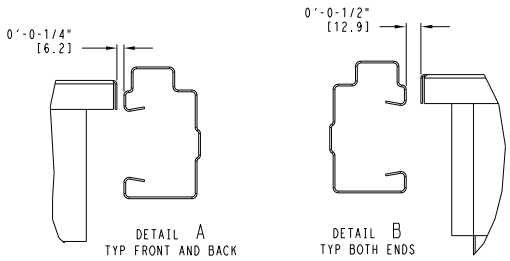
MAX CURB LEVELING TOLERANCES

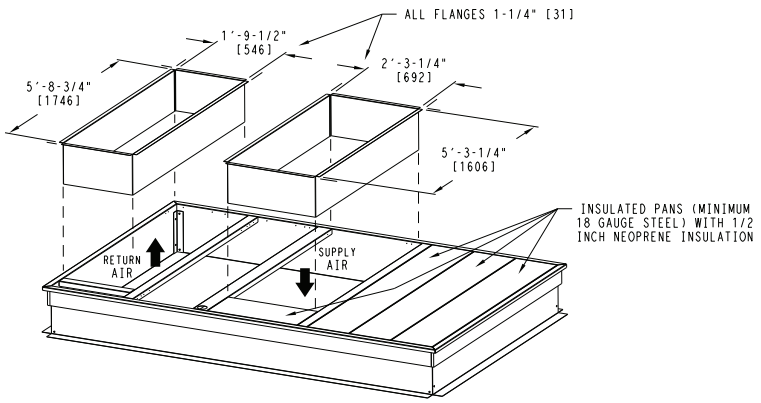




TYPICAL 4 SIDES





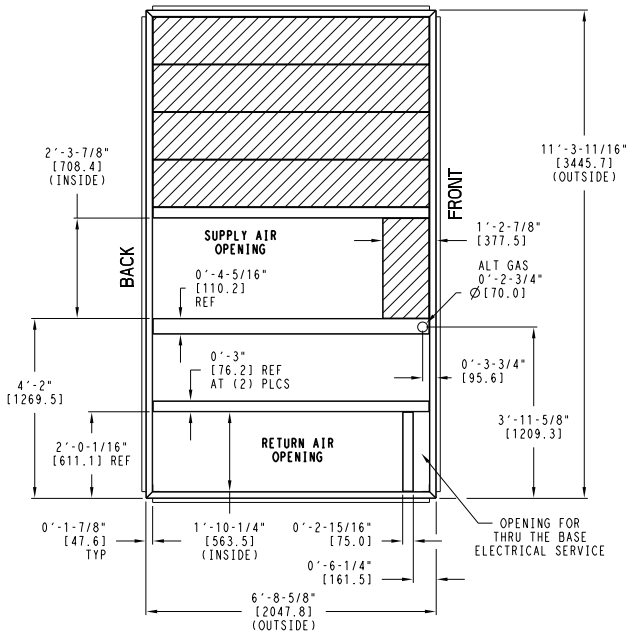


C13780

Fig. 6 - Roof Curb Details – 18 Size Unit

DIMENSIONS (cont)

UNIT SIZE	"A"	ROOF CURB ACCESSORY
21,25	1′-2" [356.0] 2′-0" [610.0]	CRRFCURB047A00 CRRFCURB048A00



NOTES:

1 ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.

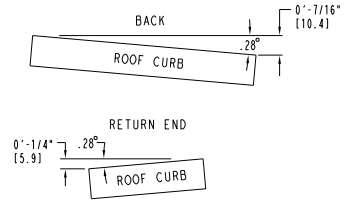
2 DIMENSIONS IN [ ] ARE IN MILLIMETERS.

3 ROOF CURB GALVANIZED STEEL.

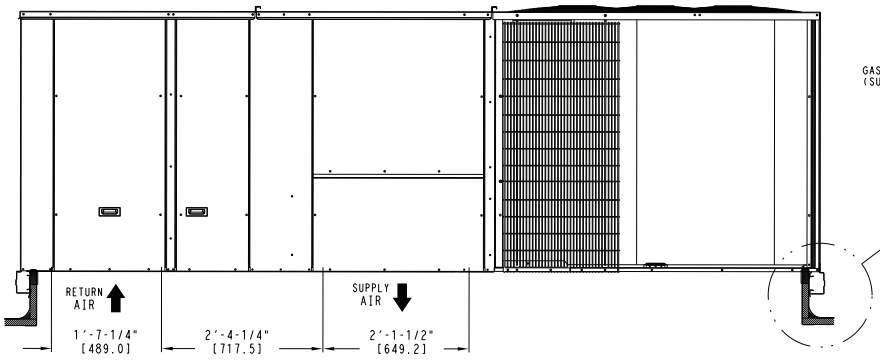
4 ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB)

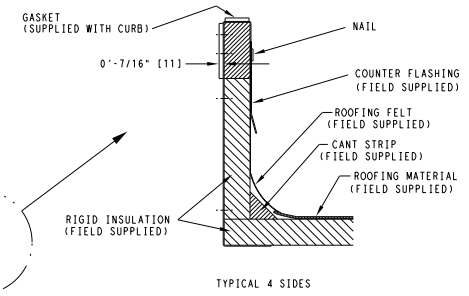
5 SERVICE CLEARANCE 4 ft ON EACH SIDE

➡ DIRECTION OF AIR FLOW

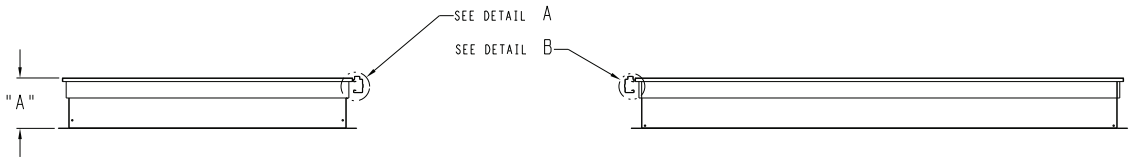


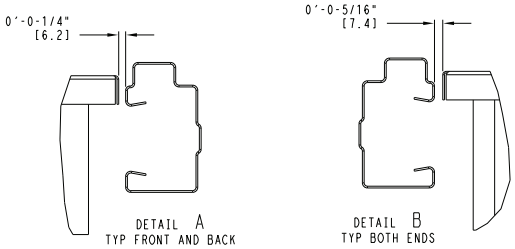
MAX CURB LEVELING TOLERANCES

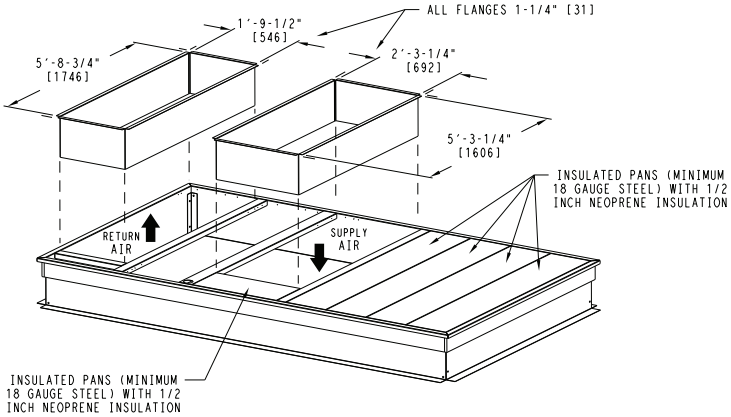




TYPICAL 4 SIDES







C13781

Fig. 7 - Roof Curb Details – 21 and 25 Size Units

DIMENSIONS (cont)

UNIT SIZE	"A"	ROOF CURB ACCESSORY
29	1′-2" [356.0] 2′-0" [610.0]	CRRFCURB049A00 CRRFCURB050A00

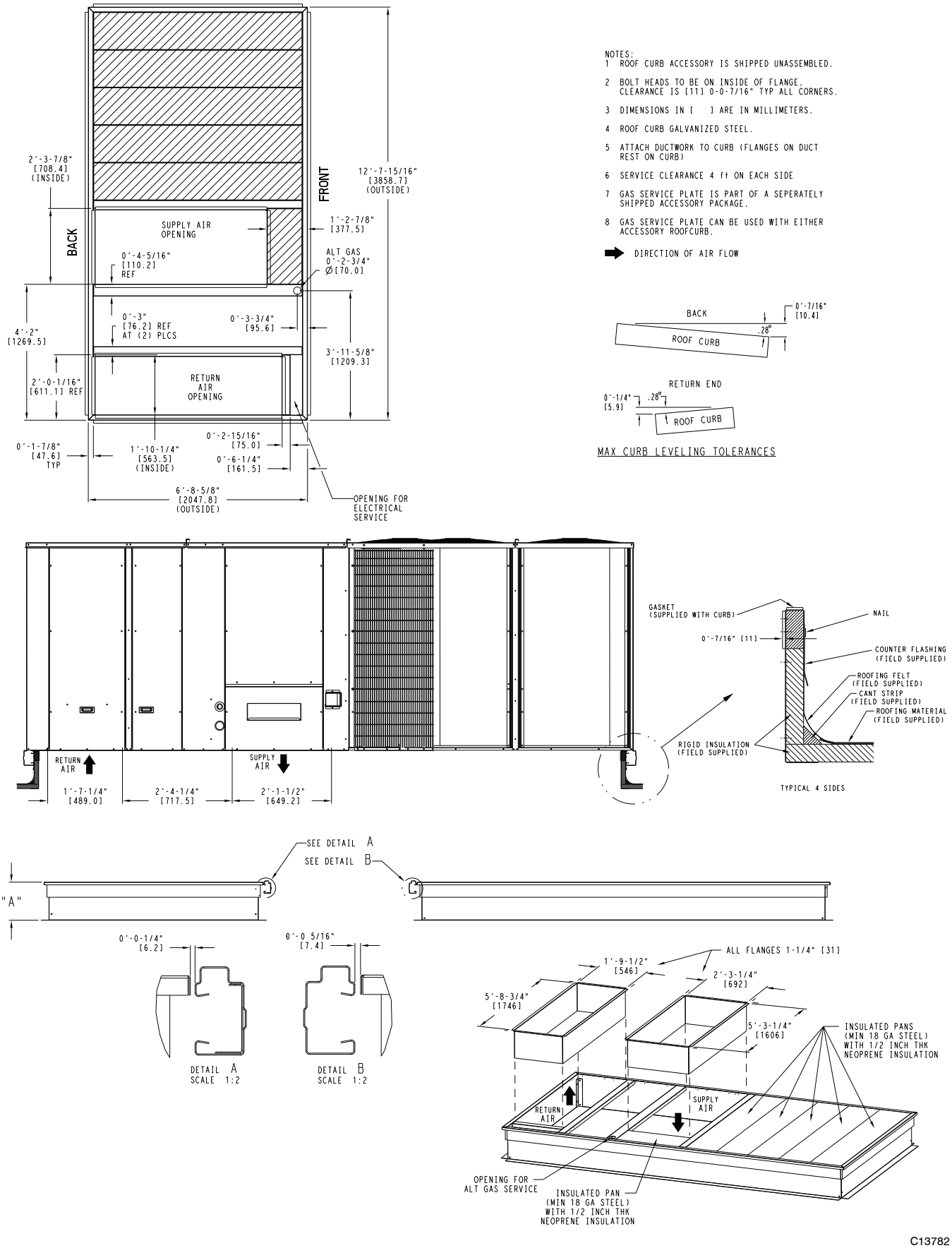


Fig. 8 - Roof Curb Details – 29 Size Unit

OPTIONS AND ACCESSORIES WEIGHT ADDERS

BASE UNIT WITH OPTIONS AND ACCESSORIES (Weight Adders)	MAX WEIGHT ADD							
	50TC–*18		50TC–*21		50TC–*25		50TC–*29	
	lb	kg	lb	kg	lb	kg	lb	kg
Base Unit Operating Weight	1793	813	2003	909	2148	974	2193	975
Humidi–MiZer® System*	110	50	120	55	120	55	120	55
Power Exhaust	125	57	125	57	125	57	125	57
Economizer	246	112	246	112	246	112	246	112
Copper Tube/Fin Evaporator Coil	53	24	58	26	64	29	64	29
Electric Heater	85	39	85	39	85	39	85	39
Single Point Kit	15	7	15	7	15	7	15	7
Roof Curb 14–in (356mm)	240	109	255	116	255	116	255	116
Roof Curb 24–in (610mm)	340	154	355	161	355	161	355	161
Louvered Hail Guard	60	27	60	27	120	54	150	68
CO_2 sensor	5	2	5	2	5	2	5	2
Return Smoke Detector	5	2	5	2	5	2	5	2
Supply Smoke Detector	5	2	5	2	5	2	5	2
Fan/Filter Status Switch	2	1	2	1	2	1	2	1
Non–Fused Disconnect	15	7	15	7	15	7	15	7
Powered Convenience Outlet	35	16	35	16	35	16	35	16
Unpowered Convenience Outlet	5	2	5	2	5	2	5	2
Enthalpy Sensor	2	1	2	1	2	1	2	1
Differential Enthalpy Sensor	3	1	3	1	3	1	3	1
Two Position Motorized Damper	50	23	50	23	50	23	65	29
Manual Damper	35	16	35	16	35	16	40	18
Field Filter Track 4–in (102mm)	12	5	12	5	12	5	12	5
Motormaster® Controller	39	18	39	18	39	18	39	18
Standard Static Motor/Drive	0	0	0	0	0	0	0	0
Medium Static Motor/Drive	5	2	6	3	6	3	6	3
High Static Motor/Drive	11	5	12	5	16	7	16	7
Barometric Relief Hood (Horizontal)	25	11	25	11	25	11	25	11
SAV™ System with VFD	20	9	20	9	20	9	20	9

* For Humidi–MiZer system add Motormaster controller

APPLICATION/SELECTION DATA

Min operating ambient temp (cooling):

In mechanical cooling mode, your Carrier rooftop can safely operate down to an outdoor ambient temperature of 35°F (2°C). It is possible to provide cooling at lower outdoor ambient temperatures by using less outside air, economizers, and/or accessory low ambient kits.

Max operating ambient temp (cooling):

The maximum operating ambient temperature for cooling mode is 115°F (46°C). While cooling operation above 115°F (46°C) may be possible, it could cause either a reduction in performance, reliability, or a protective action by the unit's internal safety devices.

Min and max airflow (cooling mode):

To maintain safe and reliable operation of your rooftop, operate within the cooling airflow limits. Operating above the max may cause blow-off, undesired airflow noise, or airflow related problems with the rooftop unit. Operating below the min may cause problems with coil freeze-up. For proper minimum and maximum CFM values see Table 3 on page 9.

Airflow:

All units are draw-through in cooling mode.

Outdoor air application strategies:

Economizers reduce operating expenses and compressor run time by providing a free source of cooling and a means of ventilation to match application changing needs. In fact, they should be considered for most applications. Also, consider the various economizer control methods and their benefits, as well as sensors required to accomplish your application goals. Please contact your local Carrier representative for assistance.

Motor limits, break horsepower (BHP):

Due to Carrier's internal unit design, air path, and specially designed motors, the full horsepower (maximum continuous BHP) band, as listed in Table 5, can be used with the utmost confidence. There is no need for extra safety factors, as Carrier's motors are designed and rigorously tested to use the entire, listed BHP range without either nuisance tripping or premature motor failure.

APPLICATION/SELECTION DATA (cont)

Sizing a rooftop

Bigger isn't necessarily better. While an air conditioner needs to have enough capacity to meet the load, it doesn't need excess capacity. In fact, having excess capacity typically results in very poor part load performance and humidity control.

Using higher design temperatures than ASHRAE recommends for your location, adding "safety factors" to the calculated load, and rounding up to the next largest unit, are all signs of oversizing air conditioners. Oversizing can cause short-cycling, and short cycling leads to poor humidity control, reduced efficiency, higher utility bills, drastic indoor temperature swings, excessive noise, and increased wear and tear on the air conditioner.

Rather than oversizing an air conditioner, wise contractors and engineers "right-size" or even slightly undersize air conditioners. Correctly sizing an air conditioner controls humidity better; promotes efficiency; reduces utility bills; extends equipment life, and maintains even, comfortable temperatures.

Low ambient applications

When equipped with a Carrier economizer, your rooftop unit can cool your space by bringing in fresh, cool outside air. In fact, when so equipped, accessory low-ambient kit may not be necessary. In low ambient conditions, unless the outdoor air is excessively humid or contaminated, economizer-based "free cooling" is the preferred less costly and energy conscious method.

In low ambient applications where outside air might not be desired (such as contaminated or excessively humid outdoor environments), your Carrier rooftop can operate to ambient temperatures down to -20°F (-29°C) using the recommended accessory Motormaster® low ambient controller.

Winter start

Carrier's winter start kit extends the low ambient limit of your rooftop to 25°F (-4°C). The kit bypasses the low-pressure switch, preventing nuisance tripping of the low-pressure switch. Other low ambient precautions may still be prudent.

Application/Selection Option

Selection software by Carrier saves time by performing many of the steps above. Contact your Carrier sales representative for assistance.

Staged Air Volume (SAV™) with Variable Frequency Drive (VFD)

Carrier's Staged Air Volume (SAV) system utilizes a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the units cooling operation. Per ASHRAE 90.1-2016 and IECC-2015 standards, during the first stage of cooling operation the VFD will adjust the fan motor to provide 66% of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%). During the heating mode, the VFD will allow total design cfm (100%) operation and during the ventilation mode the VFD will allow operation to 66% of total cfm.

The VFD used in Carrier's SAV system has soft start capabilities to slowly ramp up the speeds, thus eliminating any high inrush air volume during initial start-up. It also has internal over current protection for the fan motor and a field-installed display kit that allows adjustment and in depth diagnostics of the VFD.

This SAV system is available on models with 2-stage cooling operation with electro-mechanical or RTU Open (multi Protocol) controls. Both space sensor and conventional thermostats controls can be used to provide accurate control in any application.

The SAV system is very flexible for initial fan performance set up and adjustment. The standard factory shipped VFD is pre-programmed to automatically stage the fan speed between the first and second stage of cooling. The unit fan performance static pressure and cfm can be easily adjusted using the traditional means of pulley adjustments. The other means to adjust the unit static and cfm performance is to utilize the field-installed display module and adjust the frequency and voltage in the VFD to required performance requirements. In either case, once set up the VFD will automatically adjust the speed between the cooling stage operations.

Table 7 – COOLING CAPACITIES 2-STAGE COOLING 15 TONS

50TC–D18				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
4500 CFM	EAT (wb)	58	TC	158.3	158.3	179.2	152.6	152.6	172.9	146.6	146.6	166.1	140.2	140.2	158.8
			SHC	137.3	158.3	179.2	132.4	152.6	172.9	127.2	146.6	166.1	121.6	140.2	158.8
		62	TC	166.8	166.8	169.0	159.5	159.5	165.6	151.8	151.8	161.9	143.6	143.6	157.9
			SHC	123.1	146.1	169.0	119.7	142.6	165.6	116.1	139.0	161.9	112.3	135.1	157.9
		67	TC	182.9	182.9	182.9	174.9	174.9	174.9	166.3	166.3	166.3	157.2	157.2	157.2
			SHC	100.0	123.1	146.1	96.7	119.8	142.8	93.2	116.3	139.4	89.7	112.7	135.7
		72	TC	200.5	200.5	200.5	191.6	191.6	191.6	182.2	182.2	182.2	172.2	172.2	172.2
			SHC	76.1	99.5	122.8	72.9	96.2	119.5	69.5	92.8	116.1	66.0	89.3	112.5
		76	TC	–	215.4	215.4	–	205.8	205.8	–	195.6	195.6	–	184.8	184.8
			SHC	–	80.2	105.0	–	77.1	101.7	–	73.7	98.2	–	70.2	94.5
5250 CFM	EAT (wb)	58	TC	166.7	166.7	188.8	160.6	160.6	181.9	154.0	154.0	174.4	147.0	147.0	166.5
			SHC	144.6	166.7	188.8	139.3	160.6	181.9	133.6	154.0	174.4	127.6	147.0	166.5
		62	TC	172.0	172.0	185.1	164.3	164.3	181.2	156.3	156.3	177.0	147.8	147.8	172.4
			SHC	132.5	158.8	185.1	128.9	155.1	181.2	125.0	151.0	177.0	120.9	146.6	172.4
		67	TC	188.3	188.3	188.3	179.7	179.7	179.7	170.7	170.7	170.7	161.0	161.0	161.0
			SHC	106.1	132.7	159.3	102.8	129.3	155.9	99.3	125.8	152.4	95.6	122.1	148.6
		72	TC	206.1	206.1	206.1	196.7	196.7	196.7	186.7	186.7	186.7	176.2	176.2	176.2
			SHC	78.8	105.6	132.5	75.5	102.3	129.1	72.1	98.8	125.6	68.5	95.2	121.9
		76	TC	–	221.2	221.2	–	211.0	211.0	–	200.3	200.3	–	189.0	189.0
			SHC	–	83.6	111.7	–	80.3	108.2	–	76.9	104.6	–	73.3	100.9
6000 CFM	EAT (wb)	58	TC	173.8	173.8	196.8	167.2	167.2	189.4	160.2	160.2	181.4	152.7	152.7	173.0
			SHC	150.8	173.8	196.8	145.1	167.2	189.4	139.0	160.2	181.4	132.5	152.7	173.0
		62	TC	176.3	176.3	199.5	168.5	168.5	194.9	160.5	160.5	188.9	152.9	152.9	179.9
			SHC	140.9	170.2	199.5	136.9	165.9	194.9	132.1	160.5	188.9	125.8	152.9	179.9
		67	TC	192.3	192.3	192.3	183.4	183.4	183.4	173.9	173.9	173.9	164.0	164.0	164.0
			SHC	112.0	142.0	172.0	108.5	138.5	168.5	104.9	134.9	164.8	101.2	131.1	161.0
		72	TC	210.4	210.4	210.4	200.6	200.6	200.6	190.2	190.2	190.2	179.3	179.3	179.3
			SHC	81.2	111.4	141.7	77.9	108.0	138.2	74.4	104.5	134.6	70.7	100.8	130.8
		76	TC	–	225.6	225.6	–	215.0	215.0	–	203.8	203.8	–	192.1	192.1
			SHC	–	86.7	117.9	–	83.3	114.5	–	79.9	110.8	–	76.3	107.1
6750 CFM	EAT (wb)	58	TC	179.8	179.8	203.7	172.9	172.9	195.8	165.5	165.5	187.4	157.5	157.5	178.4
			SHC	156.0	179.8	203.7	150.0	172.9	195.8	143.5	165.5	187.4	136.7	157.5	178.4
		62	TC	180.5	180.5	210.7	173.0	173.0	203.6	165.6	165.6	194.9	157.7	157.7	185.5
			SHC	147.6	179.2	210.7	142.4	173.0	203.6	136.3	165.6	194.9	129.8	157.7	185.5
		67	TC	195.6	195.6	195.6	186.2	186.2	186.2	176.5	176.5	176.8	166.2	166.2	172.7
			SHC	117.5	150.8	184.1	114.0	147.3	180.5	110.4	143.6	176.8	106.5	139.6	172.7
		72	TC	213.8	213.8	213.8	203.6	203.6	203.6	192.9	192.9	192.9	181.6	181.6	181.6
			SHC	83.5	117.0	150.5	80.1	113.5	147.0	76.5	109.9	143.3	72.8	106.1	139.4
		76	TC	–	229.1	229.1	–	218.1	218.1	–	206.6	206.6	–	194.6	194.6
			SHC	–	89.6	124.0	–	86.2	120.5	–	82.7	116.8	–	79.0	113.0
7500 CFM	EAT (wb)	58	TC	185.1	185.1	209.6	177.7	177.7	201.3	170.0	170.0	192.5	161.6	161.6	183.0
			SHC	160.6	185.1	209.6	154.2	177.7	201.3	147.5	170.0	192.5	140.2	161.6	183.0
		62	TC	185.2	185.2	218.0	177.9	177.9	209.3	170.1	170.1	200.2	161.8	161.8	190.4
			SHC	152.5	185.2	218.0	146.4	177.9	209.3	140.0	170.1	200.2	133.2	161.8	190.4
		67	TC	198.1	198.1	198.1	188.6	188.6	192.1	178.6	178.6	188.1	168.1	168.1	183.8
			SHC	122.8	159.3	195.9	119.2	155.7	192.1	115.5	151.8	188.1	111.5	147.7	183.8
		72	TC	216.6	216.6	216.6	206.1	206.1	206.1	195.1	195.1	195.1	183.5	183.5	183.5
			SHC	85.6	122.3	159.0	82.2	118.8	155.5	78.6	115.2	151.7	74.9	111.3	147.8
		76	TC	–	231.9	231.9	–	220.7	220.7	–	208.9	208.9	–	196.5	196.5
			SHC	–	92.4	129.9	–	88.9	126.3	–	85.4	122.6	–	81.6	118.7

Note: See Minimum–Maximum Airflow Ratings in Table 3. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering Air Temperature (dry bulb)
EAT(wb) – Entering Air Temperature (wet bulb)
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

50TC–E18 (15 TONS) – UNIT WITH HUMIDI–MIZER IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		4,500			6,000			7,500		
		Air Entering Evaporator – Ewb (F)								
75	TC	202.9	184.6	166.2	213.7	194.6	175.4	222.3	202.5	182.7
	SHC	91.9	112.4	132.9	106.1	126.4	146.8	117.5	137.7	158.0
	kW	10.19	10.12	9.78	10.51	10.19	9.95	10.61	10.36	10.12
85	TC	189.8	171.8	153.8	201.0	182.2	163.3	209.9	190.4	170.8
	SHC	75.9	101.0	126.2	91.2	116.3	141.3	103.4	128.4	153.5
	kW	11.57	11.49	11.15	11.88	11.56	11.32	11.98	11.73	11.49
95	TC	176.7	159.1	141.4	188.3	169.7	151.2	197.5	178.2	159.0
	SHC	59.8	89.7	119.6	76.2	106.1	135.9	89.4	119.2	149.0
	kW	12.87	12.81	12.47	13.20	12.88	12.64	13.30	13.05	12.81
105	TC	163.6	146.3	129.0	175.6	157.3	139.1	185.1	166.1	147.1
	SHC	43.8	78.4	112.9	61.3	95.9	130.4	75.3	109.9	144.4
	kW	14.05	14.00	13.65	14.39	14.07	13.82	14.40	14.24	14.00
115	TC	150.5	133.5	116.5	162.9	144.9	127.0	172.7	154.0	135.3
	SHC	27.7	67.0	106.3	46.4	85.7	125.0	61.3	100.6	133.4
	kW	15.44	15.36	15.02	15.75	15.43	15.19	15.85	15.60	15.36

50TC–E18 (15 TONS) – UNIT WITH HUMIDI–MIZER IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR (F)								
		75 Dry Bulb			75 Dry Bulb			75 Dry Bulb		
		62.5 Wet Bulb			64 Wet Bulb			65.3 Wet Bulb		
		(50% Relative Humidity)			(56% Relative Humidity)			(60% Relative Humidity)		
		Air Entering Evaporator – Cfm								
		4,500	6,000	7,500	4,500	6,000	7,500	4,500	6,000	7,500
80	TC	64.50	71.00	73.30	68.40	74.50	77.30	71.20	79.70	80.60
	SHC	12.60	24.90	36.80	6.80	13.70	23.90	–0.80	5.50	13.80
	kW	10.10	10.26	10.42	10.18	10.40	10.56	10.33	10.47	10.67
75	TC	66.60	73.10	75.60	70.50	76.60	79.50	73.20	80.80	82.90
	SHC	14.30	26.70	38.50	8.10	14.90	25.70	0.70	7.00	15.00
	kW	10.05	10.22	10.36	10.14	10.36	10.52	10.28	10.43	10.62
70	TC	68.70	75.10	77.40	72.50	78.60	81.40	75.20	82.80	84.90
	SHC	15.40	27.80	40.00	9.50	16.20	26.80	2.10	8.40	16.30
	kW	10.00	10.18	10.33	10.10	10.31	10.47	10.23	10.40	10.58
60	TC	72.80	79.30	81.60	76.70	82.80	85.70	79.40	86.90	88.80
	SHC	19.00	31.10	43.20	12.70	19.90	30.10	5.30	11.60	20.00
	kW	9.92	10.09	10.24	10.01	10.22	10.37	10.14	10.31	10.49
50	TC	76.80	83.40	85.70	80.80	86.90	89.70	83.50	90.90	92.80
	SHC	21.70	34.20	46.20	15.80	22.70	33.20	8.40	14.70	22.80
	kW	9.83	10.00	10.15	9.92	10.13	10.29	10.05	10.21	10.39
40	TC	80.90	87.30	89.60	84.90	90.80	93.60	87.40	94.80	96.70
	SHC	24.90	37.10	49.30	19.00	26.00	36.10	11.60	17.90	26.20
	kW	9.74	9.91	10.06	9.83	10.04	10.20	9.96	10.12	10.30

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 9 – COOLING CAPACITIES 2-STAGE COOLING 17.5 TONS

50TC–D21				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
5250 CFM	EAT (wb)	58	TC	185.1	185.1	209.2	178.7	178.7	201.9	171.8	171.8	194.1	164.5	164.5	185.8
			SHC	161.1	185.1	209.2	155.4	178.7	201.9	149.4	171.8	194.1	143.1	164.5	185.8
		62	TC	193.8	193.8	199.5	185.6	185.6	195.4	176.9	176.9	191.1	167.7	167.7	186.4
			SHC	145.6	172.6	199.5	141.7	168.6	195.4	137.6	164.4	191.1	133.2	159.8	186.4
		67	TC	212.2	212.2	212.2	203.3	203.3	203.3	193.8	193.8	193.8	183.8	183.8	183.8
			SHC	119.0	146.0	173.1	115.3	142.3	169.4	111.4	138.4	165.4	107.3	134.3	161.3
		72	TC	232.3	232.3	232.3	222.7	222.7	222.7	212.4	212.4	212.4	201.6	201.6	201.6
			SHC	91.5	118.8	146.2	87.9	115.2	142.5	84.1	111.4	138.7	80.2	107.4	134.6
		76	TC	–	249.5	249.5	–	239.2	239.2	–	228.2	228.2	–	216.6	216.6
			SHC	–	96.7	125.3	–	93.2	121.7	–	89.5	117.9	–	85.6	113.8
6125 CFM	EAT (wb)	58	TC	194.7	194.7	220.0	187.8	187.8	212.2	180.4	180.4	203.8	172.5	172.5	194.9
			SHC	169.4	194.7	220.0	163.3	187.8	212.2	156.9	180.4	203.8	150.1	172.5	194.9
		62	TC	199.6	199.6	218.0	191.1	191.1	213.5	182.1	182.1	208.4	173.0	173.0	201.2
			SHC	156.5	187.2	218.0	152.3	182.9	213.5	147.7	178.0	208.4	141.8	171.5	201.2
		67	TC	218.0	218.0	218.0	208.7	208.7	208.7	198.7	198.7	198.7	188.2	188.2	188.2
			SHC	126.2	157.4	188.6	122.4	153.6	184.7	118.4	149.6	180.7	114.3	145.4	176.5
		72	TC	238.5	238.5	238.5	228.4	228.4	228.4	217.7	217.7	217.7	206.3	206.3	206.3
			SHC	94.7	126.1	157.5	91.0	122.4	153.8	87.2	118.5	149.8	83.1	114.4	145.7
		76	TC	–	255.9	255.9	–	245.1	245.1	–	233.6	233.6	–	221.4	221.4
			SHC	–	100.7	133.3	–	97.1	129.6	–	93.3	125.6	–	89.3	121.5
7000 CFM	EAT (wb)	58	TC	202.7	202.7	229.1	195.4	195.4	220.8	187.5	187.5	211.9	179.2	179.2	202.5
			SHC	176.4	202.7	229.1	170.0	195.4	220.8	163.1	187.5	211.9	155.9	179.2	202.5
		62	TC	204.6	204.6	234.4	196.0	196.0	228.0	187.7	187.7	220.3	179.3	179.3	210.5
			SHC	166.0	200.2	234.4	160.8	194.4	228.0	155.1	187.7	220.3	148.2	179.3	210.5
		67	TC	222.5	222.5	222.5	212.8	212.8	212.8	202.4	202.4	202.4	191.5	191.5	191.5
			SHC	133.0	168.2	203.4	129.2	164.3	199.5	125.1	160.3	195.4	120.9	156.0	191.0
		72	TC	243.3	243.3	243.3	232.7	232.7	232.7	221.6	221.6	221.6	209.9	209.9	209.9
			SHC	97.5	132.9	168.3	93.8	129.2	164.5	89.9	125.2	160.5	85.8	121.1	156.3
		76	TC	–	260.8	260.8	–	249.6	249.6	–	237.7	237.7	–	225.1	225.1
			SHC	–	104.4	140.8	–	100.7	137.0	–	96.9	133.0	–	92.8	128.8
7875 CFM	EAT (wb)	58	TC	209.6	209.6	236.8	201.8	201.8	228.1	193.6	193.6	218.8	184.8	184.8	208.9
			SHC	182.3	209.6	236.8	175.6	201.8	228.1	168.4	193.6	218.8	160.8	184.8	208.9
		62	TC	209.8	209.8	246.2	202.0	202.0	237.1	193.8	193.8	227.4	185.0	185.0	217.1
			SHC	173.4	209.8	246.2	167.0	202.0	237.1	160.1	193.8	227.4	152.9	185.0	217.1
		67	TC	226.1	226.1	226.1	216.0	216.0	216.0	205.4	205.4	209.4	194.2	194.2	204.8
			SHC	139.6	178.6	217.7	135.6	174.7	213.7	131.5	170.5	209.4	127.1	166.0	204.8
		72	TC	247.0	247.0	247.0	236.2	236.2	236.2	224.7	224.7	224.7	212.7	212.7	212.7
			SHC	100.2	139.5	178.8	96.5	135.7	174.9	92.5	131.7	170.9	88.4	127.5	166.6
		76	TC	–	264.7	264.7	–	253.1	253.1	–	240.9	240.9	–	227.9	227.9
			SHC	–	107.9	148.1	–	104.2	144.3	–	100.2	140.2	–	96.1	135.9
8750 CFM	EAT (wb)	58	TC	215.4	215.4	243.4	207.3	207.3	234.3	198.7	198.7	224.6	189.6	189.6	214.2
			SHC	187.4	215.4	243.4	180.3	207.3	234.3	172.9	198.7	224.6	164.9	189.6	214.2
		62	TC	215.5	215.5	253.0	207.5	207.5	243.5	198.9	198.9	233.4	189.7	189.7	222.7
			SHC	178.1	215.5	253.0	171.5	207.5	243.5	164.4	198.9	233.4	156.8	189.7	222.7
		67	TC	228.9	228.9	231.5	218.7	218.7	227.3	207.8	207.8	222.8	196.4	196.4	217.9
			SHC	145.8	188.6	231.5	141.8	184.5	227.3	137.5	180.1	222.8	133.0	175.5	217.9
		72	TC	250.1	250.1	250.1	239.0	239.0	239.0	227.3	227.3	227.3	214.9	214.9	214.9
			SHC	102.8	145.8	188.9	99.0	142.0	185.0	95.0	137.9	180.9	90.8	133.7	176.5
		76	TC	–	267.8	267.8	–	256.0	256.0	–	243.5	243.5	–	230.2	230.2
			SHC	–	111.2	155.2	–	107.4	151.3	–	103.5	147.1	–	99.3	142.8

Note: See Minimum–Maximum Airflow Ratings in Table 3. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering Air Temperature (dry bulb)
EAT(wb) – Entering Air Temperature (wet bulb)
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

50TC–E21 (17.5 TONS) – UNIT WITH HUMIDI–MIZER IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		5,250			7,000			8,750		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	232.0	211.3	190.6	242.4	221.0	199.7	250.7	228.9	207.0
	SHC	110.9	133.7	156.4	127.6	150.3	173.0	141.1	163.7	186.4
	kW	12.45	12.16	11.81	12.74	12.41	12.02	12.93	12.51	12.18
85	TC	215.9	195.7	175.5	226.0	205.2	184.4	234.2	212.8	191.5
	SHC	90.6	118.8	147.0	108.4	136.6	164.9	122.7	151.0	179.2
	kW	13.48	13.20	12.88	13.77	13.47	13.07	13.96	13.58	13.23
95	TC	199.7	180.0	160.3	209.7	189.4	169.1	217.6	196.8	176.1
	SHC	70.3	104.0	137.7	89.2	123.0	156.7	104.4	138.2	172.1
	kW	14.60	14.25	13.94	14.89	14.51	14.15	15.08	14.63	14.31
105	TC	183.6	164.5	145.2	193.3	173.5	153.8	201.0	180.8	160.6
	SHC	50.0	89.1	128.3	70.0	109.3	148.6	86.0	125.5	158.6
	kW	15.64	15.36	15.01	15.93	15.60	15.21	16.12	15.72	15.37
115	TC	167.5	148.8	130.1	176.9	157.7	138.5	184.5	164.8	145.1
	SHC	29.7	74.3	118.9	50.7	95.6	138.1	67.7	112.7	145.1
	kW	16.70	16.38	15.82	16.98	16.63	16.03	17.17	16.75	16.19

50TC–E21 (17.5 TONS) – UNIT WITH HUMIDI–MIZER IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR (F)								
		75 Dry Bulb			75 Dry Bulb			75 Dry Bulb		
		62.5 Wet Bulb			64 Wet Bulb			65.3 Wet Bulb		
		(50% Relative Humidity)			(56% Relative Humidity)			(60% Relative Humidity)		
		Air Entering Evaporator – Cfm								
		5,250	7,000	8,750	5,250	7,000	8,750	5,250	7,000	8,750
80	TC	67.80	71.30	74.10	70.50	74.80	79.80	73.30	78.20	82.40
	SHC	9.00	26.50	41.70	2.20	13.20	26.90	–5.20	2.90	13.80
	kW	11.65	11.75	11.87	11.82	11.90	11.98	11.93	12.10	12.19
75	TC	72.50	76.00	78.80	75.00	79.20	84.30	78.00	83.00	86.90
	SHC	13.40	30.90	46.10	6.50	18.00	31.30	–2.10	7.20	17.90
	kW	11.44	11.54	11.66	11.61	11.68	11.75	11.70	11.86	11.95
70	TC	77.10	80.60	83.40	79.50	83.90	88.90	82.40	87.30	91.10
	SHC	17.60	34.70	49.90	10.80	22.20	35.10	3.20	11.50	22.20
	kW	11.22	11.33	11.45	11.40	11.46	11.54	11.49	11.64	11.75
60	TC	86.30	89.90	92.70	88.80	93.20	98.20	91.70	96.60	100.50
	SHC	26.20	43.20	58.40	19.40	30.80	43.60	11.60	20.10	30.70
	kW	10.76	10.86	10.98	10.93	11.00	11.07	11.03	11.18	11.28
50	TC	95.50	99.10	101.90	98.00	102.40	107.40	101.00	106.00	109.80
	SHC	34.80	51.80	67.00	28.00	39.40	52.20	20.10	28.70	39.40
	kW	10.33	10.43	10.55	10.50	10.52	10.63	10.59	10.74	10.85
40	TC	104.80	108.40	111.20	107.30	111.70	116.60	110.30	115.30	119.10
	SHC	43.40	60.40	75.60	36.60	48.00	60.80	28.80	37.30	47.90
	kW	9.87	9.97	10.09	10.04	10.11	10.18	10.14	10.28	10.40

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 11 – COOLING CAPACITIES 2-STAGE COOLING 20 TONS

50TC–D25				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EA (db)			EA (db)			EA (db)			EA (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
6000 CFM	EAT (wb)	58	TC	214.4	214.4	242.5	207.0	207.0	234.2	199.0	199.0	225.1	190.2	190.2	215.2
			SHC	186.3	214.4	242.5	179.9	207.0	234.2	173.0	199.0	225.1	165.3	190.2	215.2
		62	TC	226.8	226.8	227.7	217.3	217.3	223.0	206.9	206.9	218.0	195.8	195.8	212.5
			SHC	167.0	197.3	227.7	162.4	192.7	223.0	157.6	187.8	218.0	152.3	182.4	212.5
		67	TC	248.4	248.4	248.4	237.9	237.9	237.9	226.6	226.6	226.6	214.3	214.3	214.3
			SHC	136.5	167.1	197.6	132.2	162.7	193.2	127.5	158.0	188.4	122.5	152.9	183.4
		72	TC	271.9	271.9	271.9	260.3	260.3	260.3	247.9	247.9	247.9	234.5	234.5	234.5
			SHC	105.1	136.0	167.0	100.8	131.7	162.5	96.3	127.1	157.9	91.4	122.1	152.9
		76	TC	–	291.7	291.7	–	279.2	279.2	–	265.7	265.7	–	251.3	251.3
			SHC	–	110.7	143.7	–	106.5	139.5	–	102.0	134.7	–	97.2	129.7
7000 CFM	EAT (wb)	58	TC	225.8	225.8	255.3	217.8	217.8	246.3	209.1	209.1	236.5	199.6	199.6	225.7
			SHC	196.2	225.8	255.3	189.3	217.8	246.3	181.7	209.1	236.5	173.4	199.6	225.7
		62	TC	233.9	233.9	248.8	223.8	223.8	243.8	213.1	213.1	238.2	201.4	201.4	231.8
			SHC	179.4	214.1	248.8	174.6	209.2	243.8	169.4	203.8	238.2	163.7	197.8	231.8
		67	TC	255.7	255.7	255.7	244.6	244.6	244.6	232.6	232.6	232.6	219.6	219.6	219.6
			SHC	144.7	179.7	214.8	140.2	175.2	210.2	135.4	170.4	205.4	130.3	165.2	200.2
		72	TC	279.4	279.4	279.4	267.3	267.3	267.3	254.1	254.1	254.1	240.1	240.1	240.1
			SHC	108.7	144.1	179.6	104.3	139.7	175.1	99.6	135.0	170.3	94.7	129.9	165.1
		76	TC	–	299.4	299.4	–	286.2	286.2	–	272.1	272.1	–	256.9	256.9
			SHC	–	115.3	152.9	–	110.9	148.2	–	106.3	143.3	–	101.3	138.0
8000 CFM	EAT (wb)	58	TC	235.3	235.3	266.2	226.8	226.8	256.5	217.5	217.5	246.0	207.4	207.4	234.5
			SHC	204.5	235.3	266.2	197.1	226.8	256.5	189.0	217.5	246.0	180.2	207.4	234.5
		62	TC	239.7	239.7	268.1	229.4	229.4	262.0	219.0	219.0	253.3	208.3	208.3	241.9
			SHC	190.7	229.4	268.1	185.4	223.7	262.0	178.6	215.9	253.3	170.4	206.2	241.9
		67	TC	261.3	261.3	261.3	249.6	249.6	249.6	237.1	237.1	237.1	223.6	223.6	223.6
			SHC	152.3	191.8	231.2	147.7	187.1	226.6	142.9	182.2	221.6	137.7	177.0	216.3
		72	TC	285.3	285.3	285.3	272.5	272.5	272.5	258.9	258.9	258.9	244.2	244.2	244.2
			SHC	111.9	151.7	191.5	107.5	147.2	186.9	102.7	142.4	182.0	97.7	137.2	176.7
		76	TC	–	305.4	305.4	–	291.6	291.6	–	276.8	276.8	–	261.2	261.2
			SHC	–	119.4	161.0	–	114.9	156.2	–	110.1	151.2	–	105.1	146.0
9000 CFM	EAT (wb)	58	TC	243.5	243.5	275.4	234.5	234.5	265.2	224.6	224.6	254.0	213.9	213.9	241.9
			SHC	211.6	243.5	275.4	203.8	234.5	265.2	195.2	224.6	254.0	185.9	213.9	241.9
		62	TC	245.4	245.4	282.9	235.4	235.4	274.6	225.0	225.0	264.3	214.4	214.4	251.7
			SHC	199.7	241.3	282.9	193.2	233.9	274.6	185.6	224.9	264.3	176.8	214.3	251.7
		67	TC	265.6	265.6	265.6	253.6	253.6	253.6	240.7	240.7	240.7	226.8	226.8	231.8
			SHC	159.6	203.3	247.1	154.9	198.6	242.3	150.0	193.6	237.3	144.7	188.3	231.8
		72	TC	289.9	289.9	289.9	276.7	276.7	276.7	262.6	262.6	262.6	247.5	247.5	247.5
			SHC	114.9	159.0	203.0	110.4	154.4	198.3	105.6	149.5	193.3	100.5	144.2	188.0
		76	TC	–	310.1	310.1	–	295.8	295.8	–	280.6	280.6	–	264.4	264.4
			SHC	–	123.2	168.9	–	118.6	164.1	–	113.8	159.0	–	108.7	153.6
10,000 CFM	EAT (wb)	58	TC	250.4	250.4	283.2	240.9	240.9	272.5	230.7	230.7	260.9	219.5	219.5	248.2
			SHC	217.7	250.4	283.2	209.4	240.9	272.5	200.5	230.7	260.9	190.7	219.5	248.2
		62	TC	250.8	250.8	294.6	241.1	241.1	283.3	231.1	231.1	271.4	219.6	219.6	258.0
			SHC	207.0	250.8	294.6	199.0	241.1	283.3	190.7	231.1	271.4	181.2	219.6	258.0
		67	TC	269.2	269.2	269.2	256.8	256.8	257.6	243.5	243.5	252.3	229.4	229.4	246.4
			SHC	166.6	214.5	262.5	161.9	209.7	257.6	156.8	204.5	252.3	151.3	198.9	246.4
		72	TC	293.7	293.7	293.7	280.1	280.1	280.1	265.6	265.6	265.6	250.2	250.2	250.2
			SHC	117.8	166.0	214.2	113.2	161.3	209.3	108.3	156.3	204.3	103.2	151.0	198.8
		76	TC	–	313.9	313.9	–	299.3	299.3	–	283.7	283.7	–	267.1	267.1
			SHC	–	126.8	176.5	–	122.2	171.6	–	117.3	166.5	–	112.1	161.0

Note: See Minimum–Maximum Airflow Ratings in Table 3. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering Air Temperature (dry bulb)
EAT(wb) – Entering Air Temperature (wet bulb)
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

50TC–E25 (20 TONS) – UNIT WITH HUMIDI–MIZER IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		6,000			8,000			10,000		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	281.6	256.5	231.3	293.1	267.0	240.9	302.3	275.4	248.6
	SHC	114.7	141.0	167.4	140.6	166.6	192.6	161.6	187.3	212.9
	kW	13.52	13.25	12.95	13.82	13.46	13.21	13.97	13.60	13.31
85	TC	261.3	236.9	212.4	272.1	247.7	221.3	280.7	254.6	228.5
	SHC	90.9	123.5	156.1	118.8	151.1	183.3	141.4	173.4	205.4
	kW	14.95	14.68	14.48	15.25	14.89	14.64	15.40	15.03	14.74
95	TC	241.1	217.2	193.4	251.1	226.4	201.7	259.2	233.8	208.4
	SHC	67.2	106.0	144.8	97.1	120.1	174.1	121.2	159.5	197.8
	kW	16.52	16.25	15.95	16.82	16.46	16.21	16.97	16.60	16.31
105	TC	220.8	197.5	174.4	230.2	206.2	182.2	237.7	213.0	188.4
	SHC	43.4	88.4	133.5	75.3	120.1	164.9	101.0	145.7	178.9
	kW	18.09	17.82	17.52	18.39	18.03	17.78	18.54	18.17	17.88
115	TC	200.5	178.0	155.5	209.2	185.9	162.6	216.2	192.2	168.7
	SHC	19.7	70.9	122.2	53.5	104.6	155.7	80.9	131.8	161.2
	kW	19.65	19.38	19.08	19.95	19.59	19.34	20.10	19.73	19.44

50TC–E25 (20 TONS) – UNIT WITH HUMIDI–MIZER IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR (F)								
		75 Dry Bulb			75 Dry Bulb			75 Dry Bulb		
		62.5 Wet Bulb			64 Wet Bulb			65.3 Wet Bulb		
		(50% Relative Humidity)			(56% Relative Humidity)			(60% Relative Humidity)		
		Air Entering Evaporator – Cfm								
		6,000	8,000	10,000	6,000	8,000	10,000	6,000	8,000	10,000
80	TC	115.20	123.30	130.60	120.40	129.30	138.20	122.80	135.00	143.70
	SHC	40.80	58.30	76.10	32.30	45.50	60.40	20.10	34.30	48.00
	kW	13.24	13.32	13.39	13.43	13.57	13.65	13.49	13.68	13.74
75	TC	119.80	128.60	135.90	125.50	135.30	143.20	128.00	139.50	148.40
	SHC	45.60	62.80	82.10	37.00	49.80	65.20	24.30	38.70	52.60
	kW	13.05	13.10	13.17	13.21	13.35	13.43	13.27	13.46	13.52
70	TC	122.50	133.10	140.20	129.80	140.70	147.60	132.40	144.40	153.20
	SHC	49.80	76.00	86.10	41.10	54.30	69.20	28.80	41.40	56.80
	kW	12.80	12.87	12.94	12.98	13.12	13.20	13.04	13.23	13.29
60	TC	133.80	142.50	149.60	139.30	150.40	157.40	141.50	154.20	163.00
	SHC	58.60	76.00	95.00	50.20	63.50	78.10	37.80	52.10	65.90
	kW	12.34	12.42	12.49	12.53	12.67	12.75	12.59	12.78	12.84
50	TC	143.50	151.80	159.30	149.00	160.00	167.00	151.30	163.60	172.50
	SHC	67.70	84.80	103.80	59.10	72.40	87.00	46.70	61.00	74.90
	kW	11.88	11.95	12.03	12.07	12.21	12.29	12.13	12.32	12.38
40	TC	153.20	161.30	168.70	158.60	169.20	176.60	160.80	173.10	182.00
	SHC	76.50	93.60	111.60	68.00	81.50	95.80	55.80	69.80	84.00
	kW	11.42	11.49	11.56	11.60	11.74	11.82	11.66	11.85	11.91

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 13 – COOLING CAPACITIES 2-STAGE COOLING 25 TONS

50TC–E29				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EA (db)			EA (db)			EA (db)			EA (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
7,500 CFM	EAT (wb)	58	TC	264.4	264.4	298.9	254.6	254.6	287.9	244.1	244.1	276.0	232.7	232.7	263.1
			SHC	229.9	264.4	298.9	221.4	254.6	287.9	212.2	244.1	276.0	202.3	232.7	263.1
		62	TC	278.7	278.7	282.4	266.3	266.3	276.4	252.8	252.8	269.8	238.5	238.5	262.4
			SHC	206.8	244.6	282.4	200.9	238.7	276.4	194.6	232.2	269.8	187.7	225.0	262.4
		67	TC	305.3	305.3	305.3	291.9	291.9	291.9	277.3	277.3	277.3	261.5	261.5	261.5
			SHC	169.0	207.0	245.0	163.4	201.4	239.4	157.4	195.3	233.3	151.0	188.9	226.8
		72	TC	334.0	334.0	334.0	319.4	319.4	319.4	303.6	303.6	303.6	286.5	286.5	286.5
			SHC	129.9	168.5	207.1	124.5	163.0	201.5	118.7	157.1	195.5	112.5	150.8	189.2
		76	TC	–	358.2	358.2	–	342.4	342.4	–	325.4	325.4	–	307.1	307.1
			SHC	–	137.0	178.2	–	131.7	172.9	–	126.0	166.9	–	119.9	160.4
8,750 CFM	EAT (wb)	58	TC	278.2	278.2	314.5	267.8	267.8	302.8	256.5	256.5	289.9	244.2	244.2	276.1
			SHC	241.9	278.2	314.5	232.8	267.8	302.8	223.0	256.5	289.9	212.3	244.2	276.1
		62	TC	287.2	287.2	308.3	274.3	274.3	301.5	260.8	260.8	291.7	247.0	247.0	280.9
			SHC	222.1	265.2	308.3	215.7	258.6	301.5	207.7	249.7	291.7	199.0	240.0	280.9
		67	TC	314.0	314.0	314.0	299.8	299.8	299.8	284.4	284.4	284.4	267.8	267.8	267.8
			SHC	179.1	222.7	266.4	173.3	216.9	260.6	167.2	210.8	254.3	160.7	204.2	247.7
		72	TC	343.0	343.0	343.0	327.7	327.7	327.7	311.1	311.1	311.1	293.1	293.1	293.1
			SHC	134.3	178.5	222.6	128.8	172.9	216.9	122.9	166.9	210.8	116.6	160.4	204.3
		76	TC	–	367.3	367.3	–	350.8	350.8	–	333.0	333.0	–	313.8	313.8
			SHC	–	142.6	189.4	–	137.1	183.5	–	131.2	177.3	–	125.0	170.7
10,000 CFM	EAT (wb)	58	TC	289.7	289.7	327.5	278.7	278.7	315.0	266.6	266.6	301.4	253.6	253.6	286.7
			SHC	251.9	289.7	327.5	242.3	278.7	315.0	231.8	266.6	301.4	220.5	253.6	286.7
		62	TC	294.6	294.6	329.6	282.2	282.2	319.7	268.7	268.7	309.1	254.1	254.1	298.4
			SHC	234.7	282.1	329.6	226.8	273.3	319.7	218.4	263.7	309.1	209.7	254.1	298.4
		67	TC	320.6	320.6	320.6	305.9	305.9	305.9	289.9	289.9	289.9	272.7	272.7	272.7
			SHC	188.6	237.7	286.8	182.7	231.8	280.9	176.5	225.5	274.5	169.8	218.8	267.7
		72	TC	350.0	350.0	350.0	334.0	334.0	334.0	316.8	316.8	316.8	298.2	298.2	298.2
			SHC	138.4	187.9	237.5	132.8	182.2	231.7	126.8	176.1	225.5	120.4	169.6	218.8
		76	TC	–	374.4	374.4	–	357.3	357.3	–	338.7	338.7	–	318.9	318.9
			SHC	–	147.7	199.5	–	142.1	193.7	–	136.1	187.4	–	129.7	180.6
11,250 CFM	EAT (wb)	58	TC	299.4	299.4	338.4	287.8	287.8	325.4	275.2	275.2	311.1	261.4	261.4	295.6
			SHC	260.3	299.4	338.4	250.2	287.8	325.4	239.2	275.2	311.1	227.3	261.4	295.6
		62	TC	302.2	302.2	346.0	289.3	289.3	335.7	275.5	275.5	323.5	262.1	262.1	307.7
			SHC	244.8	295.4	346.0	236.7	286.2	335.7	227.5	275.5	323.5	216.4	262.1	307.7
		67	TC	325.9	325.9	325.9	310.7	310.7	310.7	294.2	294.2	294.2	276.6	276.6	286.7
			SHC	197.6	252.1	306.5	191.7	246.1	300.4	185.3	239.6	293.9	178.5	232.6	286.7
		72	TC	355.5	355.5	355.5	339.1	339.1	339.1	321.3	321.3	321.3	302.2	302.2	302.2
			SHC	142.1	197.0	251.8	136.4	191.2	245.9	130.4	185.0	239.6	123.9	178.3	232.8
		76	TC	–	380.0	380.0	–	362.4	362.4	–	343.3	343.3	–	322.8	322.8
			SHC	–	152.4	209.4	–	146.8	203.4	–	140.7	197.0	–	134.2	190.2
12,500 CFM	EAT (wb)	58	TC	307.7	307.7	347.9	295.7	295.7	334.2	282.5	282.5	319.3	268.2	268.2	303.2
			SHC	267.6	307.7	347.9	257.1	295.7	334.2	245.6	282.5	319.3	233.2	268.2	303.2
		62	TC	308.4	308.4	362.2	295.9	295.9	347.4	283.1	283.1	332.4	268.4	268.4	315.2
			SHC	254.6	308.4	362.2	244.4	295.9	347.4	233.8	283.1	332.4	221.7	268.4	315.2
		67	TC	330.2	330.2	330.2	314.6	314.6	319.2	297.8	297.8	312.3	279.8	279.8	304.7
			SHC	206.3	265.9	325.5	200.3	259.7	319.2	193.8	253.1	312.3	186.7	245.7	304.7
		72	TC	360.1	360.1	360.1	343.2	343.2	343.2	325.0	325.0	325.0	305.4	305.4	305.4
			SHC	145.7	205.7	265.7	139.9	199.8	259.7	133.8	193.5	253.3	127.3	186.8	246.3
		76	TC	–	384.6	384.6	–	366.5	366.5	–	346.9	346.9	–	325.9	325.9
			SHC	–	157.0	218.9	–	151.2	212.9	–	145.1	206.3	–	138.5	199.3

Note: See Minimum–Maximum Airflow Ratings in Table 3. Do not operate outside these limits.

LEGEND:

– – Do not operate
Cfm – Cubic feet per minute (supply air)
EAT(db) – Entering Air Temperature (dry bulb)
EAT(wb) – Entering Air Temperature (wet bulb)
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

50TC–E29 (25 TONS) – UNIT WITH HUMIDI–MIZER IN SUBCOOLING MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR – CFM								
		7,500			10,000			12,500		
		Air Entering Evaporator – Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	351.3	319.5	287.8	370.4	337.3	304.1	385.8	351.5	317.2
	SHC	166.5	199.4	232.3	191.2	245.6	258.5	211.4	245.6	279.9
	kW	16.75	16.55	15.20	17.30	16.75	15.85	17.80	17.50	16.50
85	TC	327.5	296.4	265.3	346.1	313.6	281.2	361.1	327.5	294.0
	SHC	137.4	178.2	219.0	162.6	204.5	246.4	183.3	226.0	268.7
	kW	18.65	18.45	17.25	19.20	18.65	17.80	19.45	19.15	18.15
95	TC	303.7	273.3	242.9	321.8	290.0	258.3	336.4	303.5	270.7
	SHC	108.2	157.0	205.8	134.0	184.1	234.3	155.1	206.4	257.6
	kW	20.60	20.40	19.34	21.15	20.60	19.95	21.60	21.30	20.30
105	TC	279.9	250.2	220.4	297.5	266.4	235.3	311.7	279.5	247.4
	SHC	79.0	135.8	192.5	105.4	163.8	222.2	127.1	186.7	246.4
	kW	22.85	22.65	21.45	23.40	22.85	22.05	23.70	23.40	22.40
115	TC	256.2	227.1	198.0	273.2	242.8	212.4	287.0	255.5	224.1
	SHC	49.9	114.5	179.2	76.8	143.4	210.1	98.9	167.1	223.8
	kW	25.05	24.85	23.65	25.60	25.05	24.25	25.90	25.60	24.60

50TC–E29 (25 TONS) – UNIT WITH HUMIDI–MIZER IN HOT GAS REHEAT MODE										
Temp (F) Air Entering Condenser (Edb)		AIR ENTERING EVAPORATOR (F)								
		75 Dry Bulb			75 Dry Bulb			75 Dry Bulb		
		62.5 Wet Bulb			64 Wet Bulb			65.3 Wet Bulb		
		(50% Relative Humidity)			(56% Relative Humidity)			(60% Relative Humidity)		
		Air Entering Evaporator – Cfm								
		7,500	10,000	12,500	7,500	10,000	12,500	7,500	10,000	12,500
80	TC	124.40	133.90	139.00	132.00	142.10	145.10	135.60	149.10	151.50
	SHC	37.60	60.70	82.20	27.80	45.40	65.80	17.50	34.20	50.10
	kW	15.83	15.90	16.00	15.97	16.13	16.16	16.11	16.31	16.38
75	TC	129.00	138.50	144.60	136.60	147.60	150.10	140.60	154.00	156.30
	SHC	47.10	70.60	92.10	37.30	55.30	75.70	27.00	43.70	60.00
	kW	15.77	15.83	15.94	15.91	16.07	16.10	16.05	16.25	16.32
70	TC	133.60	143.10	149.20	141.20	152.30	154.80	145.30	158.80	161.10
	SHC	57.30	80.70	102.20	47.50	65.40	85.80	37.20	53.90	70.10
	kW	15.68	15.75	15.86	15.83	16.00	16.04	15.88	16.08	16.15
60	TC	142.80	158.40	158.40	150.40	161.40	163.90	153.90	167.40	169.70
	SHC	76.50	121.40	121.40	66.70	84.60	105.00	56.40	73.10	89.30
	kW	15.54	15.60	15.71	15.68	15.84	15.87	15.82	16.02	16.09
50	TC	151.80	161.30	167.40	159.40	170.50	173.20	162.80	176.20	178.80
	SHC	94.10	117.50	139.00	84.30	102.20	122.60	74.00	90.70	106.90
	kW	15.40	15.47	15.58	15.54	15.68	15.71	15.66	15.86	15.93
40	TC	161.20	170.70	176.80	168.80	179.80	182.50	172.20	185.70	188.20
	SHC	114.10	137.60	159.10	104.30	122.30	142.70	94.00	110.70	127.00
	kW	15.24	15.31	15.42	15.39	15.55	15.58	15.53	15.73	15.80

LEGEND

Edb – Entering Dry–Bulb
Ewb – Entering Wet–Bulb
kW – Compressor Motor Power Input
ldb – Leaving Dry–Bulb
lwb – Leaving Wet–Bulb
SHC – Sensible Heat Capacity (1000 Btuh) Gross
TC – Total Capacity (1000 Btuh) Gross

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet–bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

Table 15 – STATIC PRESSURE ADDERS (IN. WG) - FACTORY OPTIONS AND/OR ACCESSORIES

Humidi-MiZer® System

MODEL SIZES 18 & 21											
CFM	**3750**	**4750**	**5750**	**6750**	**7750**	**8750**	**9750**	**10750**	**110750**	**12750**	**13750**
Static Pressure Adder (in. wg)	0.03	0.04	0.06	0.07	0.09	0.10	0.12	0.14	0.16	0.19	0.21

MODEL SIZES 25 & 29											
CFM	**3750**	**4750**	**5750**	**6750**	**7750**	**8750**	**9750**	**10750**	**110750**	**12750**	**13750**
Static Pressure Adder (in. wg)	0.02	0.03	0.04	0.05	0.07	0.08	0.09	0.11	0.13	0.14	0.16

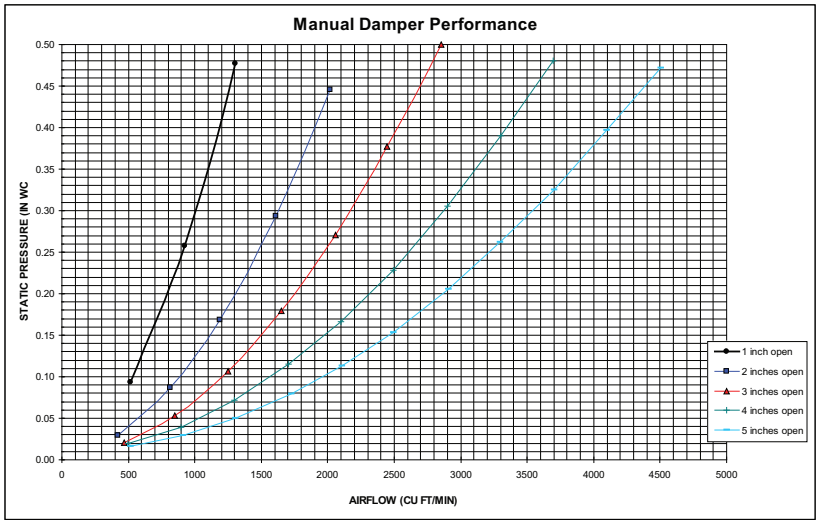
Economizer - Horizontal Duct Configuration

MODEL SIZES 18–29										
CFM	**4750**	**5750**	**6750**	**7750**	**8750**	**9750**	**10750**	**11750**	**12750**	**13750**
Static Pressure Adder (in. wg)	0.00	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.09	0.11

Electric Heaters - Horizontal Duct Configuration

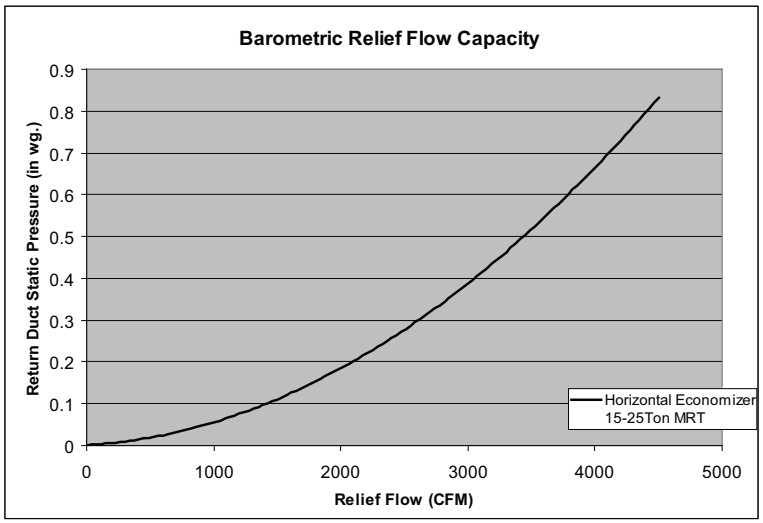
MODEL SIZES 18–29										
CFM	**4750**	**5750**	**6750**	**7750**	**8750**	**9750**	**10750**	**11750**	**12750**	**13750**
25 kW Heater	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.11	0.13
50 kW Heater	0.02	0.03	0.05	0.07	0.10	0.12	0.15	0.19	0.22	0.26
75 kW Heater	0.03	0.05	0.08	0.11	0.14	0.18	0.23	0.28	0.34	0.40

DAMPER, BAROMETRIC RELIEF AND PE PERFORMANCE



C09264

Fig. 9 - Manual Damper Performance



C13850

Fig. 10 - Barometric Relief Flow Capacity

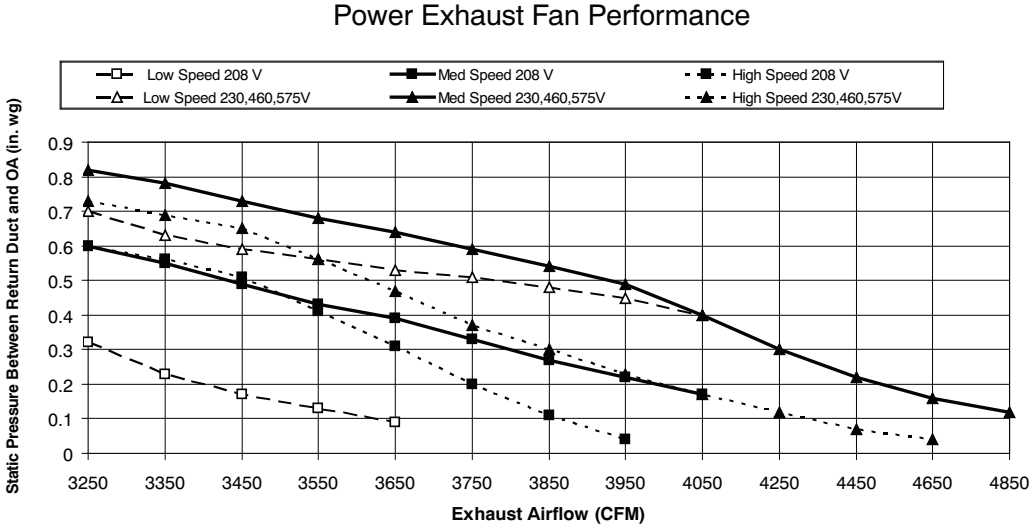


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Fig. 11 - Power Exhaust Fan Performance

FAN PERFORMANCE

GENERAL FAN PERFORMANCE NOTES:

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, and wet coils. Factory options and accessories may add static pressure losses. Selection software is available, through your salesperson, to help you select the best motor/drive combination for your application.
4. The Fan Performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommended the lower horsepower option.
5. For information on the electrical properties of Carrier motors, please see the Electrical information section of this book.
6. For more information on the performance limits of Carrier motors, see the application data section of this book.

FAN PERFORMANCE (cont)

Table 16 – 50TC-*18 **HORIZONTAL SUPPLY / RETURN** **15 TON**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	**472**	**1.04**	549	1.51	616	2.03	676	2.59	731	3.19
4900	**500**	**1.26**	573	1.76	638	2.30	696	2.89	750	3.51
5250	525	1.48	595	2.00	658	2.57	715	3.18	767	3.82
5600	554	1.76	620	2.30	681	2.90	736	3.54	787	4.21
6000	580	2.04	643	2.61	702	3.22	756	3.88	806	4.58
6400	610	2.39	670	2.99	727	3.64	779	4.32	–	–
6750	636	2.74	695	3.36	749	4.03	800	4.74	–	–
7100	667	3.18	723	3.83	775	4.52	–	–	–	–
7500	694	3.60	748	4.28	–	–	–	–	–	–
CFM	**Available External Static Pressure (in. wg)**									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	781	3.81	828	4.46	–	–	–	–	–	–
4900	799	4.16	845	4.84	–	–	–	–	–	–
5250	816	4.49	–	–	–	–	–	–	–	–
5600	–	–	–	–	–	–	–	–	–	–
6000	–	–	–	–	–	–	–	–	–	–
6400	–	–	–	–	–	–	–	–	–	–
6750	–	–	–	–	–	–	–	–	–	–
7100	–	–	–	–	–	–	–	–	–	–
7500	–	–	–	–	–	–	–	–	–	–

Standard Static Motor and Drive – 514 – 680 RPM, Max BHP 2.9
Medium Static Motor and Drive – 614 – 780 RPM, Max BHP 3.7
High Static Motor and Drive – 746 – 912 RPM, Max BHP 4.9
– Outside operating range
BOLD requires alternate standard static drive package

Table 17 – 50TC-*21 **HORIZONTAL SUPPLY / RETURN** **17.5 TON**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5250	**525**	**1.48**	**595**	**2.00**	658	2.57	715	3.18	767	3.82
5700	**558**	**1.80**	624	2.35	684	2.95	739	3.58	790	4.26
6100	**591**	**2.16**	654	2.74	711	3.37	764	4.04	814	4.75
6500	**621**	**2.54**	681	3.14	736	3.80	788	4.50	836	5.23
7000	656	3.01	712	3.65	765	4.33	*815*	*5.06*	862	5.82
7500	690	3.54	744	4.21	*795*	*4.93*	843	5.68	888	6.47
7900	726	4.14	777	4.84	*825*	*5.59*	872	6.37	916	7.19
8300	757	4.72	*806*	*5.45*	853	6.23	898	7.04	940	7.89
8750	*793*	*5.45*	840	6.21	885	7.02	928	7.86	–	–
CFM	**Available External Static Pressure (in. wg)**									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5250	816	4.49	861	5.20	904	5.92	945	6.68	984	7.45
5700	836	4.96	882	5.70	925	6.46	965	7.24	1003	8.04
6100	861	5.48	904	6.25	946	7.04	986	7.85	–	–
6500	882	5.99	925	6.78	966	7.60	–	–	–	–
7000	906	6.61	948	7.43	988	8.28	–	–	–	–
7500	931	7.30	973	8.15	–	–	–	–	–	–
7900	958	8.05	–	–	–	–	–	–	–	–
8300	–	–	–	–	–	–	–	–	–	–
8750	–	–	–	–	–	–	–	–	–	–

Standard Static Motor and Drive – 622 – 822 RPM, Max BHP 3.7
Medium Static Motor and Drive – 713 – 879 RPM, Max BHP 4.9
High Static Motor and Drive – 835 – 1021 RPM, Voltage / Max BHP: 208V / 6.5 / 230V / 6.9 / 460V / 7.0 / 575V / 8.3
ITALICS requires high static drive package with different motor pulley
BLACK Operation point covered by high static drive. Confirm Max BHP coverage based on unit voltage selected.
– Outside operating range
BOLD requires alternate standard static drive package

FAN PERFORMANCE (cont)

Table 18 – 50TC-*25 HORIZONTAL SUPPLY / RETURN 20 TON

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	**575**	**1.54**	**645**	**2.01**	708	2.51	764	3.02	815	3.56
6500	**610**	**1.87**	**677**	**2.37**	738	2.90	792	3.45	842	4.02
7000	**646**	**2.25**	710	2.79	768	3.35	821	3.93	870	4.53
7500	**683**	**2.68**	744	3.25	800	3.85	851	4.46	899	5.09
8000	720	3.17	779	3.78	832	4.41	882	5.05	929	5.72
8500	758	3.73	814	4.36	865	5.02	913	5.70	959	6.40
9000	796	4.34	849	5.01	899	5.71	946	6.42	990	7.15
9500	834	5.03	885	5.73	933	6.46	978	7.20	1021	7.96
10000	873	5.78	921	6.52	968	7.28	1011	8.06	1053	8.86
CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	863	4.11	907	4.68	949	5.26	989	5.86	1026	6.47
6500	889	4.60	933	5.20	974	5.82	1013	6.44	1051	7.09
7000	916	5.14	959	5.77	1000	6.42	1039	7.08	1076	7.75
7500	944	5.74	986	6.40	1026	7.08	1064	7.77	–	–
8000	972	6.39	1014	7.09	1053	7.79	1091	8.51	–	–
8500	1002	7.11	1042	7.83	1081	8.51	–	–	–	–
9000	1031	7.89	1071	8.65	–	–	–	–	–	–
9500	1062	8.74	–	–	–	–	–	–	–	–
10000	1093	9.66	–	–	–	–	–	–	–	–

Standard Static Motor and Drive – 690 – 863 RPM, Max BHP 4.9	– Outside operating range
Medium Static Motor and Drive – 835–1021 RPM, Voltage/Max BHP: 208V/6.5 / 230V/6.9 / 460V/7.0 / 575V/8.3	**BOLD** requires alternate standard static drive package
High Static Motor and Drive – 941 – 1100 RPM, Voltage/Max BHP: 208V/10.5 / 230V/11.9 / 460V/11.9 / 575V/11.0	UNDERSCORE Operation point covered by medium static drive. Confirm Max BHP coverage based on unit voltage selected

Table 19 – 50TC-*29 HORIZONTAL SUPPLY / RETURN 25 TON

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7500	683	2.68	744	3.25	800	3.85	851	4.46	899	5.09
8000	720	3.17	779	3.78	832	4.41	882	5.05	929	5.72
8500	758	3.73	814	4.36	865	5.02	913	5.70	959	6.40
9000	796	4.34	849	5.01	899	5.71	946	6.42	990	7.15
9500	834	5.03	885	5.73	933	6.46	978	7.20	1021	7.96
10000	873	5.78	921	6.52	968	7.28	1011	8.06	1053	8.86
10500	911	6.62	958	7.39	1003	8.18	1045	8.99	1086	9.82
11000	950	7.53	995	8.34	1038	9.16	1079	10.01	–	–
11500	989	8.53	1033	9.37	1074	10.23	–	–	–	–
CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7500	944	5.74	986	6.40	1026	7.08	1064	7.77	–	–
8000	972	6.39	1014	7.09	1053	7.79	1091	8.51	–	–
8500	1002	7.11	1042	7.83	1081	8.57	–	–	–	–
9000	1031	7.89	1071	8.65	–	–	–	–	–	–
9500	1062	8.74	–	–	–	–	–	–	–	–
10000	1093	9.66	–	–	–	–	–	–	–	–
10500	–	–	–	–	–	–	–	–	–	–
11000	–	–	–	–	–	–	–	–	–	–
11500	–	–	–	–	–	–	–	–	–	–

Standard Static Motor and Drive – 647 – 791 RPM, Max BHP 4.9
Medium Static Motor and Drive – 755–923 RPM, Voltage/Max BHP: 208V/6.5 / 230V/6.9 / 460V/7.0 / 575V/8.3
High Static Motor and Drive – 906 – 1100 RPM, Voltage/Max BHP: 208V/10.5 / 230V/11.9 / 460V/11.9 / 575V/11.0
– Outside operating range

FAN PERFORMANCE (cont)

Table 20 – PULLEY ADJUSTMENT - HORIZONTAL

50TC UNIT SIZE	MOTOR/DRIVE COMBO	MOTOR PULLEY TURNS OPEN										
		0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
18	Standard Static	680	663	647	630	614	597	580	564	547	531	514
	Medium Static	780	763	747	730	714	697	680	664	647	631	614
	High Static	912	895	879	862	846	829	812	796	779	763	746
21	Standard Static	822	802	782	762	742	722	702	682	662	642	622
	Medium Static	879	862	846	829	813	796	779	763	746	730	713
	High Static	1021	1002	984	965	947	928	909	891	872	854	835
25	Standard Static	863	846	828	811	794	777	759	742	725	707	690
	Medium Static	1021	1002	984	965	947	928	909	891	872	854	835
	High Static	1176	1153	1129	1106	1082	1059	1035	1012	988	965	941
29	Standard Static	791	777	762	748	733	719	705	690	676	661	647
	Medium Static	923	906	889	873	856	839	822	805	789	772	755
	High Static	1107	1087	1067	1047	1027	1007	986	966	946	926	906

NOTE: Do not adjust pulley further than 5 turns open.

– Factory settings

ELECTRICAL INFORMATION

Legend and Notes

LEGEND:

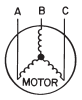
BRKR	–	Circuit breaker
C.O.	–	Convenience outlet
DD	–	Direct drive
DISC	–	Disconnect
FLA	–	Full load amps
IFM	–	Indoor fan motor
LRA	–	Locked rotor amps
MCA	–	Minimum circuit amps
OFM	–	Outdoor fan motor
P.E.	–	Power exhaust
Pwrd fr/ unit	–	Powered from unit
PWRD C.O.	–	Powered convenience outlet
UNPWR C.O.	–	Unpowered convenience outlet

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. For 208/230 v units, where one value is shown it is the same for either 208 or 230 volts.
3. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3}$$

$$= 227$$

Determine maximum deviation from average voltage.
(AB) 227 – 224 = 3 v
(BC) 231 – 227 = 4 v
(AC) 227 – 226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227}$$

$$= 1.76\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

ELECTRICAL INFORMATION (cont)

Table 21 – 2-STAGE COOLING WITH SINGLE SPEED INDOOR FAN MOTOR 15 - 25 TONS

UNIT	V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
		MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
50TC–*18	208–3–60	187	253	25.0	164	25.0	164	350	1.5	STD	88.6%	8.4
										MED	87.0%	10.6
										HIGH	82.9%	13.6
	230–3–60	187	253	25.0	164	25.0	164	350	1.5	STD	88.6%	8.3
										MED	87.0%	10.6
										HIGH	82.9%	12.7
	460–3–60	414	506	12.8	100	12.8	100	277	0.9	STD	88.6%	4.2
										MED	87.0%	5.3
										HIGH	82.9%	6.4
	575–3–60	518	633	9.6	78	9.6	78	397	0.6	STD	81.1%	2.8
										MED	81.1%	2.8
										HIGH	83.6%	5.6
50TC–*21	208–3–60	187	253	27.6	191	25.0	164	350	1.5	STD	87.0%	10.6
										MED	82.9%	13.6
										HIGH–High Eff.	89.5%	17.1
	230–3–60	187	253	27.6	191	25.0	164	350	1.5	STD	87.0%	10.6
										MED	82.9%	12.7
										HIGH–High Eff.	89.5%	17.1
	460–3–60	414	506	12.8	100	12.2	100	277	0.9	STD	87.0%	5.3
										MED	82.9%	6.4
										HIGH–High Eff.	89.5%	8.6
	575–3–60	518	633	9.6	78	9.0	78	397	0.6	STD	81.1%	2.8
										MED	83.6%	5.6
										HIGH–High Eff.	89.5%	7.6
50TC–*25	208–3–60	187	253	28.2	239	28.2	239	350	1.5	STD	82.9%	13.6
										MED–High Eff.	89.5%	17.1
										HIGH–High Eff.	91.7%	28.5
	230–3–60	187	253	28.2	239	28.2	239	350	1.5	STD	82.9%	12.7
										MED–High Eff.	89.5%	17.1
										HIGH–High Eff.	91.7%	28.5
	460–3–60	414	506	14.7	130	14.7	130	277	0.9	STD	82.9%	6.4
										MED–High Eff.	89.5%	8.6
										HIGH–High Eff.	91.7%	14.3
	575–3–60	518	633	11.3	94	11.3	94	397	0.6	STD	83.6%	5.6
										MED–High Eff.	89.5%	7.6
										HIGH–High Eff.	91.7%	9.5

See: “Legend and Notes” on page 39

Size 29 unit is not available with single speed indoor fan motor

ELECTRICAL INFORMATION (cont)

Table 22 – 2-STAGE COOLING WITH 2-SPEED INDOOR FAN MOTOR **15 - 25 TONS**

UNIT	V–Ph–Hz	VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM		
		MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
50TC–*18	208–3–60	187	253	25.0	164	25.0	164	350	1.5	STD	85.0%	8.6
										MED	81.5%	10.8
										HIGH	83.6%	13.6
	230–3–60	187	253	25.0	164	25.0	164	350	1.5	STD	85.0%	7.8
										MED	81.5%	9.8
										HIGH	83.6%	12.7
	460–3–60	414	506	12.8	100	12.8	100	277	0.9	STD	85.0%	3.8
										MED	81.5%	4.9
										HIGH	83.6%	6.4
	575–3–60	518	633	9.6	78	9.6	78	397	0.6	STD	81.1%	4.5
										MED	81.1%	4.5
										HIGH	83.6%	6.2
50TC–*21	208–3–60	187	253	27.6	191	25.0	164	350	1.5	STD	81.5%	10.8
										MED	83.6%	13.6
										HIGH	89.5%	17.1
	230–3–60	187	253	27.6	191	25.0	164	350	1.5	STD	81.5%	9.8
										MED	83.6%	12.7
										HIGH	89.5%	17.1
	460–3–60	414	506	12.8	100	12.2	100	277	0.9	STD	81.5%	4.9
										MED	83.6%	6.4
										HIGH	89.5%	8.6
	575–3–60	518	633	9.6	78	9.0	78	397	0.6	STD	81.1%	4.5
										MED	83.6%	6.2
										HIGH	89.5%	7.6
50TC–*25	208–3–60	187	253	28.2	239	28.2	239	350	1.5	STD	83.6%	13.6
										MED	89.5%	17.1
										HIGH	91.7%	28.5
	230–3–60	187	253	28.2	239	28.2	239	350	1.5	STD	83.6%	12.7
										MED	89.5%	17.1
										HIGH	91.7%	28.5
	460–3–60	414	506	14.7	130	14.7	130	277	0.9	STD	83.6%	6.4
										MED	89.5%	8.6
										HIGH	91.7%	14.3
	575–3–60	518	633	11.3	94	11.3	94	397	0.6	STD	83.6%	6.2
										MED	89.5%	7.6
										HIGH	91.7%	9.5
50TC–*29	208–3–60	187	253	48.1	245	33.9	240	350	1.5	STD	83.6%	13.6
										MED	89.5%	17.1
										HIGH	91.7%	28.5
	230–3–60	187	253	48.1	245	33.9	240	350	1.5	STD	83.6%	12.7
										MED	89.5%	17.1
										HIGH	91.7%	28.5
	460–3–60	414	506	18.6	125	16.0	140	277	0.9	STD	83.6%	6.4
										MED	89.5%	8.6
										HIGH	91.7%	14.3
	575–3–60	518	633	14.7	100	12.9	108	397	0.6	STD	83.6%	6.2
										MED	89.5%	7.6
										HIGH	91.7%	9.5

See: “Legend and Notes” on page 39

ELECTRIC HEAT - ELECTRICAL INFORMATION (cont)

Table 23 – 50TC-*18/21 **SINGLE SPEED INDOOR FAN MOTOR**

Model Number 50TC–*	NOM. V–Ph–Hz	IFM TYPE	Electric Heater Part Number CRHEATERXXXXXX	Nominal (kW)	Application (kW)	Application Output (MBH)	Single Point or Junction Kit Part Number CRSINGLEXXXA00			
							NO C.O. Or Unpowered C.O.		w/PWRD C.O.	
							NO P.E.	w/ P.E. (pwrd fr/unit)	NO P.E.	w/ P.E. (pwrd fr/unit)
18	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	–	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	–	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	–	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
21	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH– High Efficiency	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH– High Efficiency	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	–	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH– High Efficiency	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057

See: “Legend and Notes” on page 39

ELECTRIC HEAT - ELECTRICAL INFORMATION (cont)

Table 23 - 50TC-*25 **SINGLE SPEED INDOOR FAN MOTOR (cont)**

Model Number 50TC–*	NOM. V–Ph–Hz	IFM TYPE	Electric Heater Part Number CRHEATERXXXXXX	Nominal (kW)	Application (kW)	Application Output (MBH)	Single Point or Junction Kit Part Number CRSINGLEXXXA00			
							NO C.O. Or Unpowered C.O.		w/PWRD C.O.	
							NO P.E.	w/ P.E. (pwrd fr/unit)	NO P.E.	w/ P.E. (pwrd fr/unit)
25	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED–High Efficiency	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH–High Efficiency	270A00	25.0	18.8/23.0	64.1/78.3	–	056	–	056
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED–High Efficiency	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH–High Efficiency	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED–High Efficiency	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH–High Efficiency	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	057	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057

See: “Legend and Notes” on page 39

ELECTRIC HEAT - ELECTRICAL INFORMATION (cont)

Table 24 – 50TC-*18/21 **2-SPEED INDOOR FAN MOTOR**

Model Number 50TC–*	NOM. V–Ph–Hz	IFM TYPE	Electric Heater Part Number CRHEATERXXXXXX	Nominal (kW)	Application (kW)	Application Output (MBH)	Single Point or Junction Kit Part Number CRSINGLEXXXA00			
							NO C.O. Or Unpowered C.O.		w/PWRD C.O.	
							NO P.E.	w/ P.E. (pwrd fr/unit)	NO P.E.	w/ P.E. (pwrd fr/unit)
18	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	–	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
21	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057

See: “Legend and Notes” on page 39

77ELECTRIC HEAT - ELECTRICAL INFORMATION (cont)

Table 24 - 50TC-*25/29 **2-SPEED INDOOR FAN MOTOR (cont)**

Model Number 50TC–*	NOM. V–Ph–Hz	IFM TYPE	Electric Heater Part Number CRHEATERXXXXXX	Nominal (kW)	Application (kW)	Application Output (MBH)	Single Point or Junction Kit Part Number CRSINGLEXXXA00			
							NO C.O. Or Unpowered C.O.		w/PWRD C.O.	
							NO P.E.	w/ P.E. (pwrd fr/unit)	NO P.E.	w/ P.E. (pwrd fr/unit)
25	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	270A00	25.0	18.8/23.0	64.1/78.3	–	–	–	–
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH	270A00	25.0	18.8/23.0	64.1/78.3	–	056	–	056
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	057	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057
29	208/230–3–60	STD	270A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	270A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH	270A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			271A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			272A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460–3–60	STD	273A00	25.0	23.0	78.3	–	–	–	–
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		MED	273A00	25.0	23.0	78.3	–	–	–	057
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
		HIGH	273A00	25.0	23.0	78.3	–	057	–	057
			274A00	50.0	45.9	156.7	057	057	057	057
			275A00	75.0	68.9	235.0	057	057	057	057
	575–3–60	STD	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	–	057
			278A00	74.4	68.3	233.1	057	057	057	057
		MED	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	–	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057
		HIGH	276A00	24.8	22.8	77.7	–	–	–	–
			277A00	49.6	45.6	155.4	057	057	057	057
			278A00	74.4	68.3	233.1	057	057	057	057

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 25 – UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH SINGLE SPEED INDOOR FAN MOTOR

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*18	208/230–3–60	STD	NONE	–	–	69.2/69.1	90/90	72/72	409	81.0/80.9	100/100	86/86	429	74.0/73.9	90/90	78/78	414	85.8/85.7	100/100	91/91	434
			270A00	18.8/25.0	52.1/60.1	75.6/85.5	90/90	72/79	409/409	90.4/100.3	100/110	86/92	429/429	81.6/91.5	90/100	78/84	414/414	96.4/106.3	100/110	91/98	434/434
			271A00	37.6/50.0	104.2/120.3	140.8/130.7	150/150	129/148	409/409	155.5/145.4	175/175	143/161	429/429	146.8/136.7	150/150	135/153	414/414	161.5/151.4	175/175	149/167	434/434
			272A00	56.3/75.0	156.4/180.4	166.9/190.8	200/200	190/217	409/409	181.7/205.5	200/225	203/231	429/429	172.9/196.8	200/225	195/223	414/414	187.7/211.5	200/225	209/236	434/434
		MED	NONE	–	–	71.4	90	75	423	83.2	100	88	443	76.2	100	80	428	88.0	100	94	448
			270A00	18.8/25.0	52.1/60.1	78.4/88.4	90/90	75/81	423/423	93.1/103.1	100/110	88/95	443/443	84.4/94.4	100/100	80/87	428/428	99.1/109.1	100/110	94/100	448/448
			271A00	37.6/50.0	104.2/120.3	143.5/133.6	150/150	132/151	423/423	158.3/148.3	175/175	146/164	443/443	149.5/139.6	150/150	138/156	428/428	164.3/154.3	175/175	151/170	448/448
			272A00	56.3/75.0	156.4/180.4	169.7/193.7	200/225	192/220	423/423	184.4/208.4	200/225	206/233	443/443	175.7/199.7	200/225	198/225	428/428	190.4/214.4	200/225	211/239	448/448
		HIGH	NONE	–	–	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	79.2/78.3	100/100	84/83	430	91.0/90.1	100/100	97/96	450
			270A00	18.8/25.0	52.1/60.1	82.1/91.0	90/100	78/84	425/425	96.9/105.8	100/110	92/97	445/445	88.1/97.0	100/100	84/89	430/430	102.9/111.8	110/125	97/103	450/450
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	425/425	162.0/150.9	175/175	149/167	445/445	153.3/142.2	175/175	141/158	430/430	168.0/156.9	175/175	155/172	450/450
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	425/425	188.2/211.0	200/225	209/236	445/445	179.4/202.3	200/225	201/228	430/430	194.2/217.0	200/250	215/241	450/450
	460–3–60	STD	NONE	–	–	35.7	45	37	242	41.9	50	45	254	37.9	50	40	244	44.1	50	47	256
			273A00	25.0	30.1	42.9	45	39	242	50.6	60	47	254	45.6	50	42	244	53.4	60	49	256
			274A00	50.0	60.1	65.4	70	74	242	73.1	80	81	254	68.1	80	76	244	75.9	80	84	256
			275A00	75.0	90.2	95.5	100	109	242	103.2	110	116	254	98.2	100	111	244	106.0	110	118	256
		MED	NONE	–	–	36.8	45	39	249	43.0	50	46	261	39.0	50	41	251	45.2	50	48	263
			273A00	25.0	30.1	44.3	45	41	249	52.0	60	48	261	47.0	50	43	251	54.8	60	50	263
			274A00	50.0	60.1	66.7	80	75	249	74.5	80	82	261	69.5	80	78	251	77.2	80	85	263
			275A00	75.0	90.2	96.8	100	110	249	104.6	110	117	261	99.6	110	112	251	107.3	125	119	263
		HIGH	NONE	–	–	37.9	50	40	250	44.1	50	47	262	40.1	50	42	252	46.3	50	50	264
			273A00	25.0	30.1	45.6	50	42	250	53.4	60	49	262	48.4	50	45	252	56.1	60	52	264
			274A00	50.0	60.1	68.1	80	76	250	75.9	80	84	262	70.9	80	79	252	78.6	80	86	264
			275A00	75.0	90.2	98.2	100	111	250	106.0	125	118	262	101.0	110	114	252	108.7	125	121	264
	575–3–60	STD	NONE	–	–	26.2	30	27	184	31.0	40	33	192	27.9	35	29	186	32.7	40	35	194
			276A00	24.8	23.9	33.4	35	31	184	39.4	40	36	192	35.5	40	33	186	41.5	45	38	194
			277A00	49.6	47.7	63.1	70	58	184	69.1	70	64	192	65.3	70	60	186	71.3	80	66	194
			278A00	74.4	71.6	75.1	80	86	184	81.1	90	91	192	77.2	80	88	186	83.2	90	93	194
		MED	NONE	–	–	26.2	30	27	184	31.0	40	33	192	27.9	35	29	186	32.7	40	35	194
			276A00	24.8	23.9	33.4	35	31	184	39.4	40	36	192	35.5	40	33	186	41.5	45	38	194
			277A00	49.6	47.7	63.1	70	58	184	69.1	70	64	192	65.3	70	60	186	71.3	80	66	194
			278A00	74.4	71.6	75.1	80	86	184	81.1	90	91	192	77.2	80	88	186	83.2	90	93	194
		HIGH	NONE	–	–	29.0	35	31	198	33.8	40	36	206	30.7	40	33	200	35.5	45	38	208
			276A00	24.8	23.9	36.9	40	34	198	42.9	45	39	206	39.0	40	36	200	45.0	50	41	208
			277A00	49.6	47.7	66.6	70	61	198	72.6	80	67	206	68.8	70	63	200	74.8	80	69	208
			278A00	74.4	71.6	78.6	90	89	198	84.6	90	94	206	80.7	90	91	200	86.7	90	96	208

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 25 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH SINGLE SPEED INDOOR FAN MOTOR (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*21	208/230–3–60	STD	NONE	–	–	76.1	100	80	453	87.9	100	93	473	80.9	100	85	458	92.7	100	99	478
			270A00	18.8/25.0	52.1/60.1	78.4/88.4	100/100	80/81	453/453	93.1/103.1	100/110	93/95	473/473	84.4/94.4	100/100	85/87	458/458	99.1/109.1	100/110	99/100	478/478
			271A00	37.6/50.0	104.2/120.3	143.5/133.6	150/150	132/151	453/453	158.3/148.3	175/175	146/164	473/473	149.5/139.6	150/150	138/156	458/458	164.3/154.3	175/175	151/170	478/478
			272A00	56.3/75.0	156.4/180.4	169.7/193.7	200/225	192/220	453/453	184.4/208.4	200/225	206/233	473/473	175.7/199.7	200/225	198/225	458/458	190.4/214.4	200/225	211/239	478/478
		MED	NONE	–	–	79.1/78.2	100/100	83/82	455	90.9/90.0	100/100	97/96	475	83.9/83.0	100/100	89/88	460	95.7/94.8	110/110	102/101	480
			270A00	18.8/25.0	52.1/60.1	82.1/91.0	100/100	83/84	455/455	96.9/105.8	100/110	97/97	475/475	88.1/97.0	100/100	89/89	460/460	102.9/111.8	110/125	102/103	480/480
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	455/455	162.0/150.9	175/175	149/167	475/475	153.3/142.2	175/175	141/158	460/460	168.0/156.9	175/175	155/172	480/480
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	455/455	188.2/211.0	200/225	209/236	475/475	179.4/202.3	200/225	201/228	460/460	194.2/217.0	200/250	215/241	480/480
		HIGH – High Eff.	NONE	–	–	82.6	100	87	451	94.4	110	101	471	87.4	100	93	456	99.2	125	106	476
			270A00	18.8/25.0	52.1/60.1	86.5/96.5	100/100	87/89	451/451	101.3/111.3	110/125	101/102	471/471	92.5/102.5	100/110	93/94	456/456	107.3/117.3	125/125	106/108	476/476
			271A00	37.6/50.0	104.2/120.3	151.6/141.7	175/175	139/158	451/451	166.4/156.4	175/175	153/172	471/471	157.6/147.7	175/175	145/164	456/456	172.4/162.4	175/175	159/177	476/476
			272A00	56.3/75.0	156.4/180.4	177.8/201.8	200/225	200/227	451/451	192.5/216.5	200/250	213/241	471/471	183.8/207.8	200/225	205/233	456/456	198.5/222.5	200/250	219/246	476/476
	460–3–60	STD	NONE	–	–	37.1	45	39	251	43.3	50	46	263	39.3	50	42	253	45.5	50	49	265
			273A00	25.0	30.1	44.3	45	41	251	52.0	60	48	263	47.0	50	43	253	54.8	60	50	265
			274A00	50.0	60.1	66.7	80	75	251	74.5	80	82	263	69.5	80	78	253	77.2	80	85	265
			275A00	75.0	90.2	96.8	100	110	251	104.6	110	117	263	99.6	110	112	253	107.3	125	119	265
		MED	NONE	–	–	38.2	50	40	252	44.4	50	47	264	40.4	50	43	254	46.6	50	50	266
			273A00	25.0	30.1	45.6	50	42	252	53.4	60	49	264	48.4	50	45	254	56.1	60	52	266
			274A00	50.0	60.1	68.1	80	76	252	75.9	80	84	264	70.9	80	79	254	78.6	80	86	266
			275A00	75.0	90.2	98.2	100	111	252	106.0	125	118	264	101.0	110	114	254	108.7	125	121	266
		HIGH – High Eff.	NONE	–	–	40.4	50	43	250	46.6	50	50	262	42.6	50	45	252	48.8	60	52	264
			273A00	25.0	30.1	48.4	50	45	250	56.1	60	52	262	51.1	60	47	252	58.9	60	54	264
			274A00	50.0	60.1	70.9	80	79	250	78.6	80	86	262	73.6	80	82	252	81.4	90	89	264
			275A00	75.0	90.2	101.0	110	114	250	108.7	125	121	262	103.7	125	116	252	111.5	125	123	264
	575–3–60	STD	NONE	–	–	26.2	30	27	186	31.0	40	33	194	27.9	35	29	188	32.7	40	35	196
			276A00	24.8	23.9	33.4	35	31	186	39.4	40	36	194	35.5	40	33	188	41.5	45	38	196
			277A00	49.6	47.7	63.1	70	58	186	69.1	70	64	194	65.3	70	60	188	71.3	80	66	196
			278A00	74.4	71.6	75.1	80	86	186	81.1	90	91	194	77.2	80	88	188	83.2	90	93	196
		MED	NONE	–	–	29.0	35	31	200	33.8	40	36	208	30.7	40	33	202	35.5	45	38	210
			276A00	24.8	23.9	36.9	40	34	200	42.9	45	39	208	39.0	40	36	202	45.0	50	41	210
			277A00	49.6	47.7	66.6	70	61	200	72.6	80	67	208	68.8	70	63	202	74.8	80	69	210
			278A00	74.4	71.6	78.6	90	89	200	84.6	90	94	208	80.7	90	91	202	86.7	90	96	210
		HIGH – High Eff.	NONE	–	–	31.0	40	33	198	35.8	45	38	206	32.7	40	35	200	37.5	45	40	208
			276A00	24.8	23.9	39.4	40	36	198	45.4	50	42	206	41.5	45	38	200	47.5	50	44	208
			277A00	49.6	47.7	69.1	70	64	198	75.1	80	69	206	71.3	80	66	200	77.3	80	71	208
			278A00	74.4	71.6	81.1	90	91	198	87.1	90	97	206	83.2	90	93	200	89.2	90	99	208

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 25 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH SINGLE SPEED INDOOR FAN MOTOR (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*25	208/230–3–60	STD	NONE	–	–	83.1/82.2	100/100	87/86	578	94.9/94.0	110/110	101/100	598	87.9/87.0	100/100	93/92	583	99.7/98.8	125/125	106/105	603
			270A00	18.8/25.0	52.1/60.1	83.1/91.0	100/100	87/86	578/578	96.9/105.8	110/110	101/100	598/598	88.1/97.0	100/100	93/92	583/583	102.9/111.8	125/125	106/105	603/603
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	578/578	162.0/150.9	175/175	149/167	598/598	153.3/142.2	175/175	141/158	583/583	168.0/156.9	175/175	155/172	603/603
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	578/578	188.2/211.0	200/225	209/236	598/598	179.4/202.3	200/225	201/228	583/583	194.2/217.0	200/250	215/241	603/603
		MED – High Eff.	NONE	–	–	86.6	100	91	574	98.4	125	105	594	91.4	100	97	579	103.2	125	111	599
			270A00	18.8/25.0	52.1/60.1	86.6/96.5	100/100	91/91	574/574	101.3/111.3	125/125	105/105	594/594	92.5/102.5	100/110	97/97	579/579	107.3/117.3	125/125	111/111	599/599
			271A00	37.6/50.0	104.2/120.3	151.6/141.7	175/175	139/158	574/574	166.4/156.4	175/175	153/172	594/594	157.6/147.7	175/175	145/164	579/579	172.4/162.4	175/175	159/177	599/599
			272A00	56.3/75.0	156.4/180.4	177.8/201.8	200/225	200/227	574/574	192.5/216.5	200/250	213/241	594/594	183.8/207.8	200/225	205/233	579/579	198.5/222.5	200/250	219/246	599/599
		HIGH – High Eff.	NONE	–	–	98.0	125	105	653	109.8	125	118	673	102.8	125	110	658	114.6	125	124	678
			270A00	18.8/25.0	52.1/60.1	100.8/110.8	125/125	105/105	653/653	115.5/125.5	125/150	118/118	673/673	106.8/116.8	125/125	110/110	658/658	121.5/131.5	125/150	124/124	678/678
			271A00	37.6/50.0	104.2/120.3	165.9/155.9	175/175	153/171	653/653	180.6/170.7	200/175	166/185	673/673	171.9/161.9	175/175	158/177	658/658	186.6/176.7	200/200	172/190	678/678
			272A00	56.3/75.0	156.4/180.4	192.0/216.0	200/250	213/240	653/653	206.8/230.8	225/250	226/254	673/673	198.0/222.0	225/250	218/246	658/658	212.8/236.8	225/250	232/259	678/678
	460–3–60	STD	NONE	–	–	43.1	50	45	312	49.3	60	52	324	45.3	50	48	314	51.5	60	55	326
			273A00	25.0	30.1	45.6	50	45	312	53.4	60	52	324	48.4	50	48	314	56.1	60	55	326
			274A00	50.0	60.1	68.1	80	76	312	75.9	80	84	324	70.9	80	79	314	78.6	80	86	326
			275A00	75.0	90.2	98.2	100	111	312	106.0	125	118	324	101.0	110	114	314	108.7	125	121	326
		MED – High Eff.	NONE	–	–	45.3	50	48	310	51.5	60	55	322	47.5	60	50	312	53.7	60	58	324
			273A00	25.0	30.1	48.4	50	48	310	56.1	60	55	322	51.1	60	50	312	58.9	60	58	324
			274A00	50.0	60.1	70.9	80	79	310	78.6	80	86	322	73.6	80	82	312	81.4	90	89	324
			275A00	75.0	90.2	101.0	110	114	310	108.7	125	121	322	103.7	125	116	312	111.5	125	123	324
		HIGH – High Eff.	NONE	–	–	51.0	60	54	350	57.2	70	62	362	53.2	60	57	352	59.4	70	64	364
			273A00	25.0	30.1	55.5	60	54	350	63.3	70	62	362	58.3	60	57	352	66.0	70	64	364
			274A00	50.0	60.1	78.0	90	86	350	85.7	90	93	362	80.7	90	88	352	88.5	100	95	364
			275A00	75.0	90.2	108.1	125	120	350	115.8	125	127	362	110.8	125	123	352	118.6	125	130	364
	575–3–60	STD	NONE	–	–	33.4	40	35	232	38.2	45	41	240	35.1	45	37	234	39.9	50	43	242
			276A00	24.8	23.9	36.9	40	35	232	42.9	45	41	240	39.0	45	37	234	45.0	50	43	242
			277A00	49.6	47.7	66.6	70	61	232	72.6	80	67	240	68.8	70	63	234	74.8	80	69	242
			278A00	74.4	71.6	78.6	90	89	232	84.6	90	94	240	80.7	90	91	234	86.7	90	96	242
		MED – High Eff.	NONE	–	–	35.4	45	37	230	40.2	50	43	238	37.1	45	39	232	41.9	50	45	240
			276A00	24.8	23.9	39.4	45	37	230	45.4	50	43	238	41.5	45	39	232	47.5	50	45	240
			277A00	49.6	47.7	69.1	70	64	230	75.1	80	69	238	71.3	80	66	232	77.3	80	71	240
			278A00	74.4	71.6	81.1	90	91	230	87.1	90	97	238	83.2	90	93	232	89.2	90	99	240
		HIGH – High Eff.	NONE	–	–	37.3	45	40	257	42.1	50	45	265	39.0	50	42	259	43.8	50	47	267
			276A00	24.8	23.9	41.8	45	40	257	47.8	50	45	265	43.9	50	42	259	49.9	50	47	267
			277A00	49.6	47.7	71.5	80	66	257	77.5	80	71	265	73.6	80	68	259	79.6	80	73	267
			278A00	74.4	71.6	83.5	90	93	257	89.5	100	99	265	85.6	90	95	259	91.6	100	101	267

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 26 – UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH FACTORY-INSTALLED 2-SPEED INDOOR FAN OPTION

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*18	208/230–3–60	STD	NONE	–	–	69.4/68.6	90/90	73/72	390	81.2/80.4	100/100	86/85	410	74.2/73.4	90/90	78/77	395	86.0/85.2	100/100	92/91	415
			270A00	18.8/25.0	52.1/60.1	75.9/84.9	90/90	73/78	390/390	90.6/99.6	100/100	86/92	410/410	81.9/90.9	90/100	78/84	395/395	96.6/105.6	100/110	92/97	415/415
			271A00	37.6/50.0	104.2/120.3	141.0/130.1	150/150	130/147	390/390	155.8/144.8	175/150	143/161	410/410	147.0/136.1	150/150	135/153	395/395	161.8/150.8	175/175	149/166	415/415
			272A00	56.3/75.0	156.4/180.4	167.2/190.2	200/200	190/216	390/390	181.9/204.9	200/225	203/230	410/410	173.2/196.2	200/225	195/222	395/395	187.9/210.9	200/225	209/236	415/415
		MED	NONE	–	–	71.6/70.6	90/90	75/74	414	83.4/82.4	100/100	89/88	434	76.4/75.4	100/100	81/79	419	88.2/87.2	100/100	94/93	439
			270A00	18.8/25.0	52.1/60.1	78.6/87.4	90/90	75/80	414/414	93.4/102.1	100/110	89/94	434/434	84.6/93.4	100/100	81/86	419/419	99.4/108.1	100/110	94/99	439/439
			271A00	37.6/50.0	104.2/120.3	143.8/132.6	150/150	132/150	414/414	158.5/147.3	175/175	146/163	434/434	149.8/138.6	150/150	138/155	419/419	164.5/153.3	175/175	151/169	439/439
			272A00	56.3/75.0	156.4/180.4	169.9/192.7	200/225	192/219	414/414	184.7/207.4	200/225	206/232	434/434	175.9/198.7	200/225	198/224	419/419	190.7/213.4	200/225	211/238	439/439
		HIGH	NONE	–	–	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	79.2/78.3	100/100	84/83	430	91.0/90.1	100/100	97/96	450
			270A00	18.8/25.0	52.1/60.1	82.1/91.0	90/100	78/84	425/425	96.9/105.8	100/110	92/97	445/445	88.1/97.0	100/100	84/89	430/430	102.9/111.8	110/125	97/103	450/450
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	425/425	162.0/150.9	175/175	149/167	445/445	153.3/142.2	175/175	141/158	430/430	168.0/156.9	175/175	155/172	450/450
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	425/425	188.2/211.0	200/225	209/236	445/445	179.4/202.3	200/225	201/228	430/430	194.2/217.0	200/250	215/241	450/450
	460–3–60	STD	NONE	–	–	35.3	45	37	233	41.5	50	44	245	37.5	50	39	235	43.7	50	47	247
			273A00	25.0	30.1	42.4	45	39	233	50.1	60	46	245	45.1	50	42	235	52.9	60	49	247
			274A00	50.0	60.1	64.9	70	73	233	72.6	80	81	245	67.6	80	76	235	75.4	80	83	247
			275A00	75.0	90.2	95.0	100	108	233	102.7	110	115	245	97.7	100	111	235	105.5	110	118	247
		MED	NONE	–	–	36.4	45	38	245	42.6	50	45	257	38.6	50	41	247	44.8	50	48	259
			273A00	25.0	30.1	43.8	45	40	245	51.5	60	47	257	46.5	50	43	247	54.3	60	50	259
			274A00	50.0	60.1	66.2	80	75	245	74.0	80	82	257	69.0	80	77	247	76.7	80	84	259
			275A00	75.0	90.2	96.3	100	109	245	104.1	110	116	257	99.1	100	112	247	106.8	110	119	259
		HIGH	NONE	–	–	37.9	50	40	250	44.1	50	47	262	40.1	50	42	252	46.3	50	50	264
			273A00	25.0	30.1	45.6	50	42	250	53.4	60	49	262	48.4	50	45	252	56.1	60	52	264
			274A00	50.0	60.1	68.1	80	76	250	75.9	80	84	262	70.9	80	79	252	78.6	80	86	264
			275A00	75.0	90.2	98.2	100	111	250	106.0	125	118	262	101.0	110	114	252	108.7	125	121	264
	575–3–60	STD	NONE	–	–	27.9	35	29	184	32.7	40	35	192	29.6	35	31	186	34.4	40	37	194
			276A00	24.8	23.9	35.5	40	33	184	41.5	45	38	192	37.6	40	35	186	43.6	45	40	194
			277A00	49.6	47.7	65.3	70	60	184	71.3	80	66	192	67.4	70	62	186	73.4	80	68	194
			278A00	74.4	71.6	77.2	90	88	184	83.2	90	93	192	79.4	90	89	186	85.4	90	95	194
		MED	NONE	–	–	27.9	35	29	184	32.7	40	35	192	29.6	35	31	186	34.4	40	37	194
			276A00	24.8	23.9	35.5	40	33	184	41.5	45	38	192	37.6	40	35	186	43.6	45	40	194
			277A00	49.6	47.7	65.3	70	60	184	71.3	80	66	192	67.4	70	62	186	73.4	80	68	194
			278A00	74.4	71.6	77.2	90	88	184	83.2	90	93	192	79.4	90	89	186	85.4	90	95	194
		HIGH	NONE	–	–	29.6	35	31	198	34.4	40	37	206	31.3	40	33	200	36.1	45	39	208
			276A00	24.8	23.9	37.6	40	35	198	43.6	45	40	206	39.8	40	37	200	45.8	50	42	208
			277A00	49.6	47.7	67.4	70	62	198	73.4	80	68	206	69.5	70	64	200	75.5	80	69	208
			278A00	74.4	71.6	79.4	90	89	198	85.4	90	95	206	81.5	90	91	200	87.5	90	97	208

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 26 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH FACTORY-INSTALLED 2-SPEED INDOOR FAN OPTION (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*21	208/230–3–60	STD	NONE	–	–	76.3/75.3	100/100	80/79	444	88.1/87.1	100/100	93/92	464	81.1/80.1	100/100	85/84	449	92.9/91.9	100/100	99/98	469
			270A00	18.8/25.0	52.1/60.1	78.6/87.4	100/100	80/80	444/444	93.4/102.1	100/110	93/94	464/464	84.6/93.4	100/100	85/86	449/449	99.4/108.1	100/110	99/99	469/469
			271A00	37.6/50.0	104.2/120.3	143.8/132.6	150/150	132/150	444/444	158.5/147.3	175/175	146/163	464/464	149.8/138.6	150/150	138/155	449/449	164.5/153.3	175/175	151/169	469/469
			272A00	56.3/75.0	156.4/180.4	169.9/192.7	200/225	192/219	444/444	184.7/207.4	200/225	206/232	464/464	175.9/198.7	200/225	198/224	449/449	190.7/213.4	200/225	211/238	469/469
		MED	NONE	–	–	79.1/78.2	100/100	83/82	455	90.9/90.0	100/100	97/96	475	83.9/83.0	100/100	89/88	460	95.7/94.8	110/110	102/101	480
			270A00	18.8/25.0	52.1/60.1	82.1/91.0	100/100	83/84	455/455	96.9/105.8	100/110	97/97	475/475	88.1/97.0	100/100	89/89	460/460	102.9/111.8	110/125	102/103	480/480
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	455/455	162.0/150.9	175/175	149/167	475/475	153.3/142.2	175/175	141/158	460/460	168.0/156.9	175/175	155/172	480/480
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	455/455	188.2/211.0	200/225	209/236	475/475	179.4/202.3	200/225	201/228	460/460	194.2/217.0	200/250	215/241	480/480
		HIGH	NONE	–	–	82.6	100	87	451	94.4	110	101	471	87.4	100	93	456	99.2	125	106	476
			270A00	18.8/25.0	52.1/60.1	86.5/96.5	100/100	87/89	451/451	101.3/111.3	110/125	101/102	471/471	92.5/102.5	100/110	93/94	456/456	107.3/117.3	125/125	106/108	476/476
			271A00	37.6/50.0	104.2/120.3	151.6/141.7	175/175	139/158	451/451	166.4/156.4	175/175	153/172	471/471	157.6/147.7	175/175	145/164	456/456	172.4/162.4	175/175	159/177	476/476
			272A00	56.3/75.0	156.4/180.4	177.8/201.8	200/225	200/227	451/451	192.5/216.5	200/250	213/241	471/471	183.8/207.8	200/225	205/233	456/456	198.5/222.5	200/250	219/246	476/476
	460–3–60	STD	NONE	–	–	36.7	45	39	247	42.9	50	46	259	38.9	50	41	249	45.1	50	48	261
			273A00	25.0	30.1	43.8	45	40	247	51.5	60	47	259	46.5	50	43	249	54.3	60	50	261
			274A00	50.0	60.1	66.2	80	75	247	74.0	80	82	259	69.0	80	77	249	76.7	80	84	261
			275A00	75.0	90.2	96.3	100	109	247	104.1	110	116	259	99.1	100	112	249	106.8	110	119	261
		MED	NONE	–	–	38.2	50	40	252	44.4	50	47	264	40.4	50	43	254	46.6	50	50	266
			273A00	25.0	30.1	45.6	50	42	252	53.4	60	49	264	48.4	50	45	254	56.1	60	52	266
			274A00	50.0	60.1	68.1	80	76	252	75.9	80	84	264	70.9	80	79	254	78.6	80	86	266
			275A00	75.0	90.2	98.2	100	111	252	106.0	125	118	264	101.0	110	114	254	108.7	125	121	266
		HIGH	NONE	–	–	40.4	50	43	250	46.6	50	50	262	42.6	50	45	252	48.8	60	52	264
			273A00	25.0	30.1	48.4	50	45	250	56.1	60	52	262	51.1	60	47	252	58.9	60	54	264
			274A00	50.0	60.1	70.9	80	79	250	78.6	80	86	262	73.6	80	82	252	81.4	90	89	264
			275A00	75.0	90.2	101.0	110	114	250	108.7	125	121	262	103.7	125	116	252	111.5	125	123	264
	575–3–60	STD	NONE	–	–	27.9	35	29	186	32.7	40	35	194	29.6	35	31	188	34.4	40	37	196
			276A00	24.8	23.9	35.5	40	33	186	41.5	45	38	194	37.6	40	35	188	43.6	45	40	196
			277A00	49.6	47.7	65.3	70	60	186	71.3	80	66	194	67.4	70	62	188	73.4	80	68	196
			278A00	74.4	71.6	77.2	90	88	186	83.2	90	93	194	79.4	90	89	188	85.4	90	95	196
		MED	NONE	–	–	29.6	35	31	200	34.4	40	37	208	31.3	40	33	202	36.1	45	39	210
			276A00	24.8	23.9	37.6	40	35	200	43.6	45	40	208	39.8	40	37	202	45.8	50	42	210
			277A00	49.6	47.7	67.4	70	62	200	73.4	80	68	208	69.5	70	64	202	75.5	80	69	210
			278A00	74.4	71.6	79.4	90	89	200	85.4	90	95	208	81.5	90	91	202	87.5	90	97	210
		HIGH	NONE	–	–	31.0	40	33	198	35.8	45	38	206	32.7	40	35	200	37.5	45	40	208
			276A00	24.8	23.9	39.4	40	36	198	45.4	50	42	206	41.5	45	38	200	47.5	50	44	208
			277A00	49.6	47.7	69.1	70	64	198	75.1	80	69	206	71.3	80	66	200	77.3	80	71	208
			278A00	74.4	71.6	81.1	90	91	198	87.1	90	97	206	83.2	90	93	200	89.2	90	99	208

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 26 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH FACTORY-INSTALLED 2-SPEED INDOOR FAN OPTION (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*25	208/230–3–60	STD	NONE	–	–	83.1/82.2	100/100	87/86	578	94.9/94.0	110/110	101/100	598	87.9/87.0	100/100	93/92	583	99.7/98.8	125/125	106/105	603
			270A00	18.8/25.0	52.1/60.1	83.1/91.0	100/100	87/86	578/578	96.9/105.8	110/110	101/100	598/598	88.1/97.0	100/100	93/92	583/583	102.9/111.8	125/125	106/105	603/603
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	578/578	162.0/150.9	175/175	149/167	598/598	153.3/142.2	175/175	141/158	583/583	168.0/156.9	175/175	155/172	603/603
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	578/578	188.2/211.0	200/225	209/236	598/598	179.4/202.3	200/225	201/228	583/583	194.2/217.0	200/250	215/241	603/603
		MED	NONE	–	–	86.6	100	916	574	98.4	125	105	594	91.4	100	97	579	103.2	125	111	599
			270A00	18.8/25.0	52.1/60.1	86.6/96.5	100/100	91/91	574/574	101.3/111.3	125/125	105/105	594/594	92.5/102.5	100/110	97/97	579/579	107.3/117.3	125/125	111/111	599/599
			271A00	37.6/50.0	104.2/120.3	151.6/141.7	175/175	139/158	574/574	166.4/156.4	175/175	153/172	594/594	157.6/147.7	175/175	145/164	579/579	172.4/162.4	175/175	159/177	599/599
			272A00	56.3/75.0	156.4/180.4	177.8/201.8	200/225	200/227	574/574	192.5/216.5	200/250	213/241	594/594	183.8/207.8	200/225	205/233	579/579	198.5/222.5	200/250	219/246	599/599
		HIGH	NONE	–	–	98.0	125	105	653	109.8	125	118	673	102.8	125	110	658	114.6	125	124	678
			270A00	18.8/25.0	52.1/60.1	100.8/110.8	125/125	105/105	653/653	115.5/125.5	125/150	118/118	673/673	106.8/116.8	125/125	110/110	658/658	121.5/131.5	125/150	124/124	678/678
			271A00	37.6/50.0	104.2/120.3	165.9/155.9	175/175	153/171	653/653	180.6/170.7	200/175	166/185	673/673	171.9/161.9	175/175	158/177	658/658	186.6/176.7	200/200	172/190	678/678
			272A00	56.3/75.0	156.4/180.4	192.0/216.0	200/250	213/240	653/653	206.8/230.8	225/250	226/254	673/673	198.0/222.0	225/250	218/246	658/658	212.8/236.8	225/250	232/259	678/678
	460–3–60	STD	NONE	–	–	43.1	50	45	312	49.3	60	52	324	45.3	50	48	314	51.5	60	55	326
			273A00	25.0	30.1	45.6	50	45	312	53.4	60	52	324	48.4	50	48	314	56.1	60	55	326
			274A00	50.0	60.1	68.1	80	76	312	75.9	80	84	324	70.9	80	79	314	78.6	80	86	326
			275A00	75.0	90.2	98.2	100	111	312	106.0	125	118	324	101.0	110	114	314	108.7	125	121	326
		MED	NONE	–	–	45.3	50	48	310	51.5	60	55	322	47.5	60	50	312	53.7	60	58	324
			273A00	25.0	30.1	48.4	50	48	310	56.1	60	55	322	51.1	60	50	312	58.9	60	58	324
			274A00	50.0	60.1	70.9	80	79	310	78.6	80	86	322	73.6	80	82	312	81.4	90	89	324
			275A00	75.0	90.2	101.0	110	114	310	108.7	125	121	322	103.7	125	116	312	111.5	125	123	324
		HIGH	NONE	–	–	51.0	60	54	350	57.2	70	62	362	53.2	60	57	352	59.4	70	64	364
			273A00	25.0	30.1	55.5	60	54	350	63.3	70	62	362	58.3	60	57	352	66.0	70	64	364
			274A00	50.0	60.1	78.0	90	86	350	85.7	90	93	362	80.7	90	88	352	88.5	100	95	364
			275A00	75.0	90.2	108.1	125	120	350	115.8	125	127	362	110.8	125	123	352	118.6	125	130	364
	575–3–60	STD	NONE	–	–	34.0	45	36	232	38.8	50	41	240	35.7	45	38	234	40.5	50	43	242
			276A00	24.8	23.9	37.6	45	36	232	43.6	50	41	240	39.8	45	38	234	45.8	50	43	242
			277A00	49.6	47.7	67.4	70	62	232	73.4	80	68	240	69.5	70	64	234	75.5	80	69	242
			278A00	74.4	71.6	79.4	90	89	232	85.4	90	95	240	81.5	90	91	234	87.5	90	97	242
		MED	NONE	–	–	35.4	45	37	230	40.2	50	43	238	37.1	45	39	232	41.9	50	45	240
			276A00	24.8	23.9	39.4	45	37	230	45.4	50	43	238	41.5	45	39	232	47.5	50	45	240
			277A00	49.6	47.7	69.1	70	64	230	75.1	80	69	238	71.3	80	66	232	77.3	80	71	240
			278A00	74.4	71.6	81.1	90	91	230	87.1	90	97	238	83.2	90	93	232	89.2	90	99	240
		HIGH	NONE	–	–	37.3	45	40	257	42.1	50	45	265	39.0	50	42	259	43.8	50	47	267
			276A00	24.8	23.9	41.8	45	40	257	47.8	50	45	265	43.9	50	42	259	49.9	50	47	267
			277A00	49.6	47.7	71.5	80	66	257	77.5	80	71	265	73.6	80	68	259	79.6	80	73	267
			278A00	74.4	71.6	83.5	90	93	257	89.5	100	99	265	85.6	90	95	259	91.6	100	101	267

See: “Legend and Notes” on page 39

ELECTRICAL INFORMATION (cont)

Table 26 - UNIT WIRE/FUSE OR HACR BREAKER SIZING DATA WITH FACTORY-INSTALLED 2-SPEED INDOOR FAN OPTION (cont)

UNIT	NOM. V–Ph–Hz	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER******	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
								FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA
50TC–*29	208/230–3–60	STD	NONE	–	–	116.6/115.7	150/150	120/119	591	128.4/127.5	175/175	134/133	611	121.4/120.5	150/150	126/125	596	133.2/132.3	175/175	139/138	616
			270A00	18.8/25.0	52.1/60.1	116.6/115.7	150/150	120/119	591/591	128.4/127.5	175/175	134/133	611/611	121.4/120.5	150/150	126/125	596/596	133.2/132.3	175/175	139/138	616/616
			271A00	37.6/50.0	104.2/120.3	147.3/136.2	150/150	135/153	591/591	162.0/150.9	175/175	149/167	611/611	153.3/142.2	175/175	141/158	596/596	168.0/156.9	175/175	155/172	616/616
			272A00	56.3/75.0	156.4/180.4	173.4/196.3	200/225	196/222	591/591	188.2/211.0	200/225	209/236	611/611	179.4/202.3	200/225	201/228	596/596	194.2/217.0	200/250	215/241	616/616
		MED	NONE	–	–	120.1	150	124	587	131.9	175	138	607	124.9	150	130	592	136.7	175	143	612
			270A00	18.8/25.0	52.1/60.1	120.1/120.1	150/150	124/124	587/587	131.9/131.9	175/175	138/138	607/607	124.9/124.9	150/150	130/130	592/592	136.7/136.7	175/175	143/143	612/612
			271A00	37.6/50.0	104.2/120.3	151.6/141.7	175/175	139/158	587/587	166.4/156.4	175/175	153/172	607/607	157.6/147.7	175/175	145/164	592/592	172.4/162.4	175/175	159/177	612/612
			272A00	56.3/75.0	156.4/180.4	177.8/201.8	200/225	200/227	587/587	192.5/216.5	200/250	213/241	607/607	183.8/207.8	200/225	205/233	592/592	198.5/222.5	200/250	219/246	612/612
		HIGH	NONE	–	–	131.5	175	137	666	143.3	175	151	686	136.3	175	143	671	148.1	175	157	691
			270A00	18.8/25.0	52.1/60.1	131.5/131.5	175/175	137/137	666/666	143.3/143.3	175/175	151/151	686/686	136.3/136.3	175/175	143/143	671/671	148.1/148.1	175/175	157/157	691/691
			271A00	37.6/50.0	104.2/120.3	165.9/155.9	175/175	153/171	666/666	180.6/170.7	200/175	166/185	686/686	171.9/161.9	175/175	158/177	671/671	186.6/176.7	200/200	172/190	691/691
			272A00	56.3/75.0	156.4/180.4	192.0/216.0	200/250	213/240	666/666	206.8/230.8	225/250	226/254	686/686	198.0/222.0	225/250	218/246	671/671	212.8/236.8	225/250	232/259	691/691
	460–3–60	STD	NONE	–	–	51.1	60	53	321	57.3	70	60	333	53.3	60	56	323	59.5	70	63	335
			273A00	25.0	30.1	51.1	60	53	321	57.3	70	60	333	53.3	60	56	323	59.5	70	63	335
			274A00	50.0	60.1	68.1	80	76	321	75.9	80	84	333	70.9	80	79	323	78.6	80	86	335
			275A00	75.0	90.2	98.2	100	111	321	106.0	125	118	333	101.0	110	114	323	108.7	125	121	335
		MED	NONE	–	–	53.3	60	56	319	59.5	70	63	331	55.5	70	58	321	61.7	80	66	333
			273A00	25.0	30.1	53.3	60	56	319	59.5	70	63	331	55.5	70	58	321	61.7	80	66	333
			274A00	50.0	60.1	70.9	80	79	319	78.6	80	86	331	73.6	80	82	321	81.4	90	89	333
			275A00	75.0	90.2	101.0	110	114	319	108.7	125	121	331	103.7	125	116	321	111.5	125	123	333
		HIGH	NONE	–	–	59.0	70	62	359	65.2	80	70	371	61.2	70	65	361	67.4	80	72	373
			273A00	25.0	30.1	59.0	70	62	359	65.2	80	70	371	61.2	70	65	361	67.4	80	72	373
			274A00	50.0	60.1	78.0	90	86	359	85.7	90	93	371	80.7	90	88	361	88.5	100	95	373
			275A00	75.0	90.2	108.1	125	120	359	115.8	125	127	371	110.8	125	123	361	118.6	125	130	373
	575–3–60	STD	NONE	–	–	41.1	50	43	256	45.9	60	49	264	42.8	50	45	258	47.6	60	50	266
			276A00	24.8	23.9	41.1	50	43	256	45.9	60	49	264	42.8	50	45	258	47.6	60	50	266
			277A00	49.6	47.7	67.4	70	62	256	73.4	80	68	264	69.5	70	64	258	75.5	80	69	266
			278A00	74.4	71.6	79.4	90	89	256	85.4	90	95	264	81.5	90	91	258	87.5	90	97	266
		MED	NONE	–	–	42.5	50	45	254	47.3	60	50	262	44.2	50	47	256	49.0	60	52	264
			276A00	24.8	23.9	42.5	50	45	254	47.3	60	50	262	44.2	50	47	256	49.0	60	52	264
			277A00	49.6	47.7	69.1	70	64	254	75.1	80	69	262	71.3	80	66	256	77.3	80	71	264
			278A00	74.4	71.6	81.1	90	91	254	87.1	90	97	262	83.2	90	93	256	89.2	90	99	264
		HIGH	NONE	–	–	44.4	50	47	281	49.2	60	52	289	46.1	60	49	283	50.9	60	54	291
			276A00	24.8	23.9	44.4	50	47	281	49.2	60	52	289	46.1	60	49	283	50.9	60	54	291
			277A00	49.6	47.7	71.5	80	66	281	77.5	80	71	289	73.6	80	68	283	79.6	80	73	291
			278A00	74.4	71.6	83.5	90	93	281	89.5	100	99	289	85.6	90	95	283	91.6	100	101	291

See: “Legend and Notes” on page 39

SEQUENCE OF OPERATION

General

The sequence below describes the sequence of operation for an electro-mechanical unit with and without a factory-installed EconoMi$er® IV and X (called "economizer" in this sequence). For information regarding a direct digital controller, see the start-up, operations, and troubleshooting manual for the applicable controller.

Electro-mechanical units with no economizer

Cooling (Single speed indoor fan motor) —

When the thermostat calls for cooling, terminals G and Y1 are energized. As a result, the indoor-fan contactor (IFC) and the compressor contactor (C1) are energized, causing the indoor-fan motor (IFM), compressor #1, and outdoor fan to start. If the unit has 2 stages of cooling, the thermostat will additionally energize Y2. The Y2 signal will energize compressor contactor #2 (C2), causing compressor #2 to start. Regardless of the number of stages, the outdoor-fan motor runs continuously while unit is cooling.

Cooling (2-speed indoor fan motor) —

Per ASHRAE 90.1-2016 and IECC-2015 standards, during the first stage of cooling operation the VFD will adjust the fan motor to provide 66% of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%).

Heating —

NOTE: The 50TC is sold as cooling only. If electric heaters are required, use only factory-approved electric heaters. They will operate as described below.

Units have either 1 or 2 stages of electric heat. When the thermostat calls for heating, power is applied to the W1 terminal at the unit. The unit control will energize the indoor fan contactor and the first stage of electric heat. On units with two-stage heating, when additional heating is required, the second stage of electric heat (if equipped) will be energized when power is applied at the W2 terminal on the unit.

Electro-mechanical units with an economizer

Cooling —

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the EconoMi$er IV and X control to provide a 50°F (10°C) to 55°F (13°C) mixed-air temperature into the zone. As the mixed air temperature fluctuates above 55°F (13°C) or below 50°F (10°C) dampers will be modulated (open or close) to bring the mixed-air temperature back within control. If mechanical cooling is utilized with free cooling, the outdoor-air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed-air temperature to drop below 45°F (9°C), then the outdoor-air damper position will be decreased to the minimum position. If the mixed-air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 48°F (9°C). The power exhaust fans will be energized and de-energized, if installed, as the outdoor-air damper opens and closes.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV and X control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 setpoint, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. For EconoMi$er IV and X operation, there must be a thermostat call for the fan (G). If the unit is occupied and the fan is on, the damper will operate at minimum position. Otherwise, the damper will be closed.

When the EconoMi$er IV and X control is in the occupied mode and a call for cooling exists (Y1 on the thermostat), the control will first check for indoor fan operation. If the fan is not on, then cooling will not be activated. If the fan is on, then the control will open the EconoMi$er IV and X damper to the minimum position.

On the initial power to the EconoMi$er IV and X control, it will take the damper up to 2-1/2 minutes before it begins to position itself. After the initial power-up, further changes in damper position can take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between 1-1/2 and 2-1/2 minutes. If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), then the control will modulate the dampers open to maintain the mixed-air temperature setpoint at 50°F (10°C) to 55°F (13°C). If there is a further demand for cooling (cooling second stage - Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed-air temperature setpoint. The EconoMi$er IV and X damper will be open at maximum position. EconoMi$er IV and X operation is limited to a single compressor.

2-Speed Note: When operating in ventilation mode only, the indoor fan motor will automatically adjust to 66% of the total cfm established.

Heating —

The sequence of operation for the heating is the same as an electro-mechanical unit with no economizer. The only difference is how the economizer acts. The economizer will stay at the Economizer Minimum Position while the evaporator fan is operating. The outdoor-air damper is closed when the indoor fan is not operating.

Refer to Service and Maintenance Manual for further details.

Optional Humidi-MiZer® Dehumidification System

Units with the factory equipped Humidi-MiZer system option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle. The Humidi-MiZer system option includes additional valves in the liquid line and discharge line of each refrigerant circuit, a small reheat condenser coil downstream of the evaporator, and Motormaster® variable-speed control of some or all outdoor fans. Operation of the revised refrigerant circuit for each mode is described below.

The Humidi-MiZer system provides three sub-modes of operation: Cool, Reheat1, and Reheat2.

Cool mode - provides a normal ratio of Sensible and Latent Cooling effect from the evaporator coil.

Reheat1 - provides increased Latent Cooling while slightly reducing the Sensible Cooling effect.

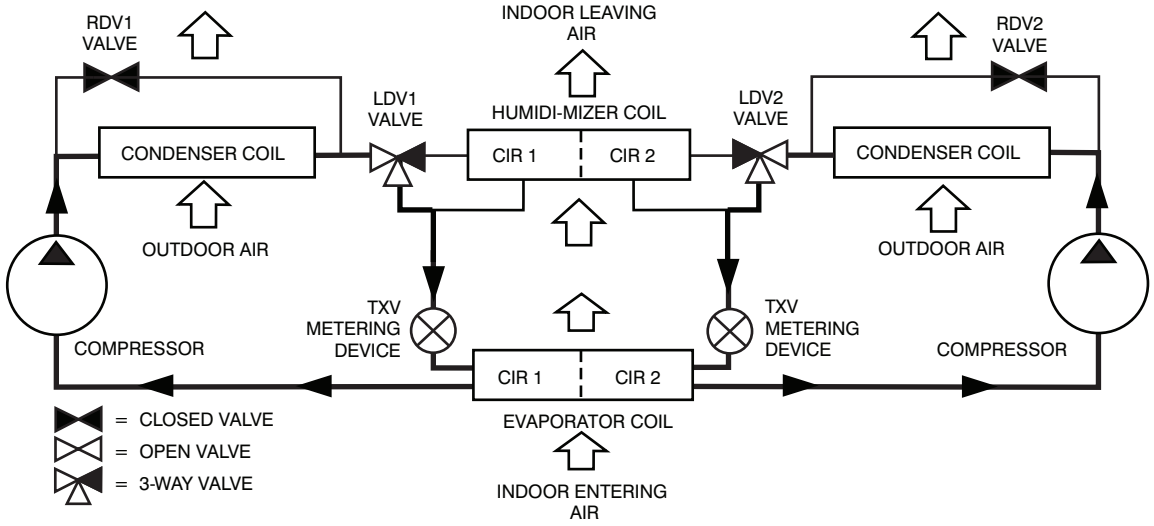
Reheat2 - provides normal Latent Cooling but with null or minimum Sensible Cooling effect delivered to the space.

The Reheat1 and Reheat2 modes are available when the unit is not in a Heating mode and when the Low Ambient Lockout switch is closed.

RTU Open (Factory Option)

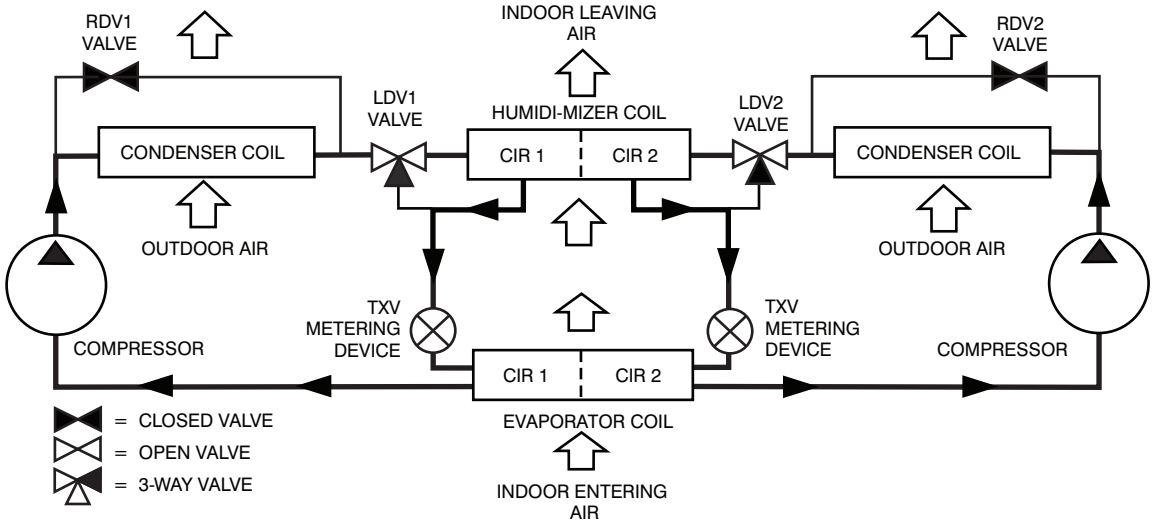
For details on operating 50TC units equipped with the factory-installed RTU Open option refer to *Factory Installed Option RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting* manual.

SEQUENCE OF OPERATION (cont)



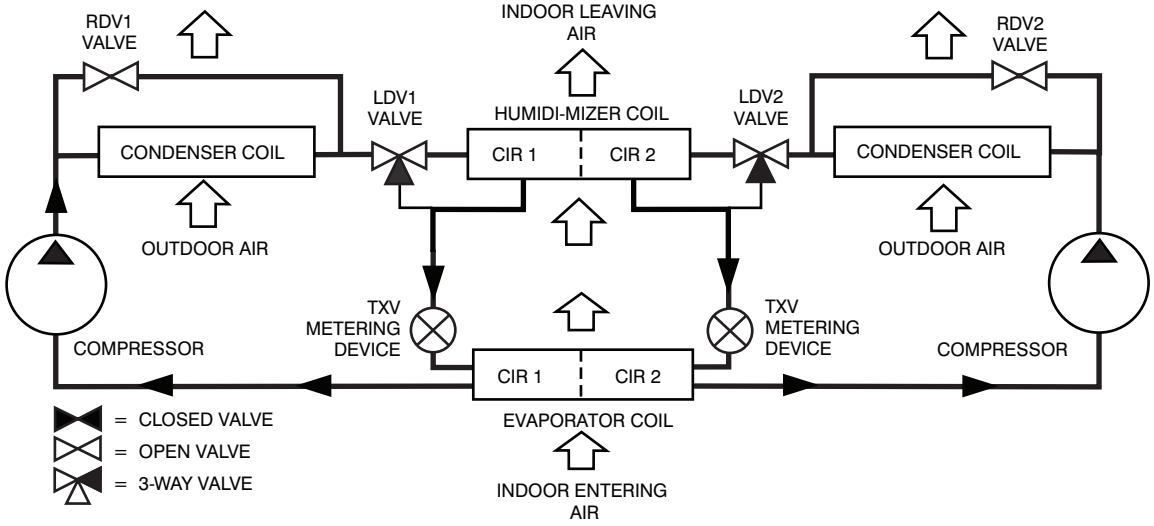
C13792

Normal Cooling Mode - Humidi-MiZer® System



C13809

Subcooling Mode (Reheat 1) - Humidi-MiZer System



C13793

Hot Gas Reheat Mode (Reheat 2) - Humidi-MiZer System

GUIDE SPECIFICATIONS - 50TC**18-29

Note about this specification:

These specifications are written in “Masterformat” as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

Cooling Only/Electric Heat Packaged Rooftop

HVAC Guide Specifications

Size Range: 15 to 25 Nominal Tons

Section **Description**

23 06 80 Schedules for Decentralized HVAC Equipment

23 06 80.13 Decentralized Unitary HVAC Equipment Schedule

23 06 80.13.A. Rooftop unit schedule

1. Schedule is per the project specification requirements.

23 07 16 HVAC Equipment Insulation

23 07 16.13 Decentralized, Rooftop Units:

23 07 16.13.A. Evaporator fan compartment:

1. Interior cabinet surfaces shall be insulated with a minimum 1/2-in. thick, minimum 1 1/2 lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
3. Unit internal insulation linings shall be resistant to mold growth in accordance with “mold growth and humidity” test in ASTM C1338, G21, and UL 181 or comparable test method. Air stream surfaces shall be evaluated in accordance with the “Erosion Test” in UL 181, as part of ASTM C1071.

23 07 16.13.B. Electric heat compartment:

1. Aluminum foil-faced fiberglass insulation shall be used.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

23 09 13 Instrumentation and Control Devices for HVAC

23 09 13.23 Sensors and Transmitters

23 09 13.23.A. Thermostats

1. Thermostat must
   a. energize both “W” and “G” when calling for heat.
   b. have capability to energize 2 different stages of cooling, and 2 different stages of heating.
   c. include capability for occupancy scheduling.

23 09 23 Direct-digital Control system for HVAC

23 09 23.13 Decentralized, Rooftop Units:

23 09 23.13.A. PremierLink™ controller

1. Shall be ASHRAE 62 compliant.
2. Shall accept 18-32VAC input power.
3. Shall have an operating temperature range from -40°F (-40°C) to 158°F (70°C), 10% - 95% RH (non-condensing).
4. Shall include an integrated economizer controller to support an economizer with 4 to 20 mA actuator input and no microprocessor controller.
5. Controller shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, indoor relative humidity, compressor lock-out, fire shutdown, enthalpy, fan status, remote time clock/door switch.
6. Shall accept a CO_2 sensor in the conditioned space, and be Demand Controlled Ventilation (DCV) ready.
7. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve/ dehumidify/ occupied.
8. Unit shall provide surge protection for the controller through a circuit breaker.
9. Shall be Internet capable, and communicate at a Baud rate of 38.4K or faster

10. Shall have an LED display independently showing the status of activity on the communication bus, and processor operation.
11. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks* plug-in communications card.
12. Shall have built-in Carrier Comfort Network® (CCN) protocol, and be compatible with other CCN devices, including ComfortVIEW™ controllers.
13. Shall have built-in support for Carrier technician tool.
14. Software upgrades will be accomplished by local download. Software upgrades through chip replacements are not allowed.
15. Shall be shock resistant in all planes to 5G peak, 11ms during operation, and 100G peak, 11ms during storage.
16. Shall be vibration resistant in all planes to 1.5G at 20-300 Hz.
17. Shall support a bus length of 4000 ft max (1219 m), 60 devices per 1000 ft (305 m) section, and 1 RS-485 repeater per 1000ft sections.

* LonWorks is a registered trademark of Echelon Corporation.

23 09 23.13.B. RTU Open protocol, direct digital controller:

1. Shall be ASHRAE 62 compliant.
2. Shall accept 18-30VAC, 50-60Hz, and consumer 15VA or less power.
3. Shall have an operating temperature range from -40°F (-40°C) to 130°F (54°C), 10% - 90% RH (non-condensing).
4. Shall include built-in protocol for BACnet† (MS/TP and PTP modes), Modbus** (RTU and ASCII), Johnson N2 and LonWorks. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers.
6. Baud rate Controller shall be selectable using a dipswitch.
7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/ humidity/ remote occupancy.
9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, heat stage 3/ exhaust/ reversing valve.
10. Shall have built-in surge protection circuitry through solid state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the “trip” condition clears.
11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
12. Shall have built-in support for Carrier technician tool.
13. Shall include an EIA-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an EIA-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.
14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

† BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air–Conditioning Engineers).

** Modbus is a registered trademark of Schneider Electric.

23 09 33 Electric and Electronic Control System for HVAC

23 09 33.13 Decentralized, Rooftop Units:

23 09 33.13.A. General:

1. Shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.
3. Shall include a central control terminal board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, economizer, thermostat, DDC control options, and low and high pressure switches.
4. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.

23 09 33.13.B. Safeties:

1. Compressor over-temperature, over current.
2. Low-pressure switch.

a. Units shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
b. Low-pressure switch shall use different color wire than the high-pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.

3. High-pressure switch.
a. Units compressors shall have different sized connectors for the circuit 1 and circuit 2 low and high pressure switches. They shall physically prevent the cross-wiring of the safety switches between circuits 1 and 2.
b. High-pressure switch shall use different color wire than the low-pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.

4. Automatic reset, motor thermal overload protector.

23 09 93 Sequence of Operations for HVAC Controls

23 09 93.13 Decentralized, Rooftop Units:

23 09 93.13.A. INSERT SEQUENCE OF OPERATION

23 40 13 Panel Air Filters

23 40 13.13 Decentralized, Rooftop Units:

23 40 13.13.A. Standard filter section

1. Shall consist of factory-installed, low velocity, throwaway 2-in. thick fiberglass filters of commercially available sizes.
2. Unit shall use only one filter size. Multiple sizes are not acceptable.
3. Filters shall be accessible through a dedicated, weather tight panel.
4. 4-in filter capabilities shall be capable with pre-engineered and approved Carrier filter track field-installed accessory. This kit requires field furnished filters.

23 81 19 Self-Contained Air Conditioners

23 81 19.13 Medium-Capacity Self-Contained Air Conditioners (50TC-*18-29)

23 81 19.13.A. General

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing hermetic scroll compressor(s) for cooling duty and with optional electrical heating accessories for heating duty.
2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
3. Unit shall use Puron® refrigerant.
4. Unit shall be installed in accordance with the manufacturer's instructions.
5. Unit must be selected and installed in compliance with local, state, and federal codes.

23 81 19.13.B. Quality Assurance

1. Unit meets ASHRAE 90.1-2016 and IECC-2015 minimum efficiency requirements.
2. Unit shall be rated in accordance with AHRI Standard 340/360.
3. Unit shall be designed to conform to ASHRAE 15.
4. Unit shall be ETL-tested and certified in accordance with ANSI Z21.47 Standards and ETL-listed and certified under Canadian standards as a total package for safety requirements.
5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
6. Unit internal insulation linings shall be resistant to mold growth in accordance with "mold growth and humidity" test in ASTM C1338, G21, and UL 181 or comparable test method. Air stream surfaces shall be evaluated in accordance with the "Erosion Test" in UL 181, as part of ASTM C1071.
7. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
8. Roof curb shall be designed to conform to NRCA Standards.
9. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
10. Unit shall be designed in accordance with UL Standard 1995, ETL listed including tested to withstand rain.
11. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
12. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.
13. High-Efficiency Motors listed shall meet section 313 of the Energy Independence and Security Act of 2007 (EISA 2007)

23 81 19.13.C. Delivery, Storage, and Handling

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

2. Lifted by crane requires either shipping top panel or spreader bars.
3. Unit shall only be stored or positioned in the upright position.

23 81 19.13.D. Project Conditions

1. As specified in the contract.

23 81 19.13.E. Operating Characteristics

1. Unit shall be capable of starting and running at 115°F (46°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 340/360 at ± 10% voltage.
2. Compressor with standard controls shall be capable of operation from 35°F (2°C), ambient outdoor temperatures. Accessory kits are necessary if mechanically cooling at ambient temperatures below 35°F (2°C).
3. Unit shall discharge supply air horizontally as shown on contract drawings.
4. Unit shall be factory configured and ordered for horizontal supply and return configurations.
5. Unit shall be factory furnished for horizontal configuration. No field conversion is required.

23 81 19.13.F. Electrical Requirements

1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.

23 81 19.13.G. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces.
2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60°F / 16°C): 60, Hardness: H-2H Pencil hardness.
3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the heat compartment.
4. Unit internal insulation linings shall be resistant to mold growth in accordance with “mold growth and humidity” test in ASTM C1338, G21, and UL 181 or comparable test method. Air stream surfaces shall be evaluated in accordance with the “Erosion Test” in UL 181, as part of ASTM C1071.
5. Base of unit shall have a minimum of four locations for factory thru-the-base electrical connections. Connections shall be internal to the cabinet to protect from environmental issues.
6. Base Rail
   a. Unit shall have base rails on a minimum of 2 sides.
   b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
   c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
   d. Base rail shall be a minimum of 16 gauge thickness.
7. Condensate pan and connections:
   a. Shall be a sloped condensate drain pan made of a non-corrosive material.
   b. Shall comply with ASHRAE Standard 62.
   c. Shall use a 3/4-in -14 NPT drain connection at the end of the drain pan. Connection shall be made per manufacturer’s recommendations.
8. Top panel:
   a. Shall be a multi-piece top panel linked with water tight flanges and interlocking systems.
9. Electrical Connections
   a. All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location.
   b. Thru-the-base capability.
      (1.) Thru-the-base provisions/connections are available as standard with every unit. When bottom connections are required, field furnished couplings are required.
      (2.) No basepan penetration, other than those authorized by the manufacturer, is permitted.
10. Component access panels (standard)
   a. Cabinet panels shall be easily removable for servicing.
   b. Unit shall have one factory-installed, removable, filter access panel.
   c. Panels covering control box and filters shall have molded composite handles while the blower access door shall have an integrated flange for easy removal.
   d. Handles shall be UV modified, composite. They shall be permanently attached, and recessed into the panel.
   e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.

f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

23 81 19.13.H. Coils

1. Standard Aluminum Fin/Copper Tube Coils:
   a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
   b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
   c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
2. Optional Pre-coated aluminum-fin condenser coils:
   a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.
   b. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.
   c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
   d. Corrosion durability of fin stock shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
   e. Corrosion durability of fin stock shall be confirmed through testing to have no visible corrosion after 48 hour immersion in a room temperature solution of 5% salt, 1% acetic acid.
   f. Fin stock coating shall pass 2000 hours of the following: one week exposure in the prohesion chamber followed by one week of accelerated ultraviolet light testing. Prohesion chamber: the solution shall contain 3.5% sodium chloride and 0.35% ammonium sulfate. The exposure cycle is one hour of salt fog application at ambient followed by one hour drying at 95°F (35°C).
3. Optional Copper-fin evaporator and condenser coils:
   a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.
   b. Galvanized steel tube sheets shall not be acceptable.
   c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.
4. Optional E-coated aluminum-fin evaporator and condenser coils:
   a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
   b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
   c. Color shall be high gloss black with gloss per ASTM D523-89.
   d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
   e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
   f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
   g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
   h. Corrosion durability shall be confirmed through testing to be no less than 6000 hours salt spray per ASTM B117-90.

23 81 19.13.I. Refrigerant Components

1. Refrigerant circuit shall include the following control, safety, and maintenance features:
   a. Thermostatic Expansion Valve (TXV) shall help provide optimum performance across the entire operating range. Shall contain removable power element to allow change out of power element and bulb without removing the valve body.
   b. Refrigerant filter drier - Solid core design.
   c. Service gauge connections on suction and discharge lines.
   d. Pressure gauge access through a specially designed screen on the side of the unit.
2. Compressors
   a. Unit shall use one fully hermetic, scroll compressor for each independent refrigeration circuit.
   b. Models shall be available with 2 compressor/2-stage cooling.
   c. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
   d. Compressors shall be internally protected from high discharge temperature conditions.
   e. Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.

f. Compressor shall be factory mounted on rubber grommets.
g. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
h. Crankcase heaters shall not be required for normal operating range, unless provided by the factory.

23 81 19.13.J. Filter Section

1. Filters access is specified in the unit cabinet section of this specification.
2. Filters shall be held in place by a preformed slide out filter tray, facilitating easy removal and installation.
3. Shall consist of factory-installed, low velocity, throw-away 2-in. thick fiberglass filters.
4. Filters shall be standard, commercially available sizes.
5. Only one size filter per unit is allowed.
6. 4-in filter capability is possible with a field-installed pre-engineered slide out filter track accessory. 4-in filters are field furnished.

23 81 19.13.K. Evaporator Fan and Motor

1. Evaporator fan motor:
   a. Shall have inherent automatic-reset thermal overload protection or circuit breaker.
   b. Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating shall be required.
2. Belt-driven Evaporator Fan:
   a. Belt drive shall include an adjustable-pitch motor pulley and belt break protection system.
   b. Shall use rigid pillow block bearing system with lubricated fittings that are accessible or lubrication line.
   c. Blower fan shall be double-inlet type with forward-curved blades.
   d. Shall be constructed from steel with a finish that aids with corrosion resistance and dynamically balanced.

23 81 19.13.L. Condenser Fans and Motors

1. Condenser fan motors:
   a. Shall be a totally enclosed motor.
   b. Shall use permanently lubricated bearings.
   c. Shall have inherent thermal overload protection with an automatic reset feature.
   d. Shall use a shaft-down design.
2. Condenser Fans:
   a. Shall be a direct-driven propeller type fan.
   b. Shall have galvalum blades riveted to steel spiders that have corrosion resistant properties and shall be dynamically balanced.

23 81 19.13.M. Special Features, Options and Accessories

1. Staged Air Volume System (SAV™) for 2-stage cooling models only:
   a. Evaporator fan motor:
      (1.) Shall have permanently lubricated bearings.
      (2.) Shall have a maximum continuous bhp rating for continuous duty operation; no safety factors above that rating.
      (3.) Shall be Variable Frequency duty and 2-speed control.
      (4.) Shall contain motor shaft grounding ring to prevent electrical bearing fluting damage by safely diverting harmful shaft voltages and bearing currents to ground.
2. Variable Frequency Drive (VFD). Only available on 2-speed indoor fan motor option (SAV):
   a. Factory-supplied VFDs qualify, through ABB, for a 24-month warranty from date of commissioning or 30 months from date of sale, whichever occurs first.
   b. Shall be installed inside the unit cabinet, mounted, wired and tested.
   c. Shall contain Electromagnetic Interference (EMI) frequency protection.
   d. Insulated Gate Bi-Polar Transistors (IGBT) used to produce the output pulse width modulated (PWM) waveform, allowing for quiet motor operation.
   e. Self diagnostics with fault and power code LED indicator. Field accessory Display Kit available for further diagnostics and special setup applications.
   f. RS485 capability standard.
   g. Electronic thermal overload protection.
   h. 5% swinging chokes for harmonic reduction and improved power factor.
   i. All printed circuit boards shall be conformal coated.

3. Integrated EconoMi$er® IV and EconoMi$er 2, and EconoMi$er X standard leak rate models. (Factory or field-installed):
   a. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
   b. Independent modules for horizontal return configuration shall be available.
   c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
   d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
   e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
   f. Standard leak rate models shall be equipped with dampers not to exceed 2% leakage at 1 in. wg pressure differential.
   g. Economizer controller on EconoMi$er IV models shall be Honeywell W7212 that provides:
      (1.) Combined minimum and DCV maximum damper position potentiometers with compressor staging relay.
      (2.) Functions with solid state analog enthalpy or dry bulb changeover control sensing.
      (3.) Contain LED indicates for: when free cooling is available, when module is in DCV mode, when exhaust fan contact is closed.
   h. Economizer controller on EconoMi$er X models shall be the Honeywell W7220 that provides:
      (1.) 2-line LCD interface screen for setup, configuration and troubleshooting.
      (2.) On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24.
      (3.) Sensor failure loss of communication identification.
      (4.) Automatic sensor detection.
      (5.) Capabilities for use with multiple-speed indoor fan systems.
      (6.) Utilize digital sensors: Dry bulb and Enthalpy.
   i. Economizer controller on EconoMi$er 2 models with PremierLink™ controller shall be 4-20mA design and controlled by the PremierLink controller. PremierLink controller does not comply with California Title 24 Fault Detection & Diagnostic (FDD) requirements.
   j. Economizer controller on EconoMi$er 2 models with RTU Open controller shall be a 4-20mA design controlled directly by the RTU Open controller. RTU Open meets California Title 24 Fault Detection & Diagnostic (FDD) requirements.
   k. Shall be capable of introducing up to 100% outdoor air.
   l. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1-2016 and IECC-2015 requirements.
   m. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
   n. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available for factory-installed economizers only. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100°F (4 to 38°C). Additional sensor options shall be available as accessories.
   o. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
   p. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.
   q. Dampers shall be completely closed when the unit is in the unoccupied mode.
   r. Economizer controller shall accept a 2-10 Vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
   s. Compressor lockout temperature on W7220 is adjustable from -45°F to 80°F, set at a factory default of 32°F. Others shall open at 35°F (2°C) and close at 50°F (10°C).
   t. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
   u. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
4. Integrated EconoMi$er2, and EconoMi$er X Ultra Low Leak rate models. (Factory or field-installed)
   a. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
   b. Independent modules for horizontal return configuration shall be available.

c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
f. Ultra Low Leak design meets California Title 24 section 140.4 and ASHRAE 90.1-2016 and IECC-2015 requirements of 4 cfm per sq. ft. on the outside air dampers and 10 cfm per sq. ft. on the return dampers.
g. Economizer controller on EconoMi$er® X models shall be the Honeywell W7220 that provides:
   (1.) 2-line LCD interface screen for setup, configuration and troubleshooting.
   (2.) On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24.
   (3.) Sensor failure loss of communication identification.
   (4.) Automatic sensor detection.
   (5.) Capabilities for use with multiple-speed indoor fan systems.
   (6.) Utilize digital sensors: Dry bulb and Enthalpy.
h. Economizer controller on EconoMi$er 2 models with RTU Open controller shall be 4-20mA design controlled directly by the RTU Open controller. RTU Open controller meets California Title 24 Fault Detection & Diagnostic (FDD) requirements.
i. Shall be capable of introducing up to 100% outdoor air.
j. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1-2016 and IECC-2015 requirements.
k. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
l. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available for factory-installed economizers only. Outdoor air sensor setpoint shall be adjustable and shall range from 40 to 100°F (4 to 38°C). Additional sensor options shall be available as accessories.
m. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
n. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.
o. Dampers shall be completely closed when the unit is in the unoccupied mode.
p. Economizer controller shall accept a 2-10 Vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
q. Compressor lockout temperature on W7220 is adjustable from -45°F to 80°F, set at a factory default of 32°F. Others shall open at 35°F (2°C) and close at 50°F (10°C).
r. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
s. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

5. Two-Position Motorized Damper
   a. Damper shall be a 2-position damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.
   b. Damper shall include adjustable damper travel from 25% to 100% (full open).
   c. Damper shall include single or dual blade, gear driven dampers and actuator motor.
   d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.
   e. Damper will admit up to 100% outdoor air for applicable rooftop units.
   f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
   g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
   h. Outside air hood shall include aluminum water entrainment filter.
6. Manual damper
   a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25% outdoor air for year round ventilation.
7. Humidi-MiZer® Adaptive Dehumidification System.
   a. The Humidi-MiZer Adaptive Dehumidification System shall be factory-installed and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode:

(1.) Subcooling mode further subcools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.

(2.) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving air temperature when only humidity in the space is not satisfied.

(3.) Includes head pressure controller.

8. Head Pressure Control Package (Motormaster®)
   a. Controller shall control coil head pressure by condenser-fan speed modulation or condenser-fan cycling and wind baffles.
   b. Shall consist of solid-state control and condenser-coil temperature sensor to maintain condensing temperature between 90°F (32°C) and 110°F (43°C) at outdoor ambient temperatures down to -20°F (-29°C).
9. Condenser Coil Hail Guard Assembly
   a. Shall protect against damage from hail.
   b. Shall be louvered style design.
10. Unit-Mounted, Non-Fused Disconnect Switch:
    a. Switch shall be factory-installed, internally mounted.
    b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
    c. Shall be accessible from outside the unit
    d. Shall provide local shutdown and lockout capability.
    e. Sized only for the unit as ordered from the factory. Does not accommodate field-installed devices.
11. Convenience Outlet:
    a. Powered convenience outlet.
       (1.) Outlet shall be powered from main line power to the rooftop unit.
       (2.) Outlet shall be powered from line side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be ETL certified and rated for additional outlet amperage.
       (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
       (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
       (5.) Voltage required to operate convenience outlet shall be provided by a factory-installed step-down transformer.
       (6.) Outlet shall be accessible from outside the unit.
       (7.) Outlet shall include a field-installed “Wet in Use” cover.
    b. Unpowered convenience outlet.
       (1.) Outlet shall be powered from a separate 115/120v power source.
       (2.) A transformer shall not be included.
       (3.) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
       (4.) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
       (5.) Outlet shall be accessible from outside the unit.
       (6.) Outlet shall include a field-installed “Wet in Use” cover.
12. Fan/Filter Status Switch:
    a. Switch shall provide status of indoor evaporator fan (ON/OFF) or filter (CLEAN/DIRTY).
    b. Status shall be displayed either over communication bus (when used with direct digital controls) or with an indicator light at the thermostat.
13. Centrifugal Power Exhaust:
    a. Power exhaust shall be used in conjunction with an integrated economizer.
    b. Independent modules for horizontal return configurations shall be available.
    c. Horizontal power exhaust shall be mounted in return ductwork.
    d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control.
14. High-Static Indoor Fan Motor(s) and Drive(s):
    a. High-static motor(s) and drive(s) shall be factory-installed to provide additional performance range.
15. Outdoor Air Enthalpy Sensor:

a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.

16. Return Air Enthalpy Sensor:
    a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.
17. Indoor Air Quality (CO_2) Sensor:
    a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.
    b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.
18. Smoke detectors:
    a. Shall be a Four-Wire Controller and Detector.
    b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.
    c. Shall use magnet-activated test/reset sensor switches.
    d. Shall have tool-less connection terminal access.
    e. Shall have a recessed momentary switch for testing and resetting the detector.
    f. Controller shall include:
        (1.) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.
        (2.) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.
        (3.) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.
        (4.) Capable of direct connection to two individual detector modules.
        (5.) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications.
19. Horn/Strobe Annunciator
    a. Provides an audible/visual signaling device for use with factory-installed option or field-installed accessory smoke detectors.
        (1.) Requires installation of a field-supplied 24-v transformer suitable for 4.2 VA (AC) or 3.0 VA (DC) per horn/strobe accessory.
        (2.) Requires field-supplied electrical box, North American 1-gang box, 2-in (51 mm) x 4-in (102 mm).
        (3.) Shall have a clear colored lens.
20. Winter start kit
    a. Shall contain a bypass device around the low-pressure switch.
    b. Shall be required when mechanical cooling is required down to 25°F (-4°C).
    c. Shall not be required to operate on an economizer when below an outdoor ambient of 40°F (4°C).
21. Time Guard
    a. Shall prevent compressor short cycling by providing a 5-minute delay (±2 minutes) before restarting a compressor after shutdown for any reason.
    b. One device shall be required per compressor.
22. Electric Heat:
    a. Heating Section
        (1.) Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.
        (2.) Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18 ga galvanized steel) attached to end of heater assembly.
23. Barometric Hood (Horizontal Economizer Applications)
    a. Shall be required when a horizontal economizer and barometric relief are required. Barometric relief damper must be installed in the return air (horizontal) duct work. This hood provides weather protection.
24. Display Kit for Variable Frequency Drive
    a. Kit allows the ability to access the VFD controller programs to provide special setup capabilities and diagnostics.
    b. Kit contains display module and communication cable.
    c. Display Kit can be permanently installed in the unit or used on any SAV™ system VFD controller as needed.

25. Hinged Access Panels
    a. Shall provide easy access through hinged access doors with vinyl coated door retainers.
    b. Shall be on major panels of filter, control box,and fan motor.
26. Energy Demand System - EDS (field-installed accessory):
    a. Shall utilize wireless network communication to optimize rooftop unit energy usage, up to 875 yds and up to 49 load controllers for each gateway. A wireless cellular signal shall be utilized to communicate energy information to/from the customer web portal.
    b. Shall utilize explicit algorithms to minimize rooftop electrical demand charges, customizable to each facility.
    c. Shall allow scheduling of rooftop units and provide a “staggered start” approach to minimize electrical consumption charges, customized to each facility.
    d. Scheduling, adjustments, and sub-metered electrical data shall be accessible through a web based customer portal.
    e. Shall provide demand response capability, including compliance with Open ADR protocol.
    f. Shall utilize an external 4-pole relay and an internal single pole relay.
    g. Shall use (2) split core transformers to provide real-time sub-metered electrical usage.

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