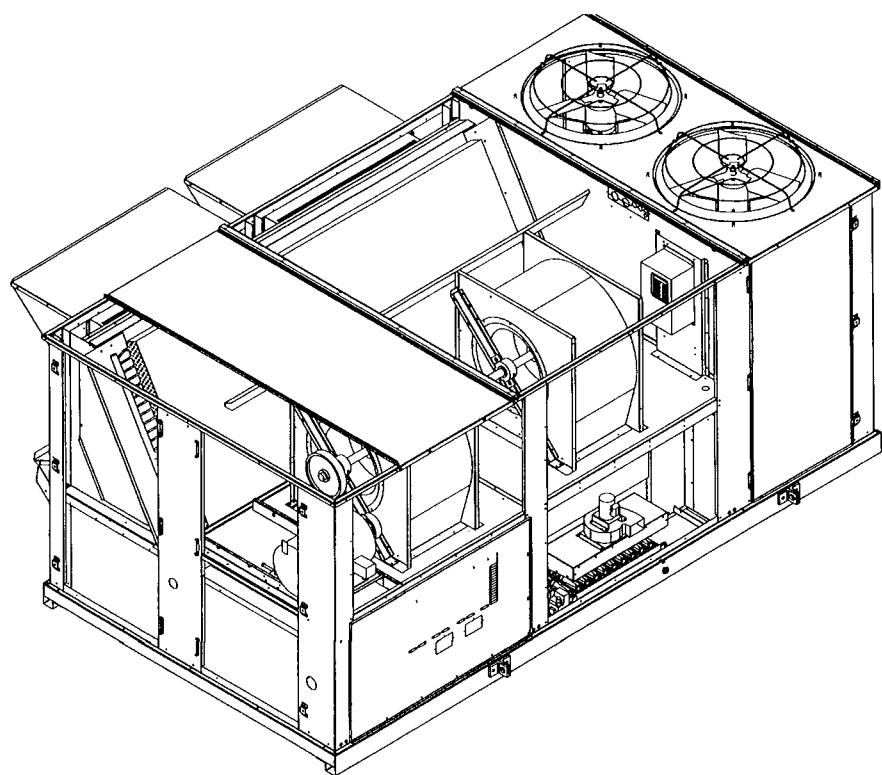




Advance Product Data

48/50EJ, EK, EW, EY Single-Package Rooftop Gas Heating/Electric Cooling and Electric Cooling Units with Optional Electric Heat

20 to 45 Nominal Tons



Single-Package Rooftop Units with:

- dedicated vertical and horizontal discharge configurations
- constant and variable volume controls
- efficiencies from 8.5 to 10.4
- meets ASHRAE Standard 62
- standard cooling operation at outdoor ambient temperatures as low as 35° F
- aluminized steel, sloped condensate pan
- all internal surfaces are sheet metal lined or anti-microbial insulation
- two-inch return air filters
- single power entry to unit
- commercial duty, totally enclosed condenser motors with permanently lubricated bearings
- Alumagard™ heat exchanger coating
- induced-draft fan for gas combustion
- tubular heat exchangers
- pre-painted, galvanized steel cabinet
- commercial strength base rails (full perimeter, 14 gage)
- communicating DDC (Direct Digital Controls) unit controllers
- semi-hermetic compressors with service valves as standard
- dual independent refrigerant circuits with intertwined evaporator coils
- hinged access panels
- short cycle protection
- service diagnostics
- integrated economizer utilizing direct-drive actuators and opposed blade dampers
- IAQ options
- VFD (variable frequency drives) on all VAV units

Features / Benefits



Design flexibility

Dedicated vertical supply/return units (EJ,EK) are ideal for new construction or retrofit to existing installations. The low unit profile is maintained when the unit is installed on the accessory roof curb, which is approved by the National Roofing Contractors Association (NRCA). The roof curb is made watertight by the roofer.

The ducts are attached directly to the roof curb to allow all ductwork to be completed before the unit is positioned.

Dedicated horizontal units (EW,EY) are ideal for replacement or applications such as through-the wall jobs or jobs where sound must be attenuated before the duct penetrates the roof. Ducts connect directly to the unit. Horizontal units may be curb or slab mounted.

Direct Digital Controls (DDC) - standard

Every unit comes equipped with a microprocessor based control system. Standard features include:

- heating / cooling operation
- space temperature offset (CV [constant volume]) / space temperature reset (VAV [variable air volume])
- intelligent outdoor air mixing for Indoor Air Quality
- supply air pressure via Variable Frequency Drive (VAV only)

Expandable features include:

- programmable heating/cooling setpoints with scheduling (CCN only)
- temperature compensated start (CCN only)
- Indoor Air Quality sensor / outdoor air quality sensor
- IAQ Pre-Occupancy Purge
- fire modes (pressurization / purge / evacuation)
- filter status
- field-configurable status
- demand limiting
- modulating power exhaust
- external alarm light

The Direct Digital Controls are "cable ready" to plug into the Carrier Comfort Network (CCN). The CCN is a fully communicating HVAC network which allows the user to fine tune equipment performance, manage energy use, and minimize operating costs. Among the network's many monitoring and management capabilities are:

- maintenance management
- data collection
- Network Service Tool
- tenant billing
- Autodial Gateway
- load shed
- water system manager

Integrated gas unit controller (IGC) (gas heating units only)

The IGC also contains burner control logic for accurate and dependable gas ignition. The light-emitting diode (LED) fault notification system reduces service person troubleshooting time and minimizes service costs. The IGC also maximizes heating efficiency by controlling evaporator fan on and off delays.

The IGC control board provides built-in diagnostic capability. An LED simplifies troubleshooting by providing visual fault notification and system status confirmation.

The IGC also contains exclusive anti-cycle protection for gas heat operation. After 4 continuous cycles on the unit high temperature limit switch, the gas heat operation is disabled, and an error code is issued. This feature greatly improves reliability of the rooftop unit.

Quality and Reliability

Dual serviceable, semi-hermetic compressors on intertwined evaporator coil ensures excellent full and part load efficiency. Dual refrigerant circuits, both electrically and mechanically independent, provide standby capability should one circuit require service. Reliable Carlyle 06D/E compressors are proven performers.

Solid core dessicant filter driers are sized at 2 cubic in. per ton to assure longer compressor life. Solid core filters prevent erosion and dispersion of dessicant

Totally enclosed outdoor-fan motors ensure many years of trouble-free operation.

Positive-locking bearings for the indoor fan ensure vibration-free operation of the supply fan assembly and remain locked during the life of the bearing.

The unique outdoor fan motor clutch (patent pending) eliminates reverse rotation of the condenser fan motors during off periods, thereby reducing bearing wear and ensuring motors will start.

Variable frequency drive (VFD) and unit unloading

Variable air volume (VAV) units utilize state of the art variable frequency drive (VFD) to control airflow.

VAV units have 6 steps of unloading for low load operation. Constant volume units come equipped with 2 stages of capacity. Field installed accessory unloaders are available to increase this to 6 stage operation. The unit operation will closely match the load and maintain comfort in the most energy-efficient manner.

Factory-installed economizer (standard)

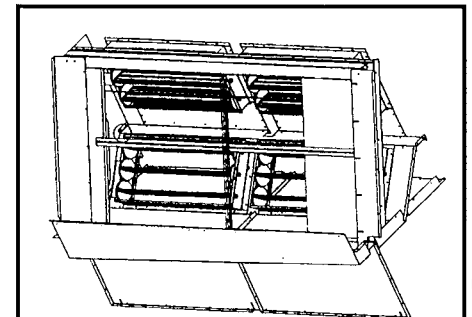
All units come equipped with an integrated economizer which permits free cooling utilizing an outdoor air sensor or a solid-state enthalpy control. The direct gear driven, low leakage blades eliminate conventional inter-blade linkages and the associated adjustments.

The economizer operates in conjunction with mechanical cooling when required and is factory-installed for either vertical or horizontal operation. The field installed rain hood/filter assembly prevents moisture or objects from entering the unit.

Exhaust air relief is available for all units:

- barometric relief (CV or VAV)
- power exhaust (CV)
- 100% modulating power exhaust (VAV)

Field-adjustable set points on modulating power exhaust prevent space pressurization problems. Factory-installed relief options are unit mounted on downflow units. Accessories can be duct mounted on horizontal applications.



Economizer with Enthalpy Control

Installation / serviceability

Dedicated design (vertical or horizontal) requires no alteration time to convert in the field. Single point electrical connections are standard on all units. Electrical service access can be made through roof curb or side of unit.

High static capability of standard units minimize the need to convert to higher static, oversized motors. The unit is less sensitive to distribution ductwork design.

The standard microprocessor controls replace the need for field installed anti-short cycle timers. The controls are compatible with either a room sensor or conventional thermostat with no need to install an accessory interface. In addition, no special tools are required to run the unit through its operational steps. It's as simple as throwing a switch to activate the automatic test mode. After the test cycle, the unit automatically returns to normal operation.

Hinged access panels are located for easy access to standard serviceable components for maintenance. No fasteners need to be removed, which reduces servicing time and prevents roof leaks caused by discarded screws.

Color coded wiring permits easy tracing and diagnostics.

The thermal insulation contains an EPA (Environmental Protection Agency) registered immobilized antimicrobial agent to inhibit the growth of bacteria and fungi.

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Model Number Nomenclature



48 EJ D 034 -- -- 6 0 1 E C

48 — Cooling unit with
Natural Gas Heat

EJ — CV Vertical
EK — VAV Vertical
EW — CV Horizontal
EY — VAV Horizontal

HEAT OPTIONS

D — Low Gas Heat
E — High Gas Heat (EJ/EW Only)

NOMINAL TONS

024 — 20
028 — 25
030 — 27
034 — 30
038 — 35 (Not available for VAV or 575-v units)
044 — 40
048 — 45 (Not available for VAV or 575-v units)

FILTER OPTION

-- Std 2-in Throwaway

COIL MATERIAL

-- Al/Cu Condenser and Evaporator
C — Cu/Cu Condenser, Al/Cu Evaporator (without lances)
E — Al/Cu Condenser with precoated fins (without lances)

LEGEND

Al — Aluminum
Cu — Copper
CV — Constant Volume
VAV — Variable Air Volume

ECONOMIZER/RELIEF OPTIONS

A — Economizer Only (all)
B — Economizer with Non-Modulating Power Exhaust (EJ Only)
C — Economizer with Barometric Relief (EJ/EK Only)
D — Economizer with Modulating Power Exhaust (EK Only)

MOTOR OPTIONS

HP	UNIT						
	024	028	030	034	038	044	048
A — 5	X						
B — 7.5		X					
C — 10	X	X	X	X	X		
D — 15	X	X	X	X	X	X	
E — 20			X	X	X	X	X
F — 25						X	X
G — 30							X

NOTE: VAV models (EK and EY) equipped with variable frequency drive (VFD)

PACKAGING

1 — Domestic
3 — Export Crate

DESIGN SERIES

0 — Original

VOLTAGE

1 — 575-3-60
5 — 208/230-3-60
6 — 460-3-60

Quality Assurance



Certificate No FM 21837

Approvals:

ISO 9002
EN 29002
BS5750 PART 2
ANSI/ASQC Q92

Model Number Nomenclature (cont'd)



50 EJ B 034 -- -- 6 0 1 E C

50 — Cooling unit with
Optional Electric Heat

EJ — CV Vertical
EK — VAV Vertical
EW — CV Horizontal
EY — VAV Horizontal

HEAT OPTIONS (kW)

	0 kW	36 kW	72 kW
024	O	O	X
028	O	O	X
030	O	O	X
034	O	O	X
038	O	X	X
044	O	O	X
048	O	X	X

X = Available CV only (EJ/EW)
O = Available CV and VAV Models

NOMINAL TONS

024 — 20
028 — 25
030 — 27
034 — 30
038 — 35 (Not available for VAV or 575-v units)
044 — 40
048 — 45 (Not available for VAV or 575-v units)

FILTER OPTION

-- — Std. 2-in. Throwaway

COIL MATERIAL

-- — Al/Cu Condenser and Evaporator
C — Cu/Cu Condenser, Al/Cu Evaporator
E — Al/Cu Condenser with precoated fins

ECONOMIZER/RELIEF OPTIONS

A — Economizer Only (all)
B — Economizer with Non-Modulating Power Exhaust (EJ Only)
C — Economizer with Barometric Relief (EJ/EK Only)
D — Economizer with Modulating Power Exhaust (EK Only)

MOTOR OPTIONS

	UNIT						
HP	024	028	030	034	038	044	048
A — 5	X						
B — 7.5		X					
C — 10	X	X	X	X	X		
D — 15	X	X	X	X	X	X	
E — 20			X	X	X	X	X
F — 25						X	X
G — 30							X

NOTE: VAV models (EK and EY) equipped with variable frequency drive (VFD)

PACKAGING

1 — Domestic
3 — Export Crate

DESIGN SERIES

0 — Original

VOLTAGE

1 — 575-3-60
5 — 208/230-3-60
6 — 460-3-60

LEGEND

Al — Aluminum
Cu — Copper
CV — Constant Volume
VAV — Variable Air Volume

Quality Assurance



Certificate No FM 21837

Approvals:

ISO 9002
EN 29002
BS5750 PART 2
ANSI/ASQC Q92

Physical data (gas heating units)



UNIT 48 EJ, EK, EW, EY	024D/E	026D/E	030D/E	034D/E	038D/E	044D/E	048D/E
NOMINAL CAPACITY (tons)	20	25	27	30	35	40	45
OPERATING WEIGHT (lb)*							
Unit							
AI/AH (Lo Heat/Hi Heat)	3940 / 4018	4025 / 4105	4025 / 4105	4025 / 4105	4305 / 4465	4530 / 4690	4810 / 4970
AI/Cut (Lo Heat/Hi Heat)	4160 / 4235	4245 / 4325	4245 / 4325	4245 / 4325	4590 / 4750	4815 / 4975	5190 / 5350
Roof Curb (14-in curb)	365	365	365	365	410	410	410
COMPRESSOR							
Quantity Type (Ckt 1, Ckt 2)	1 06D328, 1 06D818	2 06D328	1 06D537, 1 06D328	2 06D537	2 06D537	2 06EA250	1 06EA265, 1 06EA250
Number of Refrigerant Circuits	2	2	2	2	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	115, 88	115 ea.	115 ea.	115 ea.	115 ea.	224 ea.	304, 224
REFRIGERANT TYPE							
Operating Charge (lb-oz)				R-22			
Circuit 1 **	N/A	N/A	N/A	N/A	34	35	41
Circuit 2	N/A	N/A	N/A	N/A	34	35	41
CONDENSER COIL							
Quantity	1	1	1	1	2	2	1 1 1
Rows . Fins/in.	4 15	4 15	4 15	4 15	3 15	3 15	4 15 3 15
Total Face Area (sq ft)	33.3	33.3	33.3	33.3	58.3	58.3	66.7
CONDENSER FAN							
Nominal Cfm	13,420	13,420	13,420	13,420	27,064	27,064	27,064
Quantity... Diameter (in.)	2 30	2 30	2 30	2 30	4 30	4 30	4 30
Motor Hp (1075 Rpm)	1	1	1	1	1	1	1
EVAPORATOR COIL							
Rows . Fins/in	4 15	4 15	4 15	4 15	3 15	3 15	4 15
Total Face Area (sq ft)	31.7	31.7	31.7	31.7	34.7	34.7	34.7
EVAPORATOR FAN							
Quantity Size (in)	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15
Type Drive	Belt	Belt	Belt	Belt	Belt	Belt	Belt
Nominal Cfm	8,000	10,000	11,000	12,000	14,000	16,000	18,000
Motor Hp (Alternate motors available)††	10	10	15	15	15	20	25
Motor Frame Size	215T	215T	254T	254T	254T	256T	284T
Motor Bearing Type	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1200	1200	1200	1200	1200	1200	1200
Motor Pulley Pitch Diameter	6 6	6 1	6 7	6 9	6 9	8 1	5 9
Nominal Motor Shaft Diameter (in)	1 - 3/8	1 - 3/8	1 - 5/8	1 - 5/8	1 - 5/8	1 - 5/8	1 - 7/8
Fan Pulley Pitch Diameter (in)	12 5	11 1	11 1	11 1	12 5	13 7	9 1
Nominal Fan Shaft Diameter (in.)	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16
Belt, Quantity Type Length (in)	1 BX60 63	1 BX56 59	1 5VX590 59	1 5VX590 59	1 5VX630 63	1 5VX670 67	2 5VX560 56
Pulley Center Line Distance (in.)	15 6 - 18 4	15 6 - 18 4	15 0 - 17 9	15 0 - 17 9	15 0 - 17 9	15 0 - 17 9	14 6 - 17 6
Factory Speed Setting (rpm)	924	962	1056	1088	966	1035	1135

UNIT 48 EJ, EK, EW, EY	024D/E	028D/E	030D/E	034D/E	038D/E	044D/E	048D/E
FURNACE SECTION							
Rollout Switch Cutout							
Temp (F)	225	225	225	225	225	225	225
Burner Orifice Diameter (in. ... drill size)							
Natural Gas Std	111 34	111 34	111 34	111 34	120 31	120 31	120 31
Liquid Propane Alt	089 43	089 43	089 43	089 43	096 41	096 41	096 41
Thermostat Heat Anticipator							
Setting (amps)							
Stage 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Stage 2	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Gas Input (Btuh) Stage 1	262,500 / 394,000	262,500 / 394,000	262,500 / 394,000	262,500 / 394,000	300,000 / 600,000	300,000 / 600,000	300,000 / 600,000
Stage 2	350,000 / 525,000	350,000 / 525,000	350,000 / 525,000	350,000 / 525,000	400,000 / 800,000	400,000 / 800,000	400,000 / 800,000
Efficiency (Steady State) (%)	81	81	81	81	81	81	81
Temperature Rise Range	15 - 45 / 35 - 65	15 - 45 / 35 - 65	15 - 45 / 35 - 65	15 - 45 / 35 - 65	10 - 40 / 30 - 60	10 - 40 / 30 - 60	10 - 40 / 30 - 60
Manifold Pressure (in. wg)							
Natural Gas Std	3 5	3 5	3 5	3 5	3 5	3 5	3 5
Liquid Propane Alt	3 5	3 5	3 5	3 5	3 5	3 5	3 5
Gas Valve Quantity	2	2	2	2	2	2	2
Field Gas Connection Size (in. - FPT)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
HIGH-PRESSURE SWITCH (psig)							
Cutout	426	426	426	426	426	426	426
Reset (Auto.)	320	320	320	320	320	320	320
LOW-PRESSURE SWITCH (psig)							
Cutout	7	7	7	7	7	7	7
Reset (Auto.)	22	22	22	22	22	22	22
RETURN-AIR FILTERS							
Quantity ... Size (in.)	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2

LEGEND

Al — Aluminum
 Bhp — Brake Horsepower
 Cu — Copper
 N/A — Data not available at this time.

VFD WEIGHTS (lb)			
Hp	208/230 v	460 v	575 v
5	20	22	60
7.5	51	37	64
10	51	61	64
15	61	63	109
20	63	111	109
25	105	112	174
30	172	118	180

- * Weight of unit does not include variable frequency drive (VFD). If a VFD is installed, add the VFD weight in the following table
- † Evaporator coil fin material/condenser coil fin material
- ** Sizes 024 - 034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038 - 048: Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils.
- †† Motor and drive shown will deliver approximately 2.5" net external static. For other selections, see "Model Number Nomenclature"
- || Rollout switch is manual reset

Physical data (electric heating units)



UNIT 50 EJ, EK, EW, EY	024	028	030	034	038	044	048
NOMINAL CAPACITY (tons)	20	25	27	30	35	40	45
OPERATING WEIGHT (lb)*							
Unit							
Al/Alt	3780	3865	3865	3865	4145	4370	4650
Al/Cut	4000	4085	4085	4085	4430	4655	5030
Roof Curb (14-in. curb)	365	365	365	365	410	410	410
COMPRESSOR							
Quantity ... Type (Ckt 1, Ckt 2)	1 06D328, 1 06D818	2 06D328	1 06D537, 1 06D328	2 06D537	2 06D537	2 06EA250	1 06EA265, 1 06EA250
Number of Refrigerant Circuits	2	2	2	2	2	2	2
Oil (oz) (Ckt 1, Ckt 2)	115, 88	115 ea.	115 ea.	115 ea.	115 ea.	224 ea.	304, 224
REFRIGERANT TYPE							
Operating Charge (lb-oz)							
Circuit 1 **	N/A	N/A	N/A	N/A	34	35	41
Circuit 2	N/A	N/A	N/A	N/A	34	35	41
CONDENSER COIL							
Quantity	1	1	1	1	2	2	1 1
Rows . Fins/in	4 15	4 15	4 15	4 15	3 15	3 15	4 15 3 15
Total Face Area (sq ft)	33.3	33.3	33.3	33.3	58.3	58.3	66.7
CONDENSER FAN							
Nominal Cfm	13,420	13,420	13,420	13,420	27,064	27,064	27,064
Quantity.. Diameter (in)	2 30	2 30	2 30	2 30	4 30	4 30	4 30
Motor Hp (1075 Rpm)	1	1	1	1	1	1	1
EVAPORATOR COIL							
Quantity	4	4	4	4	3	3	4
Rows . Fins/in	15	15	15	15	15	15	15
Total Face Area (sq ft)	31.7	31.7	31.7	31.7	34.7	34.7	34.7
EVAPORATOR FAN							
Quantity . Size (in)	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15	2 20 X 15
Type Drive	Belt	Belt	Belt	Belt	Belt	Belt	Belt
Nominal Cfm	8,000	10,000	11,000	12,000	14,000	16,000	18,000
Motor Hp (Alternate motors available)††	10	10	15	15	20	25	25
Motor Frame Size	215T	215T	254T	254T	254T	256T	284T
Motor Bearing Type	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1200	1200	1200	1200	1200	1200	1200
Motor Pulley Pitch Diameter	6.6	6.1	6.7	6.9	6.9	8.1	5.9
Nominal Motor Shaft Diameter (in)	1 - 3/8	1 - 3/8	1 - 5/8	1 - 5/8	1 - 5/8	1 - 5/8	1 - 7/8
Fan Pulley Pitch Diameter (in)	12.5	11.1	11.1	11.1	12.5	13.7	9.1
Nominal Fan Shaft Diameter (in.)	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16	1 - 11/16
Belt, Quantity .. Type . Length (in.)	1 BX60 63	1 BX56 59	1 5VX590 59	1 5VX590 59	1 5VX630 63	1 5VX670 67	2 5VX560 56
Pulley Center Line Distance (in)	15.6 - 18.4	15.6 - 18.4	15.0 - 17.9	15.0 - 17.9	15.0 - 17.9	15.0 - 17.9	14.6 - 17.6
Factory Speed Setting (rpm)	924	962	1056	1088	966	1035	1135
HIGH-PRESSURE SWITCH (psig)							
Cutout	426	426	426	426	426	426	426
Reset (Auto.)	320	320	320	320	320	320	320
LOW-PRESSURE SWITCH (psig)							
Cutout	7	7	7	7	7	7	7
Reset (Auto.)	22	22	22	22	22	22	22
RETURN-AIR FILTERS							
Quantity ... Size (in.)	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2	10 ... 20 x 24 x 2

LEGEND

Al — Aluminum
 Bhp — Brake Horsepower
 Cu — Copper
 N/A — Data not available at this time

* Weight of unit does not include variable frequency drive (VFD) If a VFD is installed, add the VFD weight in the following table

† Evaporator coil fin material/condenser coil fin material

** Sizes 024 - 034 Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 038 - 048. Circuit 1 uses the left condenser coil, Circuit 2 the right. All units have intertwined evaporator coils

†† Motor and drive shown will deliver 2.5" net external static For other selections, see "Model Number Nomenclature"

VFD WEIGHTS (lb)			
Hp	208/230 v	460 v	575 v
5	20	22	60
7.5	51	37	64
10	51	61	64
15	61	63	109
20	63	111	109
25	105	112	174
30	172	118	180

→EER Ratings and Capacities



EER RATINGS (48 Series)

UNIT 48EJ, EK, EW, EY	NOMINAL TONS	EER
24	20	10.3
28	25	9.6
30	27.5	8.7
34	30	8.5
38	35	8.9
44	40	8.5
48	45	8.5

EER – Energy Efficiency Ratio

EER RATINGS (50 Series)

UNIT 50EJ, EK, EW, EY	NOMINAL TONS	EER
24	20	10.4
28	25	9.7
30	27.5	8.8
34	30	8.6
38	35	9.1
44	40	8.6
48	45	8.6

HEATING CAPACITIES AND EFFICIENCIES

UNIT 48EJ	HEATING INPUT (Btuh) Stage 2 / Stage 1	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE	STEADY-STATE EFFICIENCY (%)	MINIMUM HEATING CFM
D024	350,000 / 262,500	283,500	15 - 45	81.0	6,000
E024	525,000 / 394,000	425,250	35 - 65	81.0	6,000
D028	350,000 / 262,500	283,500	15 - 45	81.0	7,500
E028	525,000 / 394,000	425,250	35 - 65	81.0	7,500
D030	350,000 / 262,500	283,500	15 - 45	81.0	8,250
E030	525,000 / 394,000	425,250	35 - 65	81.0	8,250
D034	350,000 / 262,500	283,500	15 - 45	81.0	9,000
E034	525,000 / 394,000	425,250	35 - 65	81.0	9,000
D038	400,000 / 300,000	324,000	10 - 40	81.0	10,500
E038	800,000 / 600,000	648,000	30 - 60	81.0	10,500
D044	400,000 / 300,000	324,000	10 - 40	81.0	12,000
E044	800,000 / 600,000	648,000	30 - 60	81.0	12,000
D048	400,000 / 300,000	324,000	10 - 40	81.0	13,500
E048	800,000 / 600,000	648,000	30 - 60	81.0	13,500

NOTES:

- Ratings are approved for altitudes to 2000 feet. At altitudes over 2000 ft, ratings are 4% less for each 1000 ft greater than 2000 ft above sea level.
- At altitudes up to 2000 ft, the following formula may be used to calculate air temperature rise

$$\Delta t = \frac{\text{Output capacity}}{1.10 \times \text{air quantity}}$$
- At altitudes above 2000 ft, the following formula may be used.

$$\Delta t = \frac{\text{Output capacity}}{(24 \times \text{specific weight of air} \times 60) (\text{air quantity})}$$
- Minimum allowable temperature of mixed air entering the heat exchanger during half-rate (first stage) operation is 50°F. There is no minimum mixture temperature limitation during full-rate operation.
- Total unit design is listed by ETL Testing Laboratories Inc.



EER Ratings and Capacities (cont'd)



ALTITUDE COMPENSATION*

ELEVATION (Ft)	SMALL CHASSIS (024-034)		MEDIUM CHASSIS (038-048)	
	Natural Gas Orifice Drill bit Size†	Liquid Propane Orifice Drill bit Size†	Natural Gas Orifice Drill bit Size†	Liquid Propane Orifice Drill bit Size†
0-2,000	34	43	31	41
2,001-3000	7/64"	44	32	3/32"
3,001-4000	36	45	33	43
4,001-5,000	37	45	33	43
5,001-6,000	38	45	34	44
6,001-7,000	39	47	36	44
7,001-8,000	40	47	36	45
8,001-9,000	41	48	37	45
9,001-10,000	3/32"	48	38	45
10,001-11,000	42	49	39	47
11,001-12,000	43	49	40	5/64"
12,001-13,000	43	50	41	48
13,001-14,000	44	50	3/32"	49

ELECTRIC RESISTANCE HEATER DATA - 50EJ/EK/EW/EY024-048

UNIT 50EJ/EK/EW/EY	HEATER kW Unit Voltages				HEATER STAGES	% HEAT PER STAGE	MINIMUM CFM
	208	230	460	575			
024	29	36	36	36	1	100	6,000
	59	72	72	72	2	50/50	
028	29	36	36	36	1	100	7,500
	59	72	72	72	2	50/50	
030	29	36	36	36	1	100	8,250
	59	72	72	72	2	50/50	
034	29	36	36	36	1	100	9,000
	59	72	72	72	2	50/50	
038	29	36	36	36	1	100	10,500
	59	72	72	72	2	50/50	
044	29	36	36	36	1	100	12,000
	59	72	72	72	2	50/50	
048	29	36	36	36	1	100	13,500
	59	72	72	72	2	50/50	

* As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes. At altitudes over 2,000 ft., ratings are 4% less for each 1000 ft. greater than 2000 ft. above sea level.

† Orifices available through your local Carrier distributor

Options and accessories

ITEM	OPTION*	ACCESSORY†
Barometric Relief	X	
Copper/Copper Condenser Coil	X	
Pre-Coated Aluminum Fin Condenser Coil	X	
Modulating Power Exhaust (VAV only)	X	
Non-Modulating Power Exhaust (CV Only)	X	X
Power Exhaust Conversion, Non-Modulating to Modulating (CV Only)		X
Electric Heat (50EJ,EK,EW,EY Units Only)	X	X
Roof Curb		X
Motormaster® III Head Pressure Control		X
LP (Liquid Propane) Conversion Kit (48EJ,EK,EW,EY Units Only)		X
Condenser Coil Hail Guard Assembly		X
Thermostat and Subbase		X
Space Temperature Sensor		X
Space Temperature Sensor with Offset (T-56)		X
IAQ (CO ₂) Sensor		X
Enthalpy Control for Integrated Economizer		X
Compressor Unloaders		X
Expansion Electronic Board		X

LEGEND

- CV — Constant Volume
 IAQ — Indoor Air Quality
 VAV — Variable Air Volume

* Factory installed

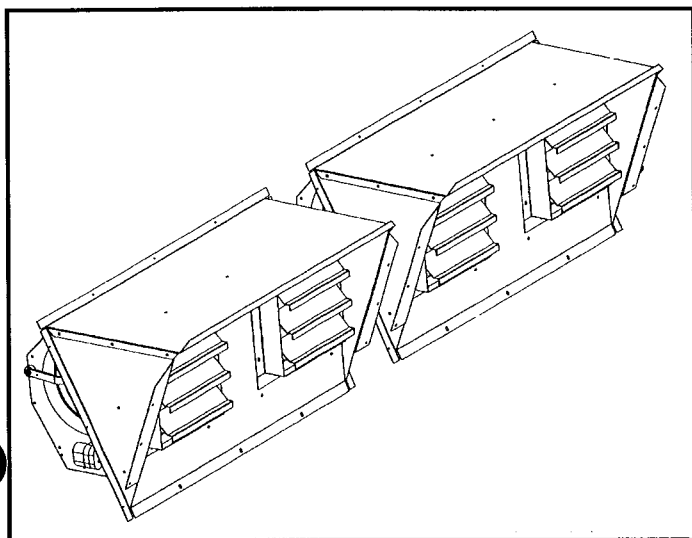
† Field installed

Power Exhaust Fans

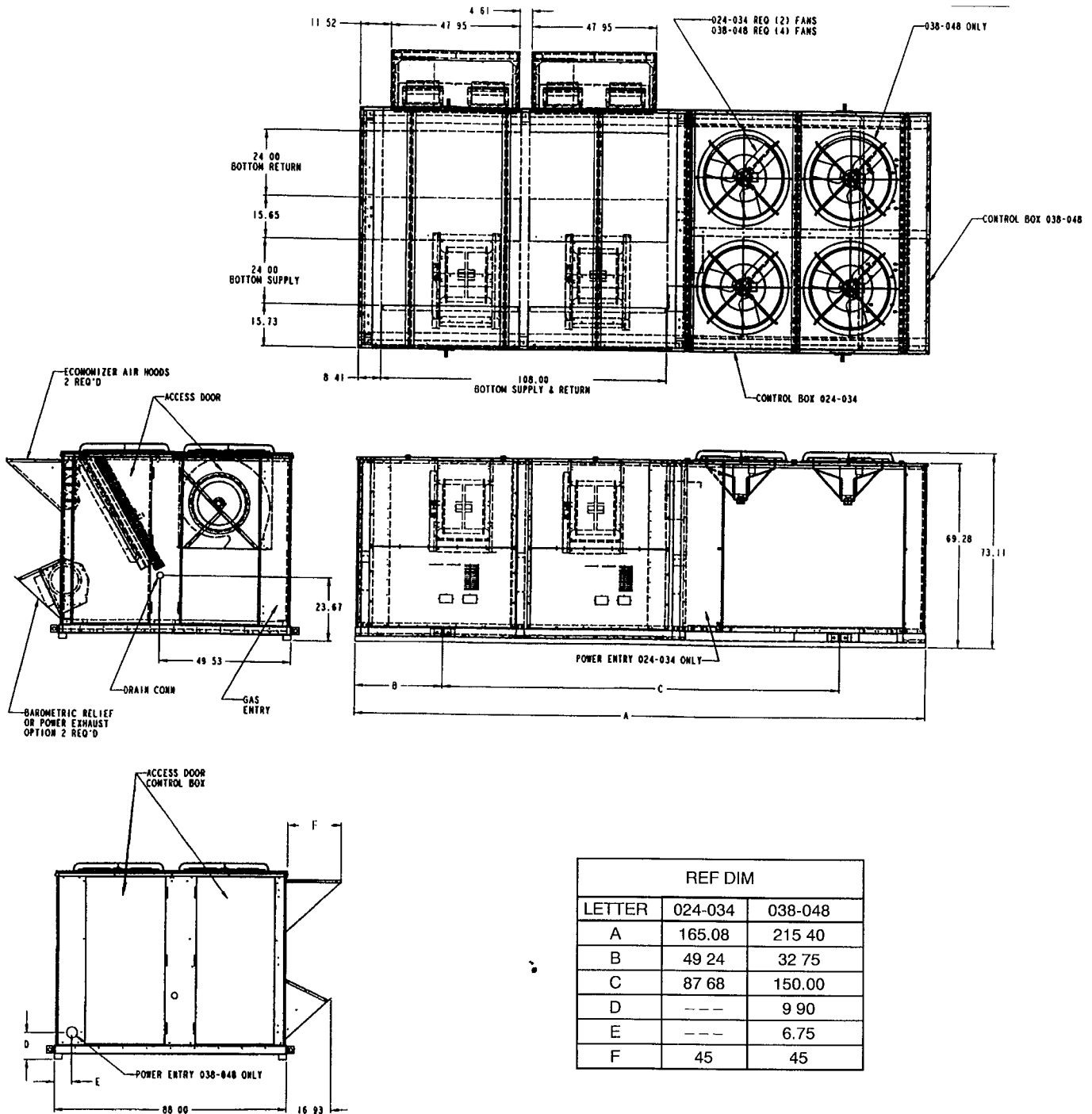
When combined with the economizer, the power exhaust can be used to exhaust up to 100% of the return air and eliminate over-pressurization of the building. The power exhaust utilizes multiple forward-curved fans, each driven by its own motor.

The constant volume power exhaust stages the motors according to economizer position to control the building pressure.

The modulating power exhaust stages the motors according to interior space pressure.

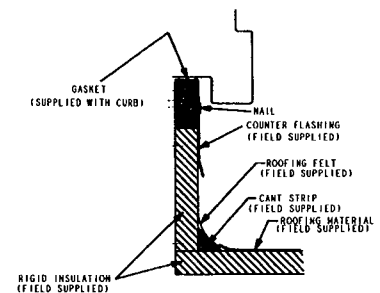
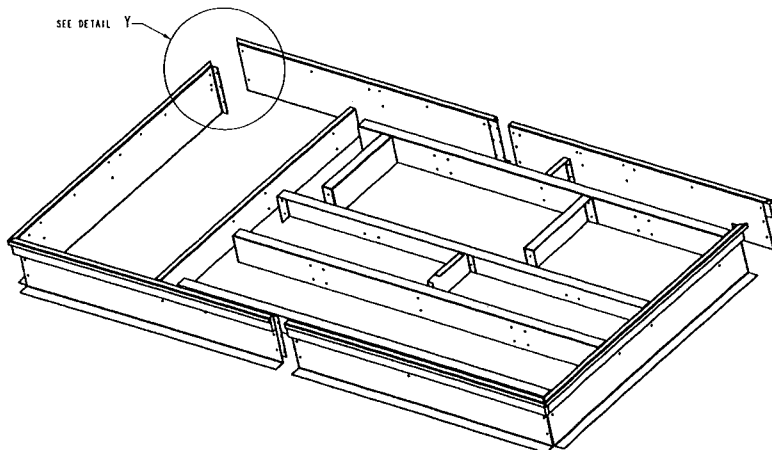
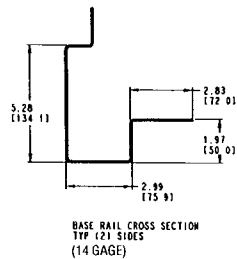
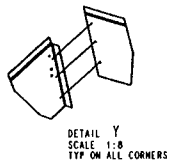
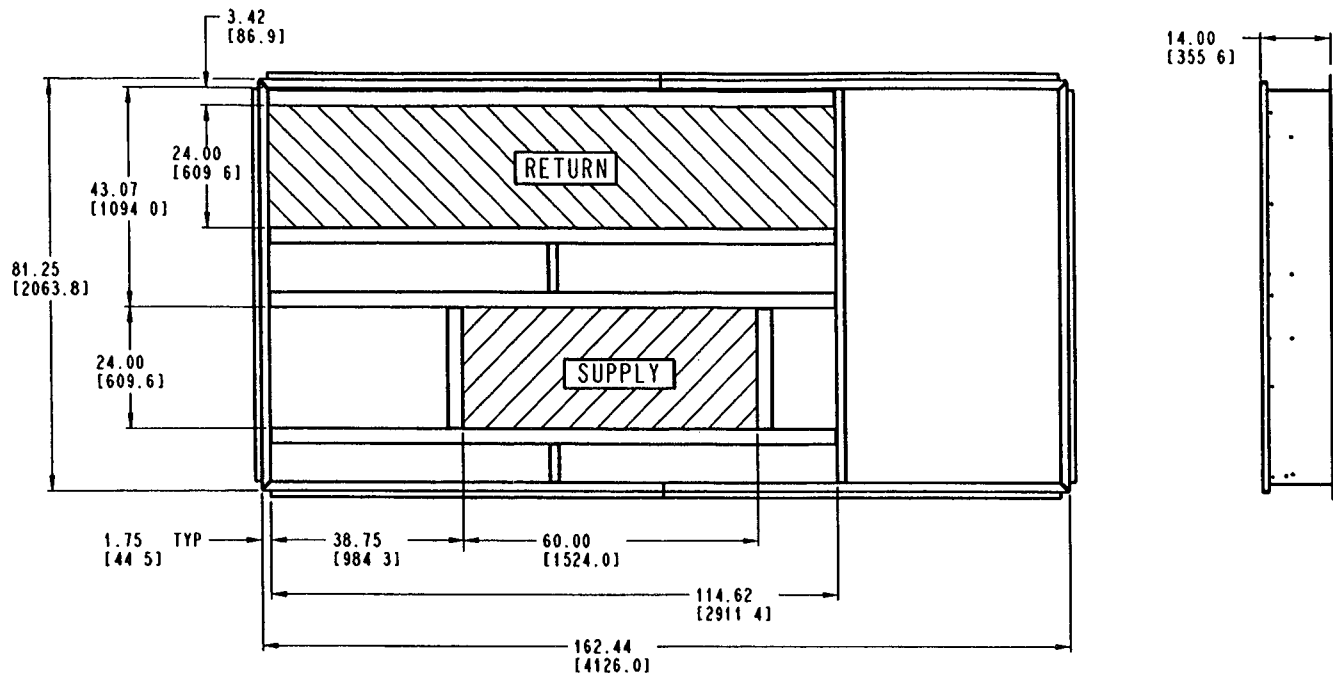


Base unit dimensions

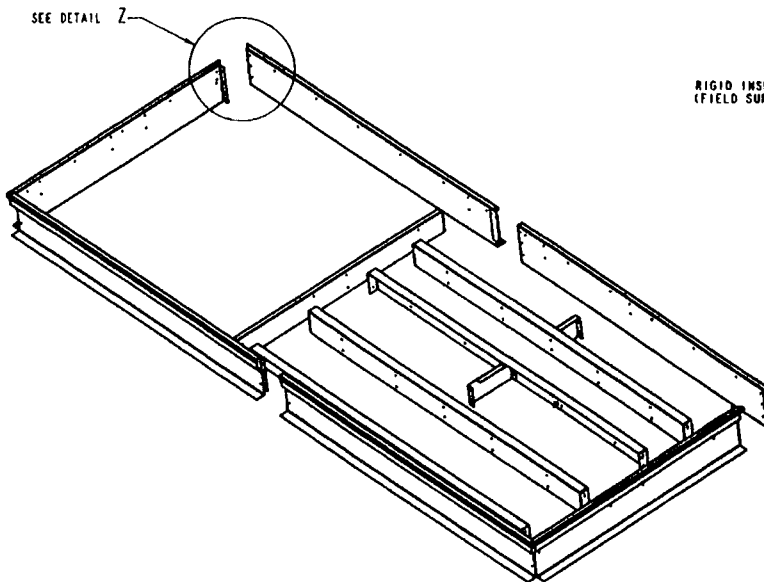
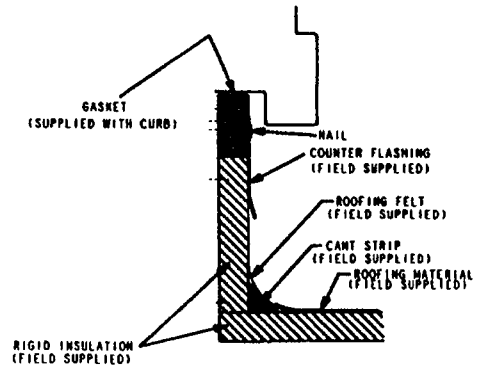
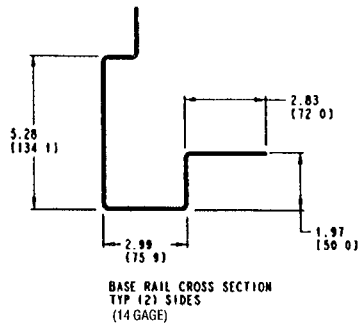
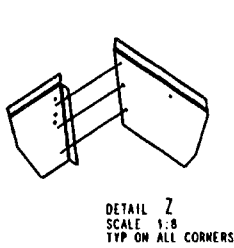
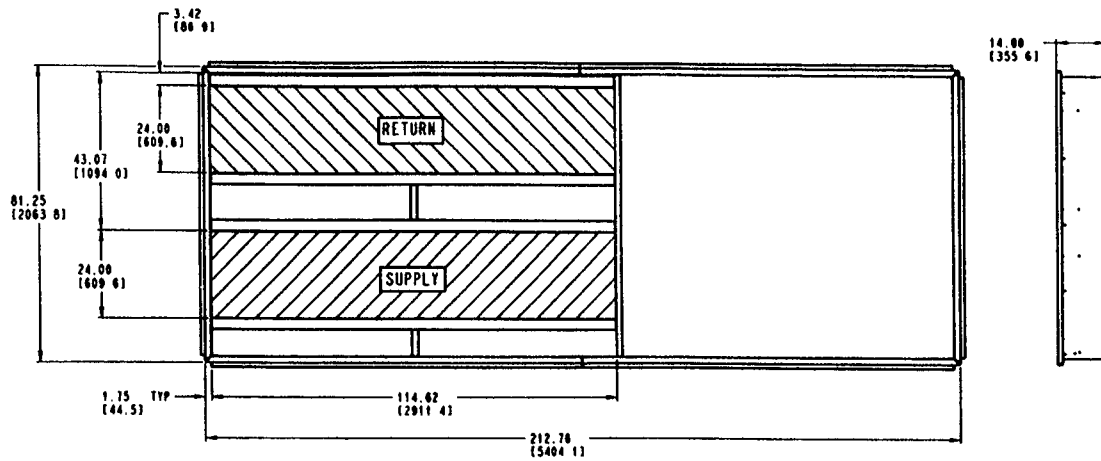


- NOTES 1) A 4-ft clearance is required on all sides, except for 10 ft required on condenser coil side of unit
2) Dimensions are in inches.

Accessory dimensions – roof curb, 024-034



Accessory dimensions – roof curb, 038-048



Selection procedure (with example)

I. Determine cooling and heating requirements at design conditions.

Given:

Required Cooling Capacity (TC) . . . 458,000 Btuh
 Sensible Heat Capacity (SHC) 338,000 Btuh
 Required Heating Capacity 640,000 Btuh
 Condenser Entering Air Temperature 95°F
 Indoor Air Temperature 80°F ewb, 67°F ewb
 Evaporator Air Quantity 16,000 cfm
 External Static Pressure 1.4 in. wg
 Electrical Characteristics (V-Ph-Hz) 460-3-60
 Unit type Gas Heating, Vertical Discharge

II. Select unit based on required cooling capacity.

Enter Cooling Capacities table at condenser entering temperature of 95°F. Unit 48EJ044 at 16,000 cfm and 67°F ewb will provide a total capacity of 462,000 Btuh and a SHC of 342,000 Btuh. Calculate SHC correction, if required, using notes under cooling capacities tables.

III. Select heating capacity of unit to provide design condition requirement.

In the Heating Capacities and Efficiencies table, page 9, note that unit 48EJE044 will provide 648,000 Btuh with an input of 800,000 Btuh.

IV. Determine fan speed and power requirements at design conditions.

Tabulated fan performance includes 2-in. throwaway filters, wet evaporator coil, economizer, cabinet losses, and roof curb. Find fan rpm and bhp at 1.4 in. wg. and 16,000 cfm on 48EJE044 Fan Performance table for vertical applications. Find that the fan speed is 1025 rpm and the power required is 18.11 bhp. The 20 hp motor is required.

V. Select unit that corresponds to power source available.

The Electrical Data table shows that a 460-3-60 unit is available

Performance data



COOLING CAPACITIES

48/50EJ, EK, EW, EY 024 (20 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		6000 / 0.08			7000 / 0.09			8000 / 0.11			9000 / 0.15		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	245	270	295	254	279	304	261	285	311	267	290	316
	SHC	208	177	145	224	190	153	240	201	161	253	214	167
	kW	14.4	14.7	14.9	14.6	14.8	15.0	14.7	14.9	15.1	14.7	14.9	15.2
85	TC	235	258	282	243	267	291	249	272	297	255	277	301
	SHC	202	172	140	219	184	148	233	196	155	245	207	161
	kW	16.1	16.5	16.9	16.2	16.6	17.0	16.4	16.7	17.1	16.5	16.8	17.1
95	TC	224	247	269	231	254	277	238	259	283	244	264	286
	SHC	197	166	135	213	179	143	226	192	150	237	202	155
	kW	17.7	18.3	18.8	18.0	18.5	18.9	18.1	18.6	19.1	18.3	18.7	19.2
105	TC	213	234	256	220	241	263	226	245	267	232	250	271
	SHC	191	161	130	206	174	137	218	186	144	228	197	150
	kW	19.3	20.0	20.6	19.5	20.1	20.7	19.7	20.3	20.8	19.9	20.4	21.0
115	TC	202	222	242	208	228	248	215	233	253	221	236	255
	SHC	186	156	125	198	169	132	210	180	138	220	191	144
	kW	20.8	21.6	22.3	21.1	21.9	22.6	21.3	22.0	22.7	21.6	22.1	22.8

48/50EJ, EK, EW, EY 028 (25 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		7000 / 0.08			8750 / 0.11			10000 / 0.12			11000 / 0.14		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	288	316	347	301	330	359	310	337	366	316	343	372
	SHC	241	206	170	271	227	182	291	241	190	306	253	197
	kW	18.2	18.7	19.2	18.5	18.9	19.4	18.6	19.0	19.5	18.7	19.1	19.6
85	TC	276	302	331	287	314	342	295	321	349	300	326	354
	SHC	235	200	163	264	221	175	282	235	184	296	247	191
	kW	20.1	20.7	21.3	20.4	21.0	21.5	20.6	21.1	21.7	20.7	21.3	21.7
95	TC	263	289	315	273	299	326	279	306	332	285	311	336
	SHC	229	194	156	257	215	169	273	229	178	285	241	185
	kW	22.0	22.8	23.4	22.4	23.1	23.8	22.6	23.3	23.9	22.7	23.5	24.1
105	TC	250	275	298	260	284	308	267	290	314	272	294	319
	SHC	223	187	150	249	209	163	264	222	172	271	234	178
	kW	23.8	24.7	25.5	24.2	25.0	25.8	24.4	25.3	26.0	24.6	25.4	26.2
115	TC	236	261	283	246	268	292	253	274	297	258	278	301
	SHC	217	181	144	241	202	157	253	216	165	258	226	172
	kW	25.6	26.6	27.6	26.0	27.0	28.0	26.4	27.2	28.2	26.7	27.4	28.3

LEGEND

- BF** — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heat Cap (1000 Btuh)
TC — Total Cap (1000 Btuh) Gross

NOTES:

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

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

$$t_{lwb} = \text{Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil } (h_{lwb})$$

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

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

- SHC is based on 80°F edb temperature of air entering evaporator coil.
Below 80°F edb, subtract (corr factor x cfm) from SHC
Above 80°F edb, add (corr factor x cfm) to SHC.

BF	ENTERING AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	82	83	84	85	over 85
Correction Factor						
.05	1.04	2.07	3.11	4.14	5.18	Use formula shown below
.10	.98	1.96	2.94	3.92	4.91	
.20	.87	1.74	2.62	3.49	4.36	

Interpolation is permissible

Correction factor = $1.10 \times (1 - BF) \times (edb - 80)$

- Cooling capacities are gross and do not include deduction for indoor fan motor heat
- VAV units will operate down to 200 cfm/ton.

COOLING CAPACITIES (cont'd)

48/50EJ, EK, EW, EY 030 (27.5 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		8000 / 0.09			9000 / 0.11			11000 / 0.14			13000 / 0.18		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	325	355	386	333	364	395	345	375	407	354	385	417
	SHC	273	232	190	290	244	197	320	267	210	344	289	224
	kW	22.7	23.5	24.2	22.9	23.6	24.3	23.2	23.9	24.6	23.5	24.2	24.9
85	TC	311	340	370	318	347	378	330	359	389	339	367	397
	SHC	266	224	183	282	237	190	311	260	204	333	281	216
	kW	24.9	25.8	26.7	25.2	26.1	26.9	25.5	26.4	27.2	25.8	26.6	27.5
95	TC	297	325	354	304	332	360	314	342	370	325	349	378
	SHC	259	218	176	274	230	184	302	253	198	321	274	209
	kW	27.1	28.1	29.1	27.3	28.4	29.4	27.8	28.8	29.8	28.2	29.1	30.0
105	TC	283	310	337	289	315	343	300	325	352	310	331	358
	SHC	252	211	170	267	224	177	291	246	191	309	266	203
	kW	29.1	30.4	31.6	29.4	30.7	31.8	30.1	31.1	32.2	30.5	31.4	32.4
115	TC	268	294	320	275	300	325	285	308	333	296	313	339
	SHC	244	206	164	259	217	170	281	238	184	295	259	196
	kW	31.2	32.6	33.9	31.6	32.9	34.2	32.2	33.4	34.6	32.8	33.7	34.9

48/50EJ, EK, EW, EY 034 (30 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		8000 / 0.09			10000 / 0.12			12000 / 0.14			14000 / 0.17		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	353	385	419	369	403	438	382	415	449	391	424	459
	SHC	287	245	202	320	269	219	351	292	231	378	313	244
	kW	27.0	28.0	29.0	27.5	28.5	29.5	27.9	28.9	29.9	28.3	29.3	30.1
85	TC	338	370	403	354	386	419	364	397	430	374	405	438
	SHC	279	237	196	312	262	211	342	284	224	366	306	237
	kW	29.4	30.6	31.8	30.1	31.3	32.5	30.6	31.7	32.8	30.9	32.0	33.2
95	TC	324	354	385	338	368	400	348	378	411	357	386	417
	SHC	273	231	189.1	304	255	204	333	277	217	355	297	229
	kW	31.9	33.3	34.6	32.6	34.0	35.3	33.1	34.5	35.8	33.6	34.8	36.0
105	TC	309	338	368	323	351	381	331	360	390	342	368	397
	SHC	265	225	182.5	296	247	196.6	323	270	209	342	291	222
	kW	34.2	35.8	37.4	35.0	36.6	38.0	35.6	37.0	38.5	36.2	37.4	38.8
115	TC	294	322	350	306	333	362	315	343	370	327	348	375
	SHC	258	217	175.9	288	240	189.4	314	262	202.4	327	283	214
	kW	36.6	38.3	40.0	37.4	39.1	40.7	38.0	39.6	41.2	38.7	40.0	41.5

Performance data (cont'd)



COOLING CAPACITIES (cont'd)

48/50EJ, EK, EW, EY 038 (35 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		10500 / 0.155			12250 / 0.17			14000 / 0.19			15750 / 0.20		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	378	416	458	388	428	471	396	437	480	403	442	487
	SHC	329	278	226	354	299	239	378	318	251	398	338	266
	kW	24.8	25.6	26.4	25.1	25.9	26.9	25.3	26.1	27.1	25.5	26.3	27.2
85	TC	362	400	441	374	412	453	381	420	462	389	425	469
	SHC	321	272	220	346	291	233	369	311	244	386	330	256
	kW	27.0	28.0	29.0	27.3	28.3	29.3	27.5	28.5	29.5	27.8	28.7	29.7
95	TC	348	384	424	358	394	435	365	402	443	374	408	449
	SHC	314	266	213	338	285	225	358	304	237	373	322	249
	kW	29.2	30.3	31.5	29.5	30.6	31.9	29.8	30.9	32.1	30.1	31.1	32.3
105	TC	333	367	406	343	377	415	350	384	423	360	389	429
	SHC	306	258	207	328	278	219	346	297	231	360	314	242
	kW	31.3	32.6	34.0	31.7	33.0	34.3	32.0	33.3	34.7	32.5	33.6	34.8
115	TC	318	350	387	327	359	396	335	365	403	346	370	409
	SHC	297	252	200.1	319	272	212	334	289	224	346	307	235
	kW	33.4	35.0	36.4	33.9	35.4	36.8	34.3	35.6	37.1	34.8	35.8	37.4

48/50EJ, EK, EW, EY 038 (35 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF		
		17500 / 0.21		
		Evaporator Air - Ewb (F)		
		62	67	72
75	TC	412	448	493
	SHC	411	356	277
	kW	25.7	26.3	27.3
85	TC	398	431	475
	SHC	397	347	267
	kW	28.0	28.9	29.9
95	TC	385	412	455
	SHC	384	339	260
	kW	30.5	31.3	32.5
105	TC	370	393	434
	SHC	370	331	252
	kW	32.7	33.7	35.1
115	TC	356	374	413
	SHC	355	323	246
	kW	35.3	36.0	37.6

See LEGEND on page 16.

COOLING CAPACITIES (cont'd)

48/50EJ, EK, EW, EY 044 (40 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		8000 / 0.14			10000 / 0.16			12000 / 0.18			14000 / 0.20		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	396	437	484	418	461	508	436	478	528	449	492	545
	SHC	306	267	226	341	293	243	373	315	257	400	336	271
	kW	30.8	32.3	33.9	31.7	33.1	34.6	32.3	33.7	35.2	32.7	34.2	35.8
85	TC	378	419	464	400	443	491	417	461	508	429	473	522
	SHC	298	259	218	333	285	235	364	307	250	390	333	263
	kW	32.9	34.6	36.3	33.9	35.5	37.3	34.6	36.3	38.0	35.1	36.7	38.5
95	TC	363	400	445	383	424	470	398	439	487	409	452	499
	SHC	290	251	211	324	277	227	354	298	241	379	320	255
	kW	35.2	37.0	38.9	36.2	38.0	39.9	36.9	38.7	40.6	37.4	39.3	41.2
105	TC	345	381	425	363	403	447	377	419	464	388	429	474
	SHC	281	242	202.8	314	266	218	343	290	233	368	312	246
	kW	37.3	39.2	41.4	38.3	40.2	42.4	39.0	41.1	43.3	39.6	41.6	43.8
115	TC	328	364	403	344	382	424	357	395	439	368	406	448
	SHC	272	234	194.7	304	256	211	332	280	222	355	302	240
	kW	39.3	41.4	43.7	40.4	42.5	44.9	41.2	43.3	45.7	41.8	44.0	46.2

48/50EJ, EK, EW, EY 044 (40 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF								
		16000 / 0.22			18000 / 0.23			20000 / 0.24		
		Evaporator Air - Ewb (F)								
		62	67	72	62	67	72	62	67	72
75	TC	457	503	555	467	514	563	475	520	571
	SHC	426	358	284	449	379	300	468	400	308
	kW	33.1	34.5	36.1	33.5	34.9	36.3	33.7	35.2	36.6
85	TC	438	485	533	446	496	539	458	498	545
	SHC	416	353	276	437	371	284	452	389	301
	kW	35.5	37.2	38.8	35.8	37.6	39.1	36.3	37.8	39.3
95	TC	419	462	509	426	469	516	438	475	517
	SHC	403	342	268	422	361	277	435	380	294
	kW	37.9	39.7	41.6	38.3	40.0	41.9	38.8	40.4	41.9
105	TC	395	439	484	407	445	489	417	450	493
	SHC	389	333	259	406	352	276	417	370	282
	kW	40.1	42.2	44.2	40.7	42.4	44.5	41.2	42.8	44.6
115	TC	376	416	458	388	423	464	396	424	466
	SHC	374	322	249	388	342	262	396	359	276
	kW	42.3	44.6	46.7	43.0	45.0	47.1	43.6	45.1	47.2

See LEGEND on page 16.

Performance data (cont'd)



COOLING CAPACITIES (cont'd)

48/50EJ, EK, EW, EY 048 (45 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF											
		13500 / 0.115			15750 / 0.13			18000 / 0.14			20250 / 0.16		
		Evaporator Air - Ewb (F)											
		62	67	72	62	67	72	62	67	72	62	67	72
75	TC	512	563	619	527	579	635	537	589	648	549	599	658
	SHC	444	376	305	479	403	322	512	430	339	537	457	355
	kW	38.5	40.3	42.1	39.1	40.9	42.7	39.4	41.2	43.2	39.8	41.5	43.5
85	TC	492	540	593	505	555	609	515	565	622	528	575	631
	SHC	433	367	296	468	394	313	498	420	329	522	446	345
	kW	41.2	43.1	45.2	41.7	43.7	45.8	42.2	44.2	46.3	42.8	44.5	46.7
95	TC	469	516	569	482	529	583	494	541	594	506	548	604
	SHC	423	357	287	455	383	304	483	409	320	504	436	336
	kW	43.8	45.9	48.2	44.5	46.6	48.9	45.0	47.1	49.3	45.6	47.5	49.8
105	TC	447	491	542	459	504	556	471	514	566	485	521	575
	SHC	411	347	278	443	372	294	465	400	311	485	423	326
	kW	46.4	48.8	51.2	47.1	49.4	51.8	47.8	49.9	52.4	48.6	50.3	52.9
115	TC	424	467	515	436	479	527	450	487	536	464	494	545
	SHC	399	337	268	427	363	285	449	388	300	464	413	317
	kW	48.9	51.4	54.1	49.7	52.1	54.8	50.5	52.7	55.3	51.5	53.0	55.8

48/50EJ, EK, EW, EY 048 (45 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity - Cfm / BF		
		22500 / 0.16		
		Evaporator Air - Ewb (F)		
		62	67	72
75	TC	561	606	666
	SHC	558	480	374
	kW	40.3	41.8	43.8
85	TC	540	581	639
	SHC	540	468	361
	kW	43.3	44.8	47
95	TC	520	555	611
	SHC	519	458	345
	kW	46.3	47.8	50.2
105	TC	499	527	581
	SHC	497	447	341
	kW	49.3	50.7	53.2
115	TC	477	499	551
	SHC	476	436	331
	kW	52.2	53.4	56.2

See LEGEND on page 16

FAN PERFORMANCE - VERTICAL DISCHARGE UNITS

48EJ024 - 034 and 48EK024 - 034 (20 THRU 30 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6000	432	1.79	495	2.19	550	2.59	600	3.01	647	3.43	690	3.87	730	4.31	769	4.77
7000	483	2.48	540	2.91	591	3.33	638	3.77	682	4.22	723	4.67	762	5.14	799	5.61
8000	536	3.33	588	3.78	635	4.23	679	4.69	720	5.16	759	5.64	797	6.12	832	6.61
8250	549	3.57	600	4.02	646	4.48	690	4.95	730	5.42	769	5.90	806	6.39	841	6.88
9000	590	4.34	637	4.82	681	5.30	722	5.78	762	6.27	799	6.77	834	7.27	868	7.77
10000	645	5.54	689	6.04	729	6.54	768	7.04	805	7.56	840	8.07	874	8.59	906	9.12
11000	701	6.92	741	7.44	779	7.96	816	8.49	850	9.03	884	9.56	916	10.10	947	10.65
12000	757	8.49	795	9.04	830	9.59	865	10.14	898	10.69	929	11.25	960	11.81	990	12.37
12500	786	9.36	822	9.92	856	10.47	890	11.03	922	11.60	953	12.16	983	12.73	1012	13.31
13000	814	10.28	849	10.84	883	11.41	915	11.98	946	12.56	976	13.13	1006	13.71	1034	14.30
13750	857	11.75	890	12.34	922	12.92	953	13.51	983	14.10	1012	14.69	1041	15.28	1068	15.88
14000	871	12.27	904	12.86	936	13.45	966	14.05	996	14.64	1025	15.23	1053	15.83	1080	16.43
15000	929	14.50	960	15.10	990	15.71	1019	16.33	1047	16.94	1074	17.55	1101	18.17	1127	18.79

48EJ024 - 034 and 48EK024 - 034 (20 THRU 30 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6000	805	5.23	840	5.70	874	6.18	906	6.67	937	7.16	968	7.66	997	8.17	1025	8.69
7000	834	6.09	868	6.57	901	7.07	932	7.56	962	8.07	992	8.58	1020	9.10	1048	9.63
8000	866	7.10	899	7.60	930	8.11	961	8.62	990	9.14	1019	9.67	1047	10.20	1074	10.74
8250	874	7.38	907	7.89	938	8.40	968	8.92	998	9.44	1026	9.97	1054	10.50	1081	11.04
9000	901	8.29	932	8.80	963	9.33	992	9.86	1021	10.39	1049	10.93	1076	11.48	1102	12.03
10000	938	9.65	968	10.18	997	10.72	1026	11.27	1054	11.82	1081	12.37	1107	12.93	1133	13.49
11000	977	11.19	1006	11.75	1035	12.30	1062	12.87	1089	13.43	1115	14.00	1141	14.57	1166	15.15
12000	1019	12.94	1047	13.51	1074	14.08	1100	14.66	1126	15.24	1152	15.83	1177	16.42	1201	17.01
12500	1040	13.88	1067	14.46	1094	15.05	1120	15.63	1146	16.22	1171	16.82	1195	17.41	-	-
13000	1062	14.88	1089	15.47	1115	16.06	1140	16.66	1166	17.25	1190	17.86	-	-	-	-
13750	1095	16.48	1121	17.08	1147	17.68	1172	18.29	1196	18.90	-	-	-	-	-	-
14000	1106	17.04	1132	17.64	1157	18.25	1182	18.86	-	-	-	-	-	-	-	-
15000	1152	19.41	1177	20.04	1200	20.66	-	-	-	-	-	-	-	-	-	-

48EJ024 - 034 and 48EK024 - 034 (20 THRU 30 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6000	1053	9.21	1080	9.73	1106	10.27
7000	1075	10.16	1102	10.69	1127	11.24
8000	1100	11.28	1126	11.83	1151	12.38
8250	1107	11.59	1133	12.14	1158	12.69
9000	1128	12.58	1153	13.14	1178	13.70
10000	1158	14.06	1183	14.63	-	-
11000	1190	15.74	-	-	-	-
12000	-	-	-	-	-	-
12500	-	-	-	-	-	-
13000	-	-	-	-	-	-
13750	-	-	-	-	-	-
14000	-	-	-	-	-	-
15000	-	-	-	-	-	-

LEGEND

Bhp — Brake Horsepower

* For EW/EY units, reduce net available external static pressure by 0.3 in. wg.

NOTES:

- 1 Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters
- 2 Conversion — Bhp to watts

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

Performance data (cont'd)



FAN PERFORMANCE - VERTICAL DISCHARGE UNITS (cont'd)

48EJ038 - 044 (35 AND 40 TONS) and 48EK024 - 034 (40 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8000	475	2.36	525	3.09	571	3.49	616	3.90	658	4.31	699	4.74	738	5.17	776	5.61
9000	523	3.11	567	3.97	610	4.39	651	4.82	690	5.26	728	5.71	765	6.16	801	6.62
10000	571	4.00	612	5.01	651	5.46	689	5.91	725	6.37	761	6.84	795	7.31	829	7.79
11000	620	5.04	658	6.22	694	6.69	729	7.17	763	7.65	796	8.14	829	8.64	860	9.14
12000	670	6.24	705	7.61	738	8.10	771	8.60	803	9.11	834	9.62	865	10.13	894	10.65
13000	720	7.61	752	9.19	784	9.70	814	10.23	844	10.75	874	11.29	902	11.82	931	12.36
14000	771	9.15	801	10.97	830	11.51	859	12.05	887	12.60	915	13.15	942	13.71	969	14.27
15000	822	10.88	850	12.95	877	13.52	904	14.08	931	14.65	957	15.22	983	15.80	1008	16.38
16000	873	12.80	899	15.16	925	15.74	951	16.33	976	16.92	1001	17.51	1025	18.11	1049	18.71
17000	924	14.91	949	17.59	974	18.20	998	18.80	1022	19.41	1045	20.03	1069	20.64	1092	21.26
18000	976	17.24	999	20.26	1023	20.88	1046	21.51	1068	22.14	1091	22.77	1113	23.41	1135	24.05
19000	1027	19.77	1050	23.17	1072	23.82	1094	24.46	1115	25.11	1137	25.76	1158	26.42	1179	27.07
20000	1079	22.53	1100	26.33	1122	27.00	1142	27.66	1163	28.33	1183	29.00	-	-	-	-

48EJ038 - 044 (35 AND 40 TONS) and 48EK024 - 034 (40 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8000	813	6.06	848	6.52	883	6.98	916	7.45	949	7.92	981	8.40	1012	8.89	1042	9.38
9000	835	7.09	869	7.56	902	8.04	934	8.53	965	9.02	995	9.52	1025	10.02	1054	10.53
10000	862	8.28	893	8.77	925	9.27	955	9.77	985	10.28	1014	10.79	1043	11.31	1071	11.84
11000	891	9.64	921	10.15	951	10.67	980	11.19	1008	11.71	1036	12.24	1064	12.78	1090	13.32
12000	924	11.18	952	11.71	980	12.24	1008	12.78	1035	13.32	1062	13.87	1088	14.42	1114	14.98
13000	958	12.91	986	13.45	1012	14.01	1039	14.56	1064	15.13	1090	15.69	1115	16.26	1140	16.83
14000	995	14.83	1021	15.40	1046	15.97	1071	16.55	1096	17.13	1120	17.71	1144	18.29	1168	18.89
15000	1033	16.96	1058	17.55	1082	18.14	1106	18.73	1130	19.33	1153	19.93	1176	20.54	1199	21.14
16000	1073	19.31	1097	19.92	1120	20.52	1143	21.14	1165	21.75	1188	22.37	-	-	-	-
17000	1114	21.88	1137	22.51	1159	23.13	1181	23.76	-	-	-	-	-	-	-	-
18000	1156	24.69	1178	25.33	1199	25.98	-	-	-	-	-	-	-	-	-	-
19000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

48EJ038 - 044 (35 AND 40 TONS) and 48EK044 (40 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8000	1072	9.88	1101	10.39	1130	10.90
9000	1083	11.04	1111	11.56	1139	12.08
10000	1098	12.37	1125	12.90	1152	13.44
11000	1117	13.86	1143	14.41	1169	14.96
12000	1139	15.54	1164	16.11	1189	16.68
13000	1164	17.41	1188	17.99	-	-
14000	1191	19.48	-	-	-	-
15000	-	-	-	-	-	-
16000	-	-	-	-	-	-
17000	-	-	-	-	-	-
18000	-	-	-	-	-	-

LEGEND

Bhp — Brake Horsepower

* For EW/EY units, reduce net available external static pressure by 0.5 in. wg

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters

2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

FAN PERFORMANCE - VERTICAL DISCHARGE UNITS (cont'd)

48EJ048 (45 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)																	
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
13000	728	7.71	760	9.31	791	9.83	822	10.35	851	10.88	881	11.42	909	11.95	938	12.50	965	13.04
14000	779	9.28	809	11.11	838	11.65	867	12.20	895	12.75	923	13.31	950	13.87	976	14.43	1002	14.99
15000	830	11.03	858	13.13	886	13.69	913	14.26	939	14.83	966	15.41	991	15.99	1017	16.57	1041	17.15
16000	882	12.97	908	15.36	934	15.95	960	16.54	985	17.13	1010	17.73	1034	18.33	1058	18.93	1082	19.53
17000	934	15.12	959	17.83	983	18.44	1008	19.05	1031	19.66	1055	20.28	1078	20.89	1101	21.52	1124	22.14
18000	986	17.47	1010	20.53	1033	21.16	1056	21.79	1078	22.42	1101	23.06	1123	23.70	1145	24.34	1166	24.98
19000	1038	20.05	1061	23.49	1083	24.13	1105	24.78	1126	25.44	1147	26.09	1169	26.75	1190	27.41	-	-
20000	1091	22.84	1112	26.69	1133	27.36	1154	28.03	1174	28.70	1195	29.37	-	-	-	-	-	-

48EJ048 (45 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)																	
	2.0		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
13000	992	13.59	1019	14.15	1045	14.71	1071	15.27	1096	15.84	1121	16.41	1146	16.98	1170	17.56	1194	18.14
14000	1028	15.56	1054	16.14	1079	16.71	1103	17.30	1127	17.88	1151	18.47	1175	19.06	1198	19.66	-	-
15000	1066	17.74	1090	18.34	1114	18.93	1138	19.53	1161	20.13	1184	20.74	-	-	-	-	-	-
16000	1105	20.14	1128	20.75	1151	21.37	1174	21.99	1196	22.61	-	-	-	-	-	-	-	-
17000	1146	22.77	1168	23.40	1190	24.03	-	-	-	-	-	-	-	-	-	-	-	-
18000	1188	25.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

LEGEND

Bhp — Brake Horsepower

* For EW units, reduce net available external static pressure by 0.5 in. wg.

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters
2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

Performance data (cont'd)



FAN PERFORMANCE - VERTICAL DISCHARGE UNITS (cont'd)

50EJ024 - 034 and 50EK024 - 034 (20 THRU 30 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6000	403	1.62	468	2.01	526	2.41	577	2.81	624	3.21	668	3.62	709	4.04	748	4.46
7000	448	2.22	508	2.65	561	3.08	609	3.50	654	3.93	696	4.37	736	4.81	773	5.25
8000	495	2.97	549	3.42	599	3.88	645	4.33	687	4.79	727	5.25	765	5.71	801	6.18
8250	507	3.18	560	3.64	609	4.10	654	4.56	696	5.02	735	5.49	773	5.96	809	6.43
9000	543	3.85	593	4.34	639	4.82	682	5.30	723	5.78	761	6.27	797	6.76	832	7.24
10000	592	4.90	638	5.41	682	5.91	722	6.42	760	6.93	797	7.44	832	7.95	865	8.46
11000	642	6.10	685	6.64	725	7.17	764	7.70	800	8.24	835	8.77	868	9.30	900	9.84
12000	693	7.48	733	8.04	771	8.60	807	9.15	841	9.71	874	10.26	906	10.82	937	11.38
12500	718	8.23	757	8.80	794	9.37	829	9.94	862	10.51	895	11.08	926	11.64	956	12.21
13000	744	9.03	781	9.62	817	10.20	851	10.78	884	11.36	915	11.93	946	12.51	975	13.09
13750	783	10.32	818	10.92	852	11.52	885	12.12	917	12.71	947	13.31	977	13.90	1005	14.50
14000	795	10.77	831	11.38	864	11.98	896	12.59	928	13.19	958	13.79	987	14.39	1015	14.99
15000	847	12.71	880	13.34	912	13.96	943	14.59	972	15.21	1001	15.83	1029	16.45	1056	17.08

50EJ024 - 034 and 50EK024 - 034 (20 THRU 30 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6000	785	4.89	820	5.32	854	5.76	886	6.21	918	6.65	948	7.11	977	7.56	1006	8.02
7000	809	5.70	843	6.16	876	6.61	908	7.08	939	7.54	968	8.01	997	8.49	1025	8.96
8000	836	6.65	869	7.12	901	7.60	932	8.08	962	8.57	991	9.05	1019	9.55	1046	10.04
8250	843	6.91	876	7.39	908	7.87	938	8.36	968	8.84	997	9.34	1025	9.83	1052	10.33
9000	865	7.74	898	8.23	929	8.73	959	9.23	988	9.74	1016	10.24	1043	10.75	1070	11.27
10000	897	8.98	928	9.49	958	10.01	987	10.53	1016	11.06	1043	11.58	1070	12.11	1096	12.64
11000	931	10.37	961	10.91	990	11.45	1018	11.99	1046	12.54	1073	13.08	1099	13.63	1124	14.18
12000	967	11.94	996	12.49	1024	13.06	1051	13.62	1078	14.18	1104	14.75	1129	15.31	1154	15.88
12500	985	12.78	1014	13.35	1041	13.92	1068	14.49	1094	15.07	1120	15.64	1145	16.22	1169	16.80
13000	1004	13.67	1032	14.25	1059	14.83	1086	15.42	1111	16.00	1137	16.59	1161	17.17	1185	17.76
13750	1033	15.09	1060	15.69	1087	16.29	1112	16.88	1138	17.48	1162	18.08	1186	18.68	-	-
14000	1043	15.59	1070	16.19	1096	16.79	1122	17.40	1147	18.00	1171	18.60	1195	19.21	-	-
15000	1083	17.70	1109	18.32	1134	18.94	1159	19.56	1183	20.19	-	-	-	-	-	-

50EJ024 - 034 and 50EK024 - 034 (20 THRU 30 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6000	1034	8.49	1061	8.96	1087	9.43
7000	1052	9.44	1079	9.93	1105	10.42
8000	1073	10.54	1099	11.04	1125	11.55
8250	1079	10.84	1105	11.34	1130	11.85
9000	1096	11.78	1122	12.30	1147	12.82
10000	1122	13.18	1147	13.71	1171	14.25
11000	1149	14.73	1173	15.29	1197	15.84
12000	1178	16.45	1202	17.03	-	-
12500	1193	17.38	-	-	-	-
13000	-	-	-	-	-	-
13750	-	-	-	-	-	-
14000	-	-	-	-	-	-
15000	-	-	-	-	-	-

LEGEND

Bhp — Brake Horsepower

* For EW/EY units, reduce net available external static pressure by 0.3 in. wg

NOTES

1 Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters

2 Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

FAN PERFORMANCE - VERTICAL DISCHARGE UNITS (cont'd)

50EJ038 - 044 (35 AND 40 TONS) and 50EK044 (40 TONS)*																
Airflow (Cfm)	Available External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8000	448	2.18	498	2.87	544	3.25	589	3.64	631	4.04	671	4.44	710	4.86	747	5.27
9000	492	2.87	537	3.68	580	4.09	621	4.50	660	4.92	698	5.35	734	5.78	769	6.22
10000	537	3.69	578	4.63	617	5.07	655	5.50	692	5.95	727	6.39	761	6.85	795	7.30
11000	582	4.65	620	5.75	657	6.20	692	6.66	726	7.13	759	7.60	792	8.07	823	8.55
12000	629	5.75	664	7.02	698	7.50	730	7.98	763	8.47	794	8.96	824	9.45	854	9.95
13000	675	7.00	708	8.48	739	8.98	770	9.48	800	9.99	830	10.50	859	11.01	887	11.53
14000	722	8.42	753	10.11	782	10.63	811	11.16	840	11.69	868	12.22	895	12.75	922	13.29
15000	770	10.00	798	11.94	826	12.48	853	13.03	880	13.57	907	14.13	932	14.68	958	15.24
16000	817	11.76	844	13.96	870	14.53	896	15.09	922	15.66	947	16.23	971	16.81	995	17.38
17000	865	13.7	890	16.19	915	16.78	940	17.37	964	17.95	988	18.54	1011	19.14	1034	19.73
18000	913	15.83	937	18.64	961	19.25	984	19.85	1007	20.46	1030	21.07	1052	21.68	1074	22.30
19000	961	18.16	984	21.32	1006	21.94	1029	22.56	1050	23.19	1072	23.82	1093	24.45	1115	25.08
20000	1009	20.69	1031	24.22	1052	24.86	1074	25.50	1095	26.15	1115	26.80	1136	27.45	1156	28.10

50EJ038 - 044 (35 AND 40 TONS) and 50EK044 (40 TONS)*																
Airflow (Cfm)	Available External Static Pressure (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8000	783	5.70	818	6.13	852	6.56	884	7.00	916	7.45	947	7.90	978	8.36	1007	8.82
9000	803	6.66	836	7.11	869	7.56	900	8.02	930	8.48	960	8.95	989	9.42	1018	9.90
10000	827	7.77	858	8.23	889	8.70	919	9.18	948	9.66	977	10.15	1005	10.64	1032	11.13
11000	854	9.03	884	9.51	913	10.00	941	10.50	969	11.00	997	11.50	1024	12.01	1050	12.52
12000	883	10.45	911	10.96	939	11.47	967	11.98	993	12.50	1020	13.02	1046	13.54	1071	14.07
13000	914	12.05	942	12.57	968	13.10	994	13.63	1020	14.17	1045	14.71	1070	15.25	1094	15.79
14000	948	13.83	974	14.37	999	14.92	1024	15.47	1049	16.02	1073	16.58	1096	17.14	1120	17.70
15000	983	15.80	1007	16.36	1032	16.92	1056	17.49	1079	18.06	1102	18.64	1125	19.21	1148	19.79
16000	1019	17.96	1043	18.54	1066	19.13	1089	19.71	1111	20.30	1134	20.89	1156	21.49	1177	22.08
17000	1057	20.33	1079	20.93	1102	21.53	1124	22.14	1145	22.75	1167	23.35	1188	23.97	-	-
18000	1096	22.91	1117	23.53	1138	24.15	1160	24.78	1180	25.40	-	-	-	-	-	-
19000	1135	25.72	1156	26.36	1176	26.99	1197	27.63	-	-	-	-	-	-	-	-
20000	1176	28.75	1196	29.41	-	-	-	-	-	-	-	-	-	-	-	-

50EJ038 - 044 (35 AND 40 TONS) and 50EK044 (40 TONS)*						
Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8000	1036	9.29	1065	9.76	1092	10.24
9000	1046	10.38	1073	10.87	1100	11.36
10000	1059	11.63	1086	12.13	1112	12.64
11000	1076	13.03	1102	13.55	1127	14.07
12000	1096	14.60	1121	15.13	1145	15.67
13000	1118	16.34	1142	16.89	1165	17.45
14000	1143	18.26	1166	18.83	1188	19.40
15000	1170	20.37	1192	20.96	-	-
16000	1199	22.68	-	-	-	-
17000	-	-	-	-	-	-
18000	-	-	-	-	-	-
19000	-	-	-	-	-	-
20000	-	-	-	-	-	-

LEGEND

Bhp — Brake Horsepower

* For EW/EY units, reduce net available external static pressure by 0.5 in. wg.

NOTES

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.

2. Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

Performance data (cont'd)



FAN PERFORMANCE - VERTICAL DISCHARGE UNITS (cont'd)

50EJ048 (45 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
13000	683	7.10	715	8.59	747	9.09	777	9.60	808	10.11	837	10.62	866	11.14	894	11.66
14000	730	8.53	761	10.25	790	10.77	819	11.30	847	11.83	875	12.36	902	12.90	929	13.44
15000	778	10.14	807	12.10	834	12.65	862	13.19	888	13.75	915	14.30	941	14.86	966	15.42
16000	826	11.93	853	14.15	879	14.72	905	15.29	931	15.86	955	16.44	980	17.01	1004	17.59
17000	875	13.90	900	16.42	925	17.01	949	17.60	973	18.19	997	18.78	1020	19.38	1043	19.98
18000	923	16.06	947	18.90	971	19.51	994	20.12	1017	20.73	1039	21.34	1062	21.96	1084	22.58
19000	972	18.42	995	21.61	1017	22.24	1039	22.87	1061	23.50	1083	24.13	1104	24.76	1125	25.40
20000	1021	20.98	1042	24.55	1064	25.20	1085	25.85	1106	26.50	1126	27.15	1147	27.80	1167	28.46

50EJ048 (45 TONS)*

Airflow (Cfm)	Available External Static Pressure (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
13000	921	12.18	948	12.71	975	13.24	1001	13.77	1026	14.30	1051	14.84	1076	15.39	1100	15.93
14000	955	13.98	981	14.53	1006	15.08	1031	15.63	1056	16.18	1080	16.74	1103	17.30	1127	17.86
15000	991	15.98	1015	16.54	1040	17.11	1063	17.68	1087	18.25	1110	18.83	1133	19.41	1155	19.99
16000	1028	18.17	1051	18.76	1074	19.34	1097	19.93	1120	20.52	1142	21.12	1164	21.71	1185	22.31
17000	1066	20.58	1089	21.18	1111	21.78	1133	22.39	1154	23.00	1175	23.61	1197	24.23	-	-
18000	1106	23.19	1127	23.82	1148	24.44	1169	25.07	1190	25.69	-	-	-	-	-	-
19000	1146	26.04	1166	26.68	1187	27.32	-	-	-	-	-	-	-	-	-	-
20000	1187	29.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-

50EJ048 (45 TONS)

Airflow (Cfm)	Available External Static Pressure (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
13000	1124	16.48	1148	17.03	1171	17.59
14000	1150	18.43	1173	19.00	1195	19.57
15000	1177	20.57	1199	21.16	-	-
16000	-	-	-	-	-	-
17000	-	-	-	-	-	-
18000	-	-	-	-	-	-
19000	-	-	-	-	-	-
20000	-	-	-	-	-	-

LEGEND

Bhp — Brake Horsepower

* For EW/EY units, reduce net available external static pressure by 0.5 in. wg

NOTES:

- Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters
- Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

MOTOR LIMITATIONS

NAMEPLATE HP	VOLTAGE	MAXIMUM ACCEPTABLE OPERATING BHP
5.0	208 - 230	5.9
	460	5.9
7.5	208 - 230	8.7
	460	9.5
10.0	208 - 230	10.2
	460	11.8
15.0	208 - 230	15.3
	460	18.0
20.0	208 - 230	22.4
	460	23.4
25.0	208 - 230	28.9
	460	29.4
30.0	208 - 230	35.6
	460	34.7

BHP — Brake Horsepower

NOTE Extensive motor and electrical testing on the Carrier units has ensured that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown on the Motor Limitations table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Electrical data - 48EJ, EK, EW, EY024-048



UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP
024	208/230	187	254	44	191	31	137	2	1	5 3	5	15 2	-	-	0.96	113 9 / 112 4	150
													23 6	41 6	0.96	137 5 / 136 0	175
											10	28	-	-	0.96	128 0 / 125 2	150
													23 6	41 6	0.96	151 6 / 148 8	175
											15	42	-	-	0.96	143 4 / 139 2	175
													23 6	41 6	0.96	167 0 / 162 8	200
	460	414	508	20	86	14	62	2	1	2 7	5	7 6	-	-	0.5	52	70
													12 6	23 6	0.5	64 6	80
											10	14	-	-	0.5	58 4	70
													12 6	23 6	0.5	71	90
											15	21	-	-	0.5	65 4	80
													12 6	23 6	0.5	78	90
	575	518	632	16	69	11	50	2	1	2 4	5	6 1	-	-	0.5	42 2	50
													12 6	23 6	0.5	54 8	70
											10	11	-	-	0.5	47 1	60
													12 6	23 6	0.5	59 7	70
											15	17	-	-	0.5	53 1	60
													12 6	23 6	0.5	65 7	80
028	208/230	187	254	44	191	44	191	2	1	5 3	7 5	7 5	-	-	0.96	134 3 / 132 1	175
													23 6	41 6	0.96	157 9 / 155 7	175
											10	28	-	-	0.96	140 9 / 138 1	175
													23 6	41 6	0.96	164 5 / 161 7	200
											15	42	-	-	0.96	156 3 / 152 1	175
													23 6	41 6	0.96	179 9 / 175 7	200
	460	414	508	20	86	20	86	2	1	2 7	7 5	11	-	-	0.5	61 2	80
													12 6	23 6	0.5	73 8	90
											10	14	-	-	0.5	64 2	80
													12 6	23 6	0.5	76 8	90
											15	21	-	-	0.5	71 2	90
													12 6	23 6	0.5	83 8	100
	575	518	632	16	69	16	69	2	1	2 4	7 5	9	-	-	0.5	49 8	60
													12 6	23 6	0.5	62 4	70
											10	11	-	-	0.5	51 8	60
													12 6	23 6	0.5	64 4	80
											15	17	-	-	0.5	57 8	70
													12 6	23 6	0.5	70 4	80

LEGEND

FLA	—	Full Load Amps
Hp	—	Nominal Horsepower
IFM	—	Indoor (Evaporator) Fan Motor
LRA	—	Locked Rotor Amps
MCA	—	Minimum Circuit Amps (for wire sizing)
MOCP	—	Maximum Overcurrent Protection
OFM	—	Outdoor (Condenser) Fan Motor
RLA	—	Rated Load Amps



Electrical data - 48EJ,EK,EW,EY024-048 (cont'd)



UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
		Min	Max	NO. 1 RLA	NO. 1 LRA	NO. 2 RLA	NO. 2 LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP
048	208/230	187	254	90	446	69	345	4	1	5 3	20	54	-	-	0 96	261 9 / 256 5	300
													23 6	41 6	0 96	285 5 / 280 1	300
											25	68	-	-	0 96	277 3 / 270 5	300
													23 6	41 6	0 96	300 9 / 294 1	300
											30	80	-	-	0 96	290 5 / 282 5	300
													23 6	41 6	0 96	314 1 / 306 1	300
	460	414	508	45	223	35	173	4	1	2 7	20	27	-	-	0 5	128 5	150
													12 6	23 6	0 5	141 1	175
											25	34	-	-	0 5	135 5	175
													12 6	23 6	0 5	148 1	175
											30	40	-	-	0 5	141 5	175
													12 6	23 6	0 5	154 1	175
	575	518	632	37	164	29	120	4	1	2 4	20	22	-	-	0 5	106	125
													12 6	23 6	0 5	118 6	150
											25	27	-	-	0 5	111	125
													12 6	23 6	0 5	123 6	150
											30	32	-	-	0 5	116	150
													12 6	23 6	0 5	128 6	150

Electrical data - 50EJ,EK,EW,EY024-048



UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	NO. 1		NO. 2		Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOC
024	208/230	187	254	44	191	31	137	2	1	5 3	5	15 2	-	-	-	-	113.9 / 112.4	150
													23.6	41.6	-	-	137.5 / 136	175
													-	-	29 / 36	75.1 / 86.6	114.7 / 127.3	150
													23.6	41.6	29 / 36	75.1 / 86.6	144.2 / 156.8	175
													-	-	59 / 72	150.1 / 173.2	171.0 / 192.2	200 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	200.5 / 221.7	225
											10	28	-	-	-	-	128.0 / 125.2	150
													23.6	41.6	-	-	151.6 / 148.8	175
													-	-	29 / 36	75.1 / 86.6	132.3 / 143.3	150
													23.6	41.6	29 / 36	75.1 / 86.6	161.8 / 172.8	175
													-	-	59 / 72	150.1 / 173.2	188.6 / 208.2	220 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	218.1 / 237.7	225
											15	42	-	-	-	-	143.4 / 139.2	175
													23.6	41.6	-	-	167.0 / 162.8	200
													-	-	29 / 36	75.1 / 86.6	151.6 / 160.8	175
													23.6	41.6	29 / 36	75.1 / 86.6	181.1 / 190.3	200
													-	-	59 / 72	150.1 / 173.2	207.9 / 225.7	225
													23.6	41.6	59 / 72	150.1 / 173.2	237.4 / 255.2	275
	460	414	508	20	86	14	62	2	1	2 7	5	7 6	-	-	-	-	52.0	70
													12.6	23.6	-	-	64.6	80
													-	-	36	43.3	63.6	70
													12.6	23.6	36	43.3	79.4	80
													-	-	72	86.6	96.1	110
													12.6	23.6	72	86.6	111.9	125
											10	14	-	-	-	-	58.4	70
													12.6	23.6	-	-	71.0	90
													-	-	36	43.3	71.6	80
													12.6	23.6	36	43.3	87.4	90
													-	-	72	86.6	104.1	110
													12.6	23.6	72	86.6	119.9	125
	575	518	632	16	69	11	50	2	1	2 4	15	21	-	-	-	-	65.4	80
													12.6	23.6	-	-	78.0	90
													-	-	36	43.3	80.4	90
													12.6	23.6	36	43.3	96.1	100
													-	-	72	86.6	112.9	125
													12.6	23.6	72	86.6	128.6	150
											5	6 1	-	-	-	-	42.2	50
													12.6	23.6	-	-	54.8	70
													-	-	36	34.6	50.9	60
													12.6	23.6	36	34.6	66.7	70
													-	-	72	69.3	76.9	80
													12.6	23.6	72	69.3	92.7	80
											10	11	-	-	-	-	47.1	60
													12.6	23.6	-	-	59.7	70
													-	-	36	34.6	57.1	60
													12.6	23.6	36	34.6	72.8	80
													-	-	72	69.3	83.0	80
													12.6	23.6	72	69.3	98.8	100
											15	17	-	-	-	-	53.1	60
													12.6	23.6	-	-	65.7	80
													-	-	36	34.6	64.6	70
													12.6	23.6	36	34.6	80.3	80
													-	-	72	69.3	90.5	100
													12.6	23.6	72	69.3	106.3	110

LEGEND

FLA	—	Full Load Amps
Hp	—	Nominal Horsepower
IFM	—	Indoor (Evaporator) Fan Motor
LRA	—	Locked Rotor Amps
MCA	—	Minimum Circuit Amps (for wire sizing)
MOC	—	Maximum Overcurrent Protection
OFM	—	Outdoor (Condenser) Fan Motor
RLA	—	Rated Load Amps



Electrical data - 50EJ,EK,EW,EY024-048 (cont'd)



UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	NO. 1		NO. 2		Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP
028	208/230	187	254	44	191	44	191	2	1	5.3	7.5	22	-	-	-	-	134.3 / 132.1	175
													23.6	41.6	-	-	157.9 / 155.7	200 / 175
													-	-	29 / 36	75.1 / 86.6	134.3 / 135.8	175
													23.6	41.6	29 / 36	75.1 / 86.6	157.9 / 165.3	200 / 175
													-	-	59 / 72	150.1 / 173.2	180.4 / 200.7	200 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	209.9 / 230.2	225
													-	-	-	-	140.9 / 138.1	175
													23.6	41.6	-	-	164.5 / 161.7	200
											10	28	-	-	29 / 36	75.1 / 86.6	140.9 / 143.3	175
													23.6	41.6	29 / 36	75.1 / 86.6	164.5 / 172.8	200
													-	-	59 / 72	150.1 / 173.2	188.6 / 208.2	200 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	218.1 / 237.7	225
													-	-	-	-	156.3 / 152.1	200 / 175
													23.6	41.6	-	-	179.9 / 175.7	200
													-	-	29 / 36	75.1 / 86.6	156.3 / 160.8	200 / 175
													23.6	41.6	29 / 36	75.1 / 86.6	181.1 / 190.3	200
											15	42	-	-	59 / 72	150.1 / 173.2	207.9 / 225.7	225
													23.6	41.6	59 / 72	150.1 / 173.2	237.4 / 255.2	275
													-	-	-	-	61.2	80
													12.6	23.6	-	-	73.8	90
													-	-	36	43.3	67.9	70
													12.6	23.6	36	43.3	83.6	80
													-	-	72	86.6	100.4	110
													12.6	23.6	72	86.6	116.1	125
	10	28	-	-	-	-	64.2	80										
			12.6	23.6	-	-	76.8	90										
			-	-	36	43.3	71.6	80										
			12.6	23.6	36	43.3	87.4	80										
			-	-	72	86.6	104.1	110										
			12.6	23.6	72	86.6	119.9	125										
			-	-	-	-	71.2	90										
			12.6	23.6	-	-	83.8	100										
	15	21	-	-	36	43.3	80.4	80										
			12.6	23.6	36	43.3	96.1	100										
			-	-	72	86.6	112.9	125										
			12.6	23.6	72	86.6	128.6	150										
			-	-	-	-	49.8	60										
			12.6	23.6	-	-	62.4	70										
			-	-	36	34.6	54.6	60										
			12.6	23.6	36	34.6	70.3	80										
	575	518	632	16	69	16	69	2	1	2.4	7.5	9	-	-	-	-	49.8	60
													12.6	23.6	-	-	62.4	70
-													-	36	34.6	54.6	60	
12.6													23.6	36	34.6	70.3	80	
-													-	72	69.3	80.5	80	
12.6													23.6	72	69.3	96.3	100	
10											11	-	-	-	-	51.8	60	
												12.6	23.6	-	-	64.4	80	
												-	-	36	34.6	57.1	60	
												12.6	23.6	36	34.6	72.8	80	
												-	-	72	69.3	83.0	80	
												12.6	23.6	72	69.3	98.8	100	
15	17	-	-	-	-	57.8	70											
		12.6	23.6	-	-	70.4	80											
		-	-	36	34.6	64.6	70											
		12.6	23.6	36	34.6	80.3	80											
		-	-	72	69.3	90.5	100											
		12.6	23.6	72	69.3	106.3	110											

UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	NO. 1 RLA	NO. 1 LRA	NO. 2 RLA	NO. 2 LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP
030	208/230	187	254	57	266	44	191	2	1	5.3	10	28	-	-	-	-	157.0 / 154.2	200
													23.6	41.6	-	-	180.6 / 177.8	225
													-	-	29 / 36	75.1 / 86.6	157.0 / 154.2	200
													23.6	41.6	29 / 36	75.1 / 86.6	180.6 / 177.8	200
													-	-	59 / 72	150.1 / 173.2	188.6 / 208.2	200 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	218.1 / 237.7	225
											15	42	-	-	-	-	172.4 / 168.2	225
													23.6	41.6	-	-	196.0 / 191.8	250 / 225
													-	-	29 / 36	75.1 / 86.6	172.4 / 168.2	200
													23.6	41.6	29 / 36	75.1 / 86.6	196.0 / 191.8	200
													-	-	59 / 72	150.1 / 173.2	207.9 / 225.7	225
													23.6	41.6	59 / 72	150.1 / 173.2	237.4 / 255.2	275
											20	54	-	-	-	-	185.6 / 180.2	225
													23.6	41.6	-	-	209.2 / 203.8	250 / 225
													-	-	29 / 36	75.1 / 86.6	185.6 / 180.2	200
													23.6	41.6	29 / 36	75.1 / 86.6	209.2 / 205.3	225
													-	-	59 / 72	150.1 / 173.2	224.4 / 240.7	275
													23.6	41.6	59 / 72	150.1 / 173.2	253.9 / 270.2	300
	460	414	508	26	120	20	86	2	1	2.7	10	14	-	-	-	-	71.3	90
													12.6	23.6	-	-	83.9	100
													-	-	36	43.3	71.6	80
													12.6	23.6	36	43.3	87.4	100
													-	-	72	86.6	104.1	110
													12.6	23.6	72	86.6	119.9	125
											15	21	-	-	-	-	78.3	100
													12.6	23.6	-	-	90.9	110
													-	-	36	43.3	80.4	100
													12.6	23.6	36	43.3	96.1	110
													-	-	72	86.6	112.9	125
													12.6	23.6	72	86.6	128.6	150
											20	27	-	-	-	-	84.3	100
													12.6	23.6	-	-	96.9	110
													-	-	36	43.3	87.9	100
													12.6	23.6	36	43.3	103.6	110
													-	-	72	86.6	120.4	125
													12.6	23.6	72	86.6	136.1	150
	575	518	632	21	96	16	69	2	1	2.4	10	11	-	-	-	-	57.4	70
													12.6	23.6	-	-	70.0	90
													-	-	36	34.6	57.4	70
													12.6	23.6	36	34.6	72.8	80
													-	-	72	69.3	83.0	80
													12.6	23.6	72	69.3	98.8	100
											15	17	-	-	-	-	63.4	80
													12.6	23.6	-	-	76.0	90
													-	-	36	34.6	64.6	70
													12.6	23.6	36	34.6	80.3	80
													-	-	72	69.3	90.5	100
													12.6	23.6	72	69.3	106.3	110
											20	22	-	-	-	-	68.4	80
													12.6	23.6	-	-	81.0	100
													-	-	36	34.6	70.8	80
													12.6	23.6	36	34.6	86.6	100
													-	-	72	69.3	96.8	110
													12.6	23.6	72	69.3	112.5	125

Electrical data - 50EJ,EK,EW,EY024-048 (cont'd)



UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	NO. 1 RLA	NO. 1 LRA	NO. 2 RLA	NO. 2 LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	KW	FLA	MCA	MOCP
034	208/230	187	254	57	266	57	266	2	1	5.3	10	28	-	-	-	-	169.9 / 167.1	225 / 200
													23.6	41.6	-	-	193.5 / 190.7	250 / 225
													-	-	29 / 36	75.1 / 86.6	169.9 / 167.1	200
													23.6	41.6	29 / 36	75.1 / 86.6	193.5 / 190.7	200
											15	42	-	-	59 / 72	150.1 / 173.2	188.6 / 208.2	200 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	218.1 / 237.7	225
													-	-	-	-	185.3 / 181.1	225
													23.6	41.6	-	-	208.9 / 204.7	250
											20	54	-	-	29 / 36	75.1 / 86.6	185.3 / 181.1	200
													23.6	41.6	29 / 36	75.1 / 86.6	208.9 / 204.7	225
													-	-	59 / 72	150.1 / 173.2	207.9 / 225.7	225
													23.6	41.6	59 / 72	150.1 / 173.2	237.4 / 255.2	275
034	460	414	508	26	120	26	120	2	1	2.7	10	14	-	-	-	-	77.0	100
													12.6	23.6	-	-	89.6	110
													-	-	36	43.3	77.0	100
													12.6	23.6	36	43.3	89.6	110
											15	21	-	-	72	86.6	104.1	110
													12.6	23.6	72	86.6	119.9	125
													-	-	-	-	84.0	100
													12.6	23.6	-	-	96.6	110
											20	27	-	-	36	43.3	84.0	100
													12.6	23.6	36	43.3	96.6	110
													-	-	72	86.6	112.9	125
													12.6	23.6	72	86.6	128.6	150
034	575	518	632	21	96	21	96	2	1	2.4	10	11	-	-	-	-	61.9	80
													12.6	23.6	-	-	74.5	90
													-	-	36	34.6	61.9	70
													12.6	23.6	36	34.6	74.5	80
											15	17	-	-	72	69.3	83.0	80
													12.6	23.6	72	69.3	98.8	100
													-	-	-	-	67.9	80
													12.6	23.6	-	-	80.5	100
											20	22	-	-	36	34.6	67.9	70
													12.6	23.6	36	34.6	80.5	100
													-	-	72	69.3	90.5	100
													12.6	23.6	72	69.3	106.3	110
034	575	518	632	21	96	21	96	2	1	2.4	10	11	-	-	-	-	72.9	90
													12.6	23.6	-	-	85.5	100
													-	-	36	34.6	72.9	80
													12.6	23.6	36	34.6	86.6	100
											15	17	-	-	72	69.3	96.8	110
													12.6	23.6	72	69.3	112.5	125
													-	-	-	-	-	-
													12.6	23.6	-	-	-	-
											20	22	-	-	36	34.6	-	-
													12.6	23.6	36	34.6	-	-
													-	-	72	69.3	-	-
													12.6	23.6	72	69.3	-	-

UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP
038	208/230	187	254	57	266	57	266	4	1	5.3	10	28	-	-	-	-	180.5 / 177.7	225
													23.6	41.6	-	-	204.1 / 201.3	250
													-	-	29 / 36	75.1 / 86.6	180.5 / 177.7	200
													23.6	41.6	29 / 36	75.1 / 86.6	204.1 / 201.3	225
											15	42	-	-	59 / 72	150.1 / 173.2	188.6 / 208.2	200 / 225
													23.6	41.6	59 / 72	150.1 / 173.2	218.1 / 237.7	225
													-	-	-	-	195.9 / 191.7	250 / 225
													23.6	41.6	-	-	219.5 / 215.3	275 / 250
											20	54	-	-	29 / 36	75.1 / 86.6	195.9 / 191.7	200
													23.6	41.6	29 / 36	75.1 / 86.6	219.5 / 215.3	275 / 225
													-	-	59 / 72	150.1 / 173.2	207.9 / 225.7	225
													23.6	41.6	59 / 72	150.1 / 173.2	237.4 / 255.2	275
038	460	414	508	26	120	26	120	4	1	2.7	10	14	-	-	-	-	82.4	100
													12.6	23.6	-	-	95.0	110
													-	-	36	43.3	82.4	100
													12.6	23.6	36	43.3	95.0	110
											15	21	-	-	72	86.6	104.1	110
													12.6	23.6	72	86.6	119.9	125
													-	-	-	-	89.4	110
													12.6	23.6	-	-	102.0	125
											20	27	-	-	36	43.3	89.4	110
													12.6	23.6	36	43.3	102.0	125
													-	-	72	86.6	112.9	125
													12.6	23.6	72	86.6	128.6	150
038	575	518	632	21	96	21	96	4	1	2.4	10	11	-	-	-	-	66.7	80
													12.6	23.6	-	-	79.3	90
													-	-	36	34.6	66.7	70
													12.6	23.6	36	34.6	79.3	80
											15	17	-	-	72	69.3	83.0	80
													12.6	23.6	72	69.3	98.8	100
													-	-	-	-	72.7	90
													12.6	23.6	-	-	85.3	100
											20	22	-	-	36	34.6	72.7	80
													12.6	23.6	36	34.6	85.3	100
													-	-	72	69.3	90.5	100
													12.6	23.6	72	69.3	106.3	110
038	575	518	632	21	96	21	96	4	1	2.4	20	22	-	-	-	-	77.7	90
													12.6	23.6	-	-	90.3	110
													-	-	36	34.6	77.7	80
													12.6	23.6	36	34.6	90.3	110
											20	22	-	-	72	69.3	96.8	110
													12.6	23.6	72	69.3	112.5	125

Electrical data - 50EJ,EK,EW,EY024-048 (cont'd)



UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP
044	208/230	187	254	69	345	69	345	4	1	5 3	15	42	-	-	-	-	223.1 / 218.9	275
													23.6	41 6	-	-	246.7 / 242.5	300
													-	-	29 / 36	75 1 / 86 6	223.1 / 218.9	275
													23.6	41 6	29 / 36	75 1 / 86 6	246.7 / 242.5	300
													-	-	59 / 72	150 1 / 173 2	223.1 / 225.7	275
													23.6	41 6	59 / 72	150 1 / 173 2	246.7 / 255.2	300
											20	54	-	-	-	-	236.3 / 230.9	300
													23.6	41 6	-	-	259.9 / 254.5	300
													-	-	29 / 36	75 1 / 86 6	236.3 / 230.9	300
													23.6	41 6	29 / 36	75.1 / 86.6	259.9 / 254.5	300
													-	-	59 / 72	150 1 / 173 2	236.3 / 240.7	300
													23 6	41 6	59 / 72	150 1 / 173 2	259.9 / 270.2	300
											25	68	-	-	-	-	251.7 / 244.9	300
													23 6	41 6	-	-	275.3 / 268.5	300
													-	-	29 / 36	75 1 / 86.6	251.7 / 244.9	300
													23.6	41 6	29 / 36	75 1 / 86 6	275.3 / 268.5	300
													-	-	59 / 72	150 1 / 173 2	251.7 / 258.2	300
													23 6	41 6	59 / 72	150 1 / 173 2	275.3 / 287.7	300
	460	414	508	35	173	35	173	4	1	2 7	15	21	-	-	-	-	109.7	125
													12.6	23.6	-	-	122.3	150
													-	-	36	43 3	109.7	125
													12.6	23.6	36	43 3	122.3	150
													-	-	72	86.6	112.9	125
													12.6	23 6	72	86 6	128.6	150
											20	27	-	-	-	-	115.7	150
													12.6	23 6	-	-	128.3	150
													-	-	36	43 3	115.7	150
													12 6	23.6	36	43 3	128.3	150
													-	-	72	86 6	120.4	150
													12 6	23 6	72	86 6	136.1	150
											25	34	-	-	-	-	122.7	150
													12 6	23.6	-	-	135.3	150
													-	-	36	43 3	122.7	150
													12 6	23.6	36	43 3	135.3	150
													-	-	72	86 6	129.1	150
													12 6	23 6	72	86 6	144.9	175
	575	518	632	29	120	29	120	4	1	2 4	15	17	-	-	-	-	91.4	110
													12 6	23 6	-	-	104.0	125
													-	-	36	34 6	91.4	110
													12 6	23 6	36	34 6	104.0	125
													-	-	72	69 3	91.4	110
													12 6	23 6	72	69 3	106.3	125
											20	22	-	-	-	-	96.4	125
													12 6	23.6	-	-	109 0	125
													-	-	36	34 6	96.4	125
													12 6	23.6	36	34 6	109.0	125
													-	-	72	69 3	96 8	125
													12 6	23 6	72	69 3	112 5	125
											25	27	-	-	-	-	101.4	125
													12 6	23 6	-	-	114.0	125
													-	-	36	34 6	101.4	125
													12 6	23 6	36	34 6	114.0	125
													-	-	72	69 3	103 0	125
													12.6	23.6	72	69.3	118.8	125

UNIT SIZE	NOMINAL VOLTAGE (3 PH 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP
048	208/230	187	254	90	446	69	345	4	1	5 3	20	54	-	-	-	-	261.9 / 256.5	300
													23 6	41.6	-	-	285.5 / 280.1	300
													-	-	29 / 36	75 1 / 86 6	261.9 / 256.5	300
													23 6	41 6	29 / 36	75 1 / 86 6	285.5 / 280.1	300
													-	-	59 / 72	150 1 / 173 2	261.9 / 256.5	300
													23 6	41 6	59 / 72	150 1 / 173 2	285.5 / 280.1	300
											25	68	-	-	-	-	277.3 / 270.5	300
													23 6	41 6	-	-	300.9 / 294.1	300
													-	-	29 / 36	75 1 / 86 6	277.3 / 270.5	300
													23 6	41.6	29 / 36	75.1 / 86 6	300.9 / 294.1	300
													-	-	59 / 72	150 1 / 173.2	277.3 / 270.5	300
													23.6	41.6	59 / 72	150.1 / 173.2	300.9 / 294.1	300
											30	80	-	-	-	-	290.5 / 282.5	300
													23 6	41 6	-	-	314.1 / 306.1	300
													-	-	29 / 36	75 1 / 86 6	290.5 / 282.5	300
													23 6	41 6	29 / 36	75 1 / 86.6	314.1 / 306.1	300
													-	-	59 / 72	150 1 / 173 2	290.5 / 282.5	300
													23 6	41 6	59 / 72	150 1 / 173 2	314.1 / 306.1	300
	460	414	508	45	223	35	173	4	1	2 7	20	27	-	-	-	-	128.5	150
													12.6	23.6	-	-	141.1	175
													-	-	36	43 3	128.5	150
													12 6	23 6	36	43 3	141.1	175
													-	-	72	86 6	128.5	150
													12 6	23 6	72	86 6	141.1	175
											25	34	-	-	-	-	135.5	175
													12.6	23.6	-	-	148.1	175
													-	-	36	43 3	135.5	175
													12 6	23 6	36	43 3	148.1	175
													-	-	72	86 6	135.5	175
													12 6	23 6	72	86 6	148.1	175
											30	40	-	-	-	-	141.5	175
													12 6	23 6	-	-	154.1	175
													-	-	36	43 3	141.5	175
													12 6	23 6	36	43 3	154.1	175
													-	-	72	86 6	141.5	175
													12 6	23 6	72	86.6	154.1	175
	575	518	632	37	164	29	120	4	1	2 4	20	22	-	-	-	-	106.0	125
													12.6	23 6	-	-	118 6	150
													-	-	36	34 6	106.0	125
													12 6	23 6	36	34 6	118.6	150
													-	-	72	69 3	106 0	125
													12 6	23 6	72	69 3	118.6	150
											25	27	-	-	-	-	111.0	125
													12 6	23 6	-	-	123 6	150
													-	-	36	34 6	111.0	125
													12.6	23 6	36	34.6	123.6	150
													-	-	72	69 3	111.0	125
													12.6	23 6	72	69 3	123.6	150
											30	32	-	-	-	-	116.0	150
													12 6	23 6	-	-	128.6	150
													-	-	36	34 6	116.0	150
													12 6	23 6	36	34 6	128.6	150
													-	-	72	69 3	116.0	150
													12.6	23.6	72	69.3	128.6	150

Controls



Operating sequence

Cooling, constant volume units with wall thermostat

— When the room thermostat calls for cooling, the supply-air temperature (SAT) is above 65°F, and the SAT and the outside-air temperature (OAT) are not in alarm, compressor contactor no. 1 is energized. Then compressor no. 1 and outdoor (condenser) fan motor (OFM) no. 1 and 2 (1, 2, 3, and 4 on sizes 038 - 048) are started. The indoor (evaporator) fan motor (IFM) is then energized, and the economizer damper moves to the minimum position. Note that on 024 - 034 units, OFM 2 cycles on outdoor air temperature. The fan motor is energized at 65°F and deenergized at 55°F. On 038 - 048 units, OFM 3 and 4 are cycled on outdoor temperature in a similar manner.

Upon a further call for cooling, compressor contactor no. 2 will be energized, starting compressor no. 2.

After the thermostat is satisfied, the compressors and OFMs are turned off, and the damper moves to the fully closed position when using an auto fan. If using continuous fan the damper will stay at the minimum position.

When the outdoor-air temperature is below 65°F, and the room thermostat calls for cooling, the economizer dampers move to the minimum position. If the supply-air temperature is above 55°F, the damper continues to open until it reaches the fully open position, or until the supply-air temperature drops below 55°F.

When the supply-air temperature is 55°F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 55°F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 55°F. When the room thermostat is satisfied, the damper will move to the fully closed position when using an auto fan or to the minimum position when using a continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second-stage cooling. When the thermostat calls for second stage cooling compressor no. 1 and condenser fan(s) will be energized and the position of the economizer damper will be determined by the supply-air temperature. If the supply-air temperature is over 55°F for more than 15 minutes, compressor no. 2 is energized.

When the second stage of cooling is satisfied, the last compressor energized, and OFM(s), if appropriate, will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, the remaining compressor (if any) and the IFM shuts off. If the thermostat fan selector switch is in the ON position, the IFM will run continuously and the dampers will remain in the minimum position.

Heating, constant volume units with wall thermostat

48 Series Units — When the thermostat calls for heating, the induced draft motor (IDM) is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. When additional heat is needed, the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied, the flame is extinguished, then after a 45-second delay, the IFM is deenergized. Note that in order to prevent short-cycling, the unit is locked into the Heating mode for a least 1 minute after heating is called for. In addition, the outdoor damper stays open at the minimum position while the IFM is operating.

50 Series Units — When the thermostat calls for heating, the first stage of electric heat is energized. The indoor (evaporator) fan motor (IFM) is energized immediately after the heating element is energized. When additional heating is required, the remaining electric heating elements are energized. When the thermostat is satisfied all stages of heating and the indoor fan are deenergized.

Cooling, constant volume units with space sensor and CCN

— When the IFM is energized and the outside-air temperature sensor is not in alarm, the software controls space temperature by maintaining the supply-air temperature at the value specified by the supply-air temperature set point through cycling the compressors. Both the supply-air temperature and set point temperature are used to adjust the cycling deadband to match the actual load. The control system provides cooling capacity control of up to 2 stages of cooling to maintain occupied space temperature to the occupied or unoccupied set point.

If night time free cooling is enabled via CCN, the indoor fan will be energized and dampers opened to pre-cool the space prior to the system entering the occupied mode in the morning.

Heating, constant volume units with space sensor and CCN (both 48 and 50 series units)

— When the IFM is energized and Night Time Free Cool mode is inactive, the software controls space temperature by maintaining the supply-air temperature at the value specified by the supply-air temperature set point through adding or removing stages of heating. The space temperature, occupied set point, and the supply-air temperature are used to calculate the number of stages required. The control system provides heating capacity control of up to 2 stages of heating to maintain occupied space temperature to the occupied set point.

Cooling, variable volume units — When the internal clock places the unit in the occupied mode, the control goes through an initialization routine. Upon completion of initialization, the control operates to try to maintain the supply-air temperature at the cold temperature set point in the controls memory. The control will always try to use the economizer as the first stage of cooling. Temperature permitting, the control will open the economizer dampers and try to maintain the leaving-air temperature at the cooling set point minus 2°F. If the economizer dampers become fully open and still cannot maintain the desired leaving-air temperature, the control will begin to cycle on compressors and condenser fans. Once mechanical cooling begins, the control strives to maintain the leaving air temperature at the cooling set point rather than at the setpoint minus 2°F.

The control determines how rapidly capacity steps are added or subtracted based on deviation from leaving air set point and rate of change of leaving-air temperature.

If the temperature is such that the economizer cannot be used for cooling, the dampers will go to the minimum position. The control will then use mechanical cooling to meet the cooling load

Heating, morning warm-up, variable volume units (both 48 and 50 series units) — When in the heating mode, room terminals must be wide open.

If the return air temperature is 5°F below the warm-up temperature set point, heating will be energized and will run until the return air temperature is above 2°F below set point. During heating, the economizer dampers will be fully closed. The unit can go in and out of heating until the return air temperature rises above the warm-up temperature set point. After the return air temperature rises above the set point, the unit can not go back into heating mode until the unit enters the occupied mode.

Application data



Ductwork - Secure vertical discharge ductwork to roof curb. Interior installation may proceed before unit is set in place on roof. For horizontal discharge applications, attach ductwork to unit, or field-supplied flanges can be attached to horizontal discharge openings and all ductwork attached to flanges.

Thru-the-curb service connections - Roof curb connections allow field power wires and control wires to enter through the roof curb opening.

Thermostat (CV only) - Use of a thermistor type room sensor is recommended on all CCN installations. A thermistor type room sensor or a 2-stage cooling thermostat may be used for all other units.

Heating-to-cooling changeover - All units are automatic changeover from heating to cooling when automatic changeover thermostat and subbase or a thermistor type room sensor are used.

Airflow - Units are draw-thru on cooling and blow-thru on heating.

Maximum airflow - To minimize the possibility of condensate blow-off from evaporator, airflow through units should not exceed 500 cfm/ton.

Minimum airflow - The minimum airflow for cooling is 300 cfm/ton. Refer to Heating Capacities and Efficiencies table on page 9 for minimum airflow cfm for heating.

Minimum ambient cooling operation temperature -

All units equipped with factory economizers to allow free cooling at any outdoor ambient. If mechanical cooling is required, the units are designed to operate at outdoor temperatures down to 35°F. With accessory Motormaster® III control units can operate at outdoor temperatures down to -20°F.

Maximum operating outdoor-air temperature - The maximum operating outdoor-air temperature is 115°F. Some models will operate up to 125°F depending model and operating conditions.

High altitude - A change to the gas orifice may be required at high altitudes. Refer to Altitude Compensation table on page 10.

Minimum temperature - Air entering the heat exchanger in heating must be a minimum of 50°F.

Internal unit design - Due to Carrier's internal unit design (draw-thru over the motor), air path, and specially designed motors, the full horsepower listed in the Physical Data table and motor limitations table can be utilized with extreme confidence.

Using Carrier motors with the values listed in the Physical Data and Motor Limitations tables *will not* result in nuisance tripping or premature motor failure. The unit warranty will not be affected.

Guide specifications - 48/50EJ,EW constant volume units



Packaged Rooftop Cooling Unit and Packaged Rooftop Cooling Unit With Gas Heat - Constant Volume Application

HVAC Guide Specifications - Section 48/50EJ,EW

Size Range: **20 to 45 Tons, Nominal**

Carrier Model Number: **48EJ, 48EW, 50EJ, 50EW**

Part I - General

1.01 SYSTEM DESCRIPTION

- A. Outdoor roof curb mounted, electronically controlled heating and cooling unit utilizing semi-hermetic reciprocating type compressors for cooling duty and gas or electric heat for heating duty. Units shall discharge supply air vertically or horizontally as shown on contract drawings.

1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standard 360 and designed in accordance with UL Standard 1995.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15 (latest edition) and NEC.
- C. Unit shall be tested and certified by ETL in accordance with ANSI Z21.47 Standards as a total package
- D. Roof curb shall be NRCA approved.
- E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- F. Unit shall be manufactured in a facility registered to the ISO 9002 manufacturing quality standard.

1.03 DELIVERY, STORAGE AND HANDLING

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

Part 2 - Products

2.01 EQUIPMENT

- A. Factory-assembled, single piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, refrigerant charge (R-22), operating oil charge, dual refrigerant circuits, microprocessor based control system and associated hardware, and all special features required prior to field start-up.
- B. Unit Cabinet:
 - 1. Constructed of galvanized steel, bonderized and coated with a baked enamel finish.
 - 2. Unit casing shall be capable of withstanding Federal test method Standard No. 141 (Method 6061) 500-hour salt spray test.
 - 3. Sides shall have man size insulated hinged access doors for easy access to the control box and other areas requiring servicing. Each door shall seal against a rubber gasket to prevent air and water leakage and be equipped to permit ease and safety during servicing

- 4. Interior cabinet surfaces shall be sheet metal lined or insulated with flexible fire-retardant material, coated on the air side and containing an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM standards G21 and 22.
- 5. Unit shall have a factory-installed condensate drain connection and an aluminized steel, sloped condensate drain pan to prevent standing water from accumulating.
- 6. Equipped with lifting lugs to facilitate overhead rigging.
- 7. Filters shall be accessible through an access panel without requiring any special tools.

C Fans:

1. Indoor Evaporator Fans:

- a. Double-width, double-inlet, centrifugal belt driven forward-curved type with single outlet discharge.
- b. Fan shaft bearings shall be of the pillow-block type with positive locking collar and lubrication provisions.
- c. Statically and dynamically balanced.
- d. Evaporator fan shaft bearings shall have a life of 200,000 hours at design operating conditions in accordance with ANSI B3.15.
- e. Solid fan shaft construction.

2. Condenser Fans:

- a. Direct-driven propeller type only, with corrosion-resistant blades riveted to corrosion-resistant steel supports.
- b. Discharge air vertically upward and protected by PVC coated steel wire safety guards.
- c. Statically and dynamically balanced
- d. Fans which are staged to control head pressure are equipped with a clutch to prevent windmilling and the associated bearing wear.

D. Compressors:

- 1 Reciprocating, semi-hermetic type only and located for easy servicing
- 2. Mounted on spring vibration isolators with an isolation efficiency of no less than 95%
- 3. Each equipped with an automatically reversible oil pump, operating oil charge, insert-type crankcase heater to prevent refrigerant migration to the compressor, and suction and discharge service valves.
- 4. Maximum operating speed of 1800 rpm (30 rps).
- 5. Each on independent refrigerant and electrical circuits.

E Coils:

1 Evaporator Coil:

- a. Intertwined circuited, constructed of aluminum fins mechanically bonded to seamless copper tubes.
- b. Full face active type during full load and part load conditions.

Guide specifications - 48/50EJ,EW constant volume units (cont'd)



- c. Coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).
- 2. Condenser Coil:
 - a. Constructed of aluminum fins mechanically bonded to seamless copper tubes.
 - b. Air-cooled condenser coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).
- 3. All coils shall be same manufacturer as unit.
- F. Heating Section:
 - Electric Heat:

Electric resistance heaters shall be factory-installed, open wire, nichrome element type, insulated with ceramic bushings, and include operating and safety controls.
 - Gas Heat:
 - 1. Induced-draft combustion type with energy saving direct spark ignition systems and redundant main gas valves.
 - 2. The heat exchanger shall be of the tubular section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
 - 3. Burners shall be of the in-shot type constructed of aluminum coated steel.
 - 4. All gas piping shall enter the unit cabinet at a single location.
 - 5. Induced Draft Fans:
 - a. Direct-driven, single inlet, forward-curved centrifugal type.
 - b. Statically and dynamically balanced.
 - c. Made from steel with a corrosion-resistant finish and dynamically balanced.
- G. Refrigerant Components:

Unit shall be equipped with dual refrigerant circuits each containing:

 - 1. Liquid line service valve.
 - 2. Solid core filter drier.
 - 3. Thermostatic expansion valve.
 - 4. Fusible plug.
- H. Filter Section:

Filter section shall consist of 2-in thick, disposable fiberglass filters of commercially available sizes.
- I. Controls and Safeties:
 - 1. Controls:
 - a. Unit shall be complete with self-contained, demand-oriented microprocessor based, solid-state control system.
 - b. Unit shall be compatible with either a room sensor or room thermostat with no accessory interface required.
 - c. Unit staging shall be minimum 2-cool, 2-heat.
 - d. Unit shall perform in response to a variable space temperature signal. Control system shall determine control sequences through monitoring the following operational variables:
 - 1) Evaporator leaving air temperature.
 - 2) Economizer position.
 - 3) Minimum economizer set point.
 - 4) Morning warm-up set point.
 - 5) Outdoor air temperature.
 - e. In the event of a power failure, unit control system shall sequence the unit to re-start beginning with the first stage of cooling or heating.
 - f. Thermostats shall be of the dual set point type for heating and cooling.
 - g. Set points must have adjustable deadband between heat and cool.
 - h. Unit shall be capable of performing night time free cooling.
 - i. Control boards shall be equipped with flashing LED(s) for diagnostics
 - j. With gas heat, upon flame failure a new ignition sequence must start (rather than locking out heat).
 - k. Minimum heat on-time of 1 minute.
- 2. Safeties:

Unit components shall be equipped with the following protections:

 - a. Compressors:
 - 1) Overtemperature (shuts down individual compressor).
 - 2) Overcurrent (shuts down individual compressor).
 - 3) Crankcase heaters
 - 4) High-pressure switch (shuts down individual compressor, automatic reset type).
 - 5) Low-pressure switch (shuts down individual compressor, automatic reset type).
 - 6) Compressor shall be prevented from restarting for a minimum of 5 minutes after shut-down. Compressor shall run a minimum of 10 seconds after starting.
 - b. Heating Section:
 - Gas Heat:
 - 1) High-temperature limit switch.
 - 2) Redundant dual-stage gas valve.
 - 3) Flame rollout switches.
 - 4) Flame proving controls.
 - 5) Speed sensor on each induced draft fan motor
 - Electric Heat:
 - 1) Automatic reset high-temperature limit switches.
 - 2) Heat limiters (fusible links)
 - 3) Overcurrent protection short-circuit fuses.
 - 4) Branch circuit protection.

J. Operating Characteristics:

1. Unit shall be capable of starting and running at 115 F ambient outdoor temperature per maximum load criteria of ARI Standard 360.
2. Unit shall be capable of mechanical cooling operation down to 35 F ambient outdoor temperature.
3. Provides multi-stage mechanical cooling capability.
4. Unit provided with fan time delay to prevent cold starts.

K. Motors:

1. Compressor motors shall be cooled by suction gas passing over motor windings and shall have line break thermal and current overload protection.
2. Condenser-fan motors shall be totally enclosed, 3-phase type with permanently lubricated ball bearings and internal, automatic-reset thermal overload protection.
3. Indoor blower motor shall be of the 3-phase ball bearing type.
4. Induced-draft motor shall be of the permanently lubricated sealed bearing type with inherent automatic reset thermal overload protection.

L. Electrical Requirements:

All unit power wiring shall enter unit cabinet at a single location.

M. Integrated Economizer:

Consists of gear driven dampers, direct drive motor in conjunction with microprocessor control system to provide primary cooling using outdoor air, temperature permitting, supplemented with mechanical cooling when necessary.

1. Dampers shall be low leakage type, not to exceed 20 CFM per sq. ft. leakage at 1 in. water gage pressure differential when fully closed.
2. Motor shall have a spring return feature which shuts dampers upon a power interruption or unit shutdown.
3. Equipped with solid-state control that sets the economizer cut-in point at an economical level.
4. Capable of introducing up to 100% outdoor air.

N. Space Temperature Control

1. Two-Stage Thermostat with Integral Sensor:

- a. Thermostat shall be capable of automatic heating and cooling changeover without system switches.
- b. Each thermostat or transmitter shall provide the following features:
 - 1) Separate locking heating and cooling set point adjustments concealed under a locking cover
 - 2) An adjustable (3 to 30 F) deadband between heating and cooling set points.
 - 3) Two LED's concealed under locking cover to provide remote checkout of control system.
 - 4) Load reactive time delays to ensure stable system performance.

2. Thermistor Type Room Sensor

- a. Sensor shall be capable of setback override.
- b. Set point adjustment may be made at sensor.
- c. Allows access to CCN.

O. Special Features:

Certain standard features are not applicable when the features designated * are specified. For assistance in amending the specifications, your local Carrier Sales Office should be contacted.

*1. Optional Condenser Coil Materials:

- a. Unit shall be factory equipped with a condenser coil made from copper tubes and copper fins.
- b. Unit shall be factory equipped with a condenser coil made from corrosion resistant pre-coated aluminum fins.

*2. Roof Curb:

Formed 14-gage galvanized steel with wood nailer strip. Supports full perimeter of unit.

*3. Subbase Control:

- a. Subbase shall be used in conjunction with thermostat or transmitter.
- b. Subbase shall provide manual cool-auto-heat-off system switching from an accessible location.

*4. Constant Volume Power Exhaust:

Package shall include up to 4 double-width, double inlet direct drive, forward-curved power exhaust fans with non-modulating dampers at the discharge.

- 1) Fans shall be statically and dynamically balanced.
- 2) Exhaust hood and eliminators shall prevent objects from entering unit through the relief dampers.

*5. Non-Modulating to Modulating Power Exhaust Conversion Package:

Package shall include modulating devices to maintain a field adjustable interior space pressure set point.

6. Barometric Relief Damper Package:

- a. Package shall relieve excess internal pressure and consist of damper assembly, hoods, damper screen, seal strip, and required hardware.
- b. Damper assembly shall close due to gravity upon unit shutoff.
- c. Unit mounted on vertical supply/return units only; can be duct mounted on horizontal applications.

7. Motormaster® Head Pressure Control:

Package shall consist of an accessory outdoor-air package and a solid-state control with condenser coil temperature sensor capable of modulating outdoor fan speed to maintain condensing temperature between 90 F and 100 F at outdoor ambient temperature down to -20 F.

Guide specifications - 48/50EJ,EW constant volume units (cont'd)



8. Condenser Coil Hail Guard:
Hood with welded wire grille complete with support retainers and fasteners shall be provided for protection of condensing coil(s).
9. LP Gas Conversion Package:
ETL and ETL, Canada approved package allows unit to be field converted for use with LP (liquid propane) gas.
10. Electric Heat Package:
Shall be fully-assembled for installation. The 208/230-v, 460-v, and 575-v units are designed in accordance with UL standards and all units feature a single point connection.
- *11. Space Temperature Sensor:
This space temperature sensor (for CV applications) shall determine the actual temperature in the conditioned space.
- *12. Space Temperature Sensor with Offset (T56):
This space temperature sensor (for CV applications) shall determine the actual temperature in the conditioned space. In addition, this accessory device shall provide a space temperature offset of $\pm 5^{\circ}\text{F}$.
- *13. Enthalpy Sensor:
 - a. For use with economizer only.
 - b. Capable of measuring temperature of outdoor air and controlling economizer cut-in point at a more economical level.
- *14. Thermostat and Subbase Assembly:
To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.
15. Indoor Air Quality (CO₂) Sensor:
Shall have the ability to provide demand ventilation IAQ control through the economizer with an indoor air quality sensor.
The IAQ sensor shall be available in duct mount, wall mount, and wall mount with LED display of CO₂ in parts per million. The set point shall have adjustment capability.
16. Electronic Expansion Board:
Shall provide the following:
 - a. control of modulating economizer damper to maintain indoor air quality when outdoor conditions are suitable.
 - b. shall provide discrete inputs for fan status, filter status, field applied status, and demand limit.
 - c. shall perform demand limit functions based on the state of the discrete input.
 - d. shall provide an output for the external alarm light indicator
 - e. shall provide smoke control modes including evacuation, smoke purge, pressurization, and shutdown.
 - f. pre-occupancy purge shall be available
17. Pressure Operated Unloader:
Additional steps of unloading can be obtained by the addition of accessory pressure-actuated suction cutoff unloaders.

Guide specifications - 48/50EK,EY variable air volume units



Packaged Rooftop Cooling Unit and Packaged Rooftop Cooling Unit With Gas Heat - Variable Air Volume Application

HVAC Guide Specifications - Section 48/50EK,EY

Size Range: **20 to 40 Tons, Nominal**

Carrier Model Number: **48EK, 48EY, 50EK, 50EY**

Part 1 - General

1.01 SYSTEM DESCRIPTION

- A. Outdoor roof curb mounted, electronically controlled heating and cooling unit utilizing semi-hermetic reciprocating type compressors for cooling duty and gas combustion or electric heaters for heating duty. Units shall discharge supply air horizontally or vertically as shown on contract drawings.

1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standard 360 and designed in accordance with UL Standard 1995.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15 (latest edition) and NEC.
- C. Unit shall be tested and certified by ETL in accordance with ANSI Z21.47 Standards as a total package.
- D. Roof curb shall be NRCA approved.
- E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation. Insulation shall contain an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM standards G21 and 22.
- F. Unit shall be manufactured in a facility registered to the ISO 9002 manufacturing quality standard

1.03 DELIVERY, STORAGE AND HANDLING

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

Part 2 - Products

2.01 EQUIPMENT

- A. Factory-assembled, single piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, refrigerant charge (R-22), operating oil charge, dual refrigerant circuits, microprocessor based control system and associated hardware, and all special features required prior to field start-up
- B. Unit Cabinet:
 - 1. Constructed of galvanized steel, bonderized and coated with a baked enamel finish.
 - 2. Unit casing shall be capable of withstanding Federal test method Standard No. 141 (Method 6061) 500-hour salt spray test.
 - 3. Sides shall have man size insulated hinged access doors for easy access to the control box and other areas requiring servicing. Each door shall seal against a rubber gasket to prevent air and water leakage.

- 4. Interior cabinet surfaces shall be sheet metal lined or insulated with flexible fire-retardant material, coated on the air side and containing an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM standards G21 and 22.

- 5. Unit shall have a factory-installed condensate drain connection and an aluminized steel, sloped condensate drain pan to prevent standing water from accumulating.

- 6. Equipped with lifting lugs to facilitate overhead rigging.

- 7. Filters shall be accessible through an access panel without requiring any special tools.

C. Fans:

1. Indoor Evaporator Fans:

- a. Double-width, double-inlet, centrifugal belt driven forward-curved type with single outlet discharge.
- b. Fan shaft bearings shall be of the pillow-block type with positive locking collar and lubrication provisions.
- c. Statically and dynamically balanced.
- d. Evaporator fan shaft bearings shall have a life of 200,000 hours at design operating conditions in accordance with ANSI B3.15.
- e. Solid fan shaft construction.
- f. Statically and dynamically balanced.
- g. Evaporator fan shaft bearings shall have a life of 200,000 hours at design operating conditions in accordance with ANSI B3.15.

2. Condenser Fans:

- a. Direct-driven propeller type only, with corrosion-resistant blades riveted to corrosion-resistant steel supports.
- b. Discharge air vertically upward and protected by PVC coated steel wire safety guards.
- c. Statically and dynamically balanced.
- d. Fans which are staged to control head pressure are equipped with a clutch to prevent windmilling and the associated bearing wear.

D. Compressors:

- 1. Reciprocating semi-hermetic type only and shall be located for easy servicing.
- 2. Equipped with suction-cutoff type unloader(s).
- 3. Mounted on spring vibration isolators with an isolation efficiency of no less than 95%
- 4. Each equipped with an automatically reversible oil pump, operating oil charge, insert-type crankcase heater to prevent refrigerant migration to the compressor and suction and discharge service valves.
- 5. Maximum operating speed of 1800 rpm (30 rps).
- 6. Each on independent refrigerant and electrical circuits.

Guide specifications - 48/50EK,EY variable air volume units (cont'd)



E. Coils:

1. Evaporator Coil:

- a. Intertwined circuited, constructed of aluminum fins mechanically bonded to seamless copper tubes.
- b. Full-face active type during full load and part load conditions.
- c. Coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).

2. Condenser Coils:

- a. Constructed of aluminum fins mechanically bonded to seamless copper tubes.
- b. Air-cooled condenser coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).

3. All coils shall be same manufacturer as unit.

F. Heating Section:

Electric Heat:

Electric resistance heaters shall be factory-installed, open wire, nichrome element type, insulated with ceramic bushings, and include operating and safety controls.

Gas Heat:

1. Induced-draft combustion type with energy saving direct spark ignition systems and redundant main gas valves.
2. The heat exchanger shall be of the tubular section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
3. Burners shall be of the in-shot type constructed of aluminum coated steel.
4. All gas piping shall enter the unit cabinet at a single location
5. Induced Draft Fans:
 - a. Direct-driven, single inlet, forward-curved centrifugal type.
 - b. Statically and dynamically balanced.
 - c. Made from steel with a corrosion-resistant finish and dynamically balanced.

G. Refrigerant Components:

Unit shall be equipped with dual refrigerant circuits each containing:

1. Liquid line service valve.
2. Solid core filter drier.
3. Thermostatic expansion valve.
4. Fusible plug.

H. Filter Section:

Filter section shall consist of 2-in. thick, disposable fiberglass filters of commercially available sizes.

I. Controls, Safeties and Diagnostics:

1. Controls:

- a. Control shall be accomplished through the use of a factory-installed, microprocessor based control system and associated electronic and electrical hardware. Control system shall determine control sequences through monitoring the following operational variables:
 - 1) Evaporator leaving air temperature.
 - 2) Evaporator entering air temperature
 - 3) Economizer position.
 - 4) Minimum economizer set point.
 - 5) Morning warm-up set point.
 - 6) Outdoor air temperature.
- b. Controls shall be capable of performing the following functions:
 - 1) Capacity control based on discharge air temperature and compensated by rate of change of return air temperature. Capacity control shall be accomplished through the use of an unloading device and compressor staging.
 - 2) Perform a quick test to check the status of all input and output signals to the control system.
 - 3) Control of integrated economizer operation.
 - 4) Capable of single-step demand limit control.
 - 5) Condenser fan cycling to maintain correct head pressure.
 - 6) Morning warm-up.
 - 7) Remote monitoring and set point adjustments.
 - 8) In the event of a power failure, unit control system shall sequence the unit to re-start beginning with the first stage of cooling or heating.
 - 9) Night time free cooling.
 - 10) Control boards shall be equipped with flashing LED(s) for diagnostics.
 - 11) With gas heat, upon flame failure a new ignition sequence must start (rather than locking out heat).
 - 12) Minimum heat on-time of 1 minute.

2. Safeties:

Unit components shall be equipped with the following protections:

a. Compressors:

- 1) Overtemperature (shuts down individual compressor).
- 2) Overcurrent (shuts down individual compressor).
- 3) Crankcase heaters.
- 4) High-pressure switch (shuts down individual compressor, automatic reset type).
- 5) Low-pressure switch (shuts down individual compressor, automatic reset type).
- 6) Compressor shall be prevented from restarting for a minimum of 5 minutes after shut-down. Compressor must run for at least 10 seconds after start-up.

b. Heating Section:

Gas Heat:

- 1) High-temperature limit switch.
- 2) Redundant dual-stage gas valve
- 3) Flame rollout switches.
- 4) Flame proving controls.
- 5) Speed sensor on each induced draft fan motor.

Electric Heat:

- 1) Automatic reset high-temperature limit switches.
- 2) Heat limiters (fusible links)
- 3) Overcurrent protection short-circuit fuses.
- 4) Branch circuit protection.

3. Diagnostics:

- a. Diagnostic display via the Carrier Comfort Network (CCN) shall be capable of indicating a safety lockout condition.
- b. Diagnostics must also be capable of displaying outputs of microprocessor controlled run test to verify operation of every thermistor, potentiometer, fan and compressor before unit is started.

J. Operating Characteristics:

1. Unit shall be capable of starting and running at 115 F ambient outdoor temperature per maximum load criteria of ARI Standard 360.
2. Unit shall be capable of mechanical cooling operation down to 35 F ambient outdoor temperature.
3. Provides multi-stage mechanical cooling capability and single-stage morning warm-up heating.
4. Unit provided with fan time delay to prevent cold starts.

K. Motors:

1. Compressor motors shall be cooled by suction gas passing over motor windings and shall have line break thermal and current overload protection.
2. Condenser-fan motors shall be totally enclosed, 3-phase type with permanently lubricated ball bearings and internal, automatic-reset thermal overload protection.
3. Indoor blower motor shall be of the 3-phase ball bearing type.
4. Induced-draft motor shall be of the permanently lubricated sealed bearing type with inherent automatic reset thermal overload protection.

L. Electrical Requirements:

All unit power wiring shall enter unit cabinet at a single location.

M. Integrated Economizer:

Consists of gear driven dampers, direct drive motor in conjunction with microprocessor control system to provide primary cooling using outdoor air, temperature permitting, supplemented with mechanical cooling when necessary.

1. Dampers shall be low leakage type, not to exceed

20 CFM per sq. ft. leakage at 1 in. water gage pressure differential when fully closed.

2. Motor shall have a spring return feature which shuts dampers upon a power interruption or unit shutdown.
3. Equipped with solid-state control that sets the economizer cut-in point at an economical level.
4. Capable of introducing up to 100% outdoor air.

N. Special Features:

Certain standard features are not applicable when the features designated * are specified. For assistance in amending the specifications your local Carrier Sales Office should be contacted.

*1. Optional Condenser Coil Materials:

- a. Unit shall be factory equipped with a condenser coil made from copper tubes and copper fins.
- b. Unit shall be factory equipped with a condenser coil made from corrosion resistant pre-coated aluminum fins.

*2. Roof Curb:

Formed 14-gage galvanized steel with wood nailer strip. Supports full perimeter of unit.

*3. Demand Limit Control:

Package shall allow external demand limit control device to limit the capacity of the unit to a preselected point which is consistent with the stages of unloading on the unit.

*4. 100% Modulating Power Exhaust:

Package shall include up to 4 double-width, double inlet direct drive, forward-curved power exhaust fans staged independently to maintain a field adjustable interior space pressure set point.

- a. Fans shall be statically and dynamically balanced.
- b. Exhaust hood and eliminators shall prevent objects from entering unit through the relief dampers.

5. Barometric Relief Damper Package:

- a. Package shall relieve excess internal pressure and consist of damper assembly, hoods, damper screen, seal strip, and required hardware.
- b. Damper assembly shall close due to gravity upon unit shutoff.
- c. Unit mounted on vertical supply/return units only; can be duct mounted on horizontal applications.

6. Motormaster® Head Pressure Control:

Package shall consist of an accessory outdoor-air package and a solid-state control with condenser coil temperature sensor capable of modulating outdoor fan speed to maintain condensing temperature between 90 F and 100 F at outdoor ambient temperature down to - 20 F.

Guide specifications - 48/50EK,EY variable air volume units (cont'd)



7. Condenser Coil Hail Guard:
Hood with welded wire grille complete with support retainers and fasteners shall be provided for protection of condensing coil.
8. LP Gas Conversion Package:
ETL and ETL, Canada approved package allows unit to be field converted for use with LP gas.
9. Electric Heat Package:
Shall be fully-assembled for installation. The 208/230-v, 460-v, and 575-v units are designed in accordance with UL standards and all units feature a single point connection.
- *10. Space Temperature Sensor:
This space temperature sensor shall determine the actual temperature in the conditioned space.
- *11. Space Temperature Sensor with Offset (T56):
This space temperature sensor shall determine the actual temperature in the conditioned space. In addition, this accessory device shall provide a space temperature offset of $\pm 5^{\circ}\text{F}$.
- *12. Enthalpy Sensor:
 - a. For use with economizer only.
 - b. Capable of measuring temperature of outdoor air and controlling economizer cut-in point at a more economical level.
- *13. Thermostat and Subbase Assembly:
To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.
14. Indoor Air Quality (CO_2) Sensor:
Shall have the ability to provide demand ventilation IAQ control through the economizer with an indoor air quality sensor.
The IAQ sensor shall be available in duct mount, wall mount, and wall mount with LED display of CO_2 in parts per million. The set point shall have adjustment capability.
15. Electronic Expansion Board:
Shall provide the following:
 - a. control of modulating economizer damper to maintain indoor air quality when outdoor conditions are suitable.
 - b. shall provide discrete inputs for fan status, filter status, field applied status, and demand limit.
 - c. shall perform demand limit functions based on the state of the discrete input.
 - d. shall provide an output for the external alarm light indicator.
 - e. shall provide smoke control modes including evacuation, smoke purge, pressurization, and shutdown
 - f. pre-occupancy purge shall be available.