



Precision Environmental Control

*EC Series*

ENGINEERING MANUAL



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**The Ecosaire® Advantage**

All sensitive electronic equipment requires a stable environment for optimum performance. The Ecosaire® Precision Environmental Control system provides the best possible protection for any application.

The Ecosaire® product line is made up of feature-rich, energy efficient premium products that are available in sizes and configurations to suit any application - even corrosive industrial process environments. Ecosaire® contains unique, highly engineered subsystems that no other manufacturer duplicates, ensuring continuous, simultaneous control of temperature, humidity, air purity and air flow at each operating site.

**Ecosaire® Performance**

Ecosaire® performs with the highest energy efficiency through intelligent design: less energy wasted on undesired latent cooling, on-demand dehumidification, and the state-of-the-art Supervisaire® Control System. These new controls offer maximum design flexibility, networkable units, BACNET™, ECHELON™ and MODBUS™ compatibility, remote monitoring from either a graphics display panel, personal computer or via modem, and alarm and event logging.

The Ecosaire® product line offers the maximum in environmental control performance and the lowest life-cycle cost of ownership.

**Dehumidification on Demand**

Stable environmental conditions are further ensured by on-demand dehumidification. This is accomplished by cycling Ecosaire® multiple fans. Unlike conventional computer-grade systems that constantly dehumidify, Ecosaire® eliminates the costly process of removing and then replacing moisture.

**Supervisaire® Controls**

The Supervisaire® Microprocessor Controls provide extremely user-friendly, programmable monitoring and control for all Ecosaire® Precision Environment Control systems. Individual Ecosaire® units can be connected together on a built-in local area network together with a supervisory panel complete with a backlit graphics display for robust redundant environment control. At the same time, the network can be connected to a personal computer supervisory system either directly or via modem, or to a BACNET™, ECHELON™ and MODBUS™ network.

**Site Communications**

Thanks to its multiprotocol software, Ecosaire® systems can be connected directly to various communication standards including BACNET™, ECHELON™ and MODBUS™ and other RS485-based protocols.

The Ecosaire® units can be easily connected to each other with a built-in local area network together with a supervisory panel with a backlit graphics display to facilitate redundant system design, load sharing, remote monitoring and control.

The high capacity of the flash memory and the clock with built-in back-up battery allows the storage of all active alarms, temperature, humidity and other sensor input information as well as status of the controlled devices for very long periods.

The Supervisaire® can be easily and quickly programmed for software customization. The software can be transferred directly from a personal computer with a "plug and play" FLASH memory key, or by using a modem.

The unit mounted backlit LCD panel is large and easy to read (4 x 20 characters) and the simple 6-key layout provides an easy-to-use interface for the operator. English language menus (other languages available) walk the user step-by-step through the monitoring and control of the system, which includes built-in diagnostics.

A powerful 16-bit microprocessor ensures high program execution speed and efficient real time management of even the fastest transients.

**STANDARD FEATURES**

<b>Cabinet and Frame</b>	The cabinet and frame are constructed of heavy-gauge, heliarc-welded, cold-rolled steel. All interior air surfaces as well as access panels are lined with 1/2-inch, 1.5 pound density black-mat-coated fiberglass, providing double insulation for reduced noise levels. Access panels are mounted on liftoff hinges and may be easily removed when necessary. All units are provided with top corner lifting lugs for easy rigging. For installations with restricted clearance through elevators, doors, etc., the unit may be factory or field separated into upper and lower sections. If further clearance is necessary, even the filter frame and door hinges may be easily removed.
<b>Evaporator Coil</b>	The extra-large surface area of the A-frame evaporator coil allows Ecosaire® to provide high sensible cooling with low air velocity and smooth air flow. Each side of the coil is completely independent of the other. Each is fitted with a stainless steel corrosion-free condensate pan. The coil is constructed of copper tubes expanded into aluminum fins.
<b>Filters</b>	Deep-pleated filters rated at 45% efficient by the ASHRAE 52-76 method are standard on all Ecosaire® units. They may be easily replaced from the top of the unit on down flow units or from the front on up flow units.
<b>Dual Refrigeration Circuits</b>	In addition to the dual-circulated evaporator coil, each refrigeration circuit is fitted with its own filter/dryer, sight glass/moisture indicator, liquid-line solenoid valve, adjustable externally-equalized thermal-expansion valve, manual reset high-pressure switch, low-pressure switch, quick-connect refrigeration service valves, high-efficiency heat-pump duty hermetic compressor with crankcase heater, and stainless steel plate condenser on water, glycol and Free-Cool units. Other than the evaporator, all refrigeration components are located out of the air stream for maximum efficiency and to allow analysis while in full operation.
<b>Multiple Independent Fans</b>	System reliability is enhanced with multiple, independent fan assemblies, which maintain up to 70% of the air flow in the event of a fan failure. Multiple fan assemblies also permit automatic air flow reduction for increased dehumidification capacity. All fans are arranged for draw-through air flow and include motors with permanently lubricated ball bearings and inherent overload protection.  Down flow fans are located 23" above the bottom of the unit complying with proper fan-law application for maximum air flow.
<b>Air-Cooled Condensers</b>	Ecosaire® low-profile air-cooled condensers utilize multiple direct-drive propeller fans and dual refrigeration circuits. Standard units are rated at 95°F ambient but may be selected for higher or lower ambients. They are constructed of aluminum with copper tubes and aluminum fins. A factory-wired control panel is provided for field connection. Fan cycling and pressure-actuated fan speed control maintain head pressure of either compressor down to -20°F. Optional flood-back controls are available for either -30°F or -40°F operation.

**Glycol Cooler and Pump**

Ecosaire® low-profile glycol coolers utilize multiple direct-drive propeller fans and are constructed of aluminum body panels with copper tubes and aluminum fans. A factory-wired control box is supplied for field connection. The TEFC NEMA rated pump mounts directly to the glycol-cooler subbase. Pre-wired fan and pump control boxes are provided.

**Free-Cool**

Ecosaire® Free-Cool is a glycol-cooled Ecosaire® system which provides cooling without the use of the refrigeration compressors during cool weather. It is capable of matching the cooling performance of the refrigeration system at outdoor temperatures of 42°F to 47°F (50°F to 55°F entering glycol temperature) depending on the unit selection and room heat load. As in all Ecosaire® systems, Free-Cool provides high sensible cooling capacity at rated room temperatures.

In order to prevent the problems commonly associated with glycol economizer systems, the position and design of the Free-Cool coil has been carefully considered. Traditionally, the economizer coil precooled the air upstream of the evaporator. This lowered the suction pressure, resulting in increased compressor power consumption while reducing the total refrigeration capacity and increasing latent cooling. Hot-gas bypass valves were sometimes necessary to prevent the evaporator from freezing, and larger blower motors were necessary to overcome the resistance of the economizer coil.

The Ecosaire® Free-Cool system eliminates all of these problems with a specially designed, patented dual-circuit Free-Cool coil. Although the Free-Cool system contains all of the standard features found in the glycol-cooled unit, the circuits of each Free-Cool coil have been fully interlaced with the refrigeration circuit. This greatly increases the effective surface area providing increased Free-Cool capacity and dual Free-Cool circuits for staged cooling. Each glycol circuit is controlled by an independent solenoid valve which, in conjunction with the Supervisaire® controls, prevents simultaneous operation of the Free-Cool and refrigeration circuits.

The unique Ecosaire® Free-Cool system has been engineered for total energy savings throughout the year. Unnecessary dehumidification and subsequent rehumidification has been eliminated during the Free-Cool cycle. Compressor EER has been maintained and the need for hot-gas bypass valves eliminated. The integrated coil allows the standard fan motors to provide rated air flow, eliminating the need for increased fan motor horsepower.

**Dual-Cool**

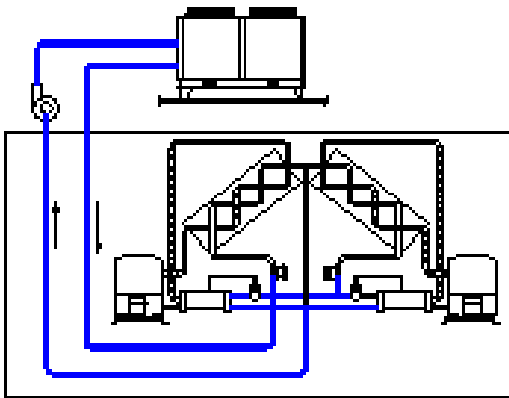
Ecosaire® Dual-Cool is an Ecosaire® system with chilled-water primary cooling and automatic mechanical cooling backup. The mechanical cooling is provided by an air-cooled, water-cooled or glycol-cooled refrigeration system, based on the type that best fits the customer's facilities.

Dual-Cool is ideal for sites where the building chilled-water system has sufficient capacity to handle the computer room, but is not in operation year-round. It allows the user to benefit from the low energy cost of chilled-water cooling, when it is available, but automatically switches to mechanical cooling whenever the built-in thermostat or flow switch senses a loss of chilled water. Dual-Cool automatically returns to chilled-water cooling as soon as the water supply is re-established.

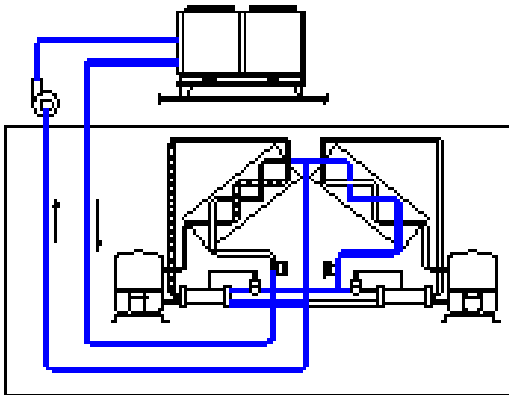
Unlike systems that utilize a separate, smaller coil to provide chilled-water cooling, Dual-Cool utilizes a patented, interlaced Dual-Cool coil with a face area as large as the standard DX coil. Typical of all Ecosaire® products, this enables Dual-Cool to provide 100% sensible cooling at rated room conditions in both the chilled-water and mechanical cooling modes, with less fan-motor power and without constant rehumidification.

In addition to the same quality features described for the standard Ecosaire® product, Dual-Cool includes a three-way proportional chilled-water valve, balanced bypass line, flow switch and water-temperature sensor. All are factory mounted to copper piping for a standard working-pressure rating of 400 psig, ideal for high-rise buildings.

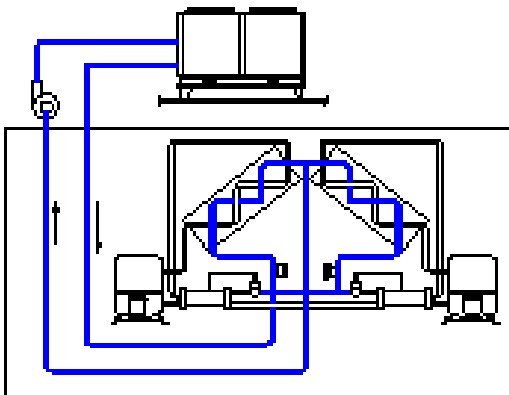
### FREE-COOL SEQUENCE OF OPERATION



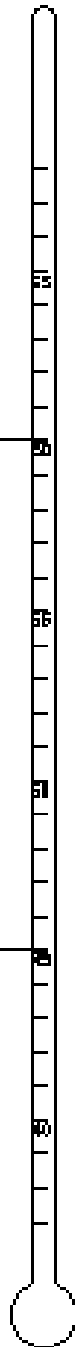
When the outdoor air temperature is above 60°F (70°F entering glycol temperature), the Free-Cool solenoid valves, ESV1 and ESV2, are closed. The compressors cycle with the room load, and the glycol pump is activated whenever either compressor is on. Condensing temperature is maintained by two-way, head-pressure-controlled glycol regulating valves.



At outside temperatures below 60°F, compressors 1 and 2 energize as necessary to meet the room load. Whenever either compressor cycles off, the corresponding Free-Cool solenoid valve opens, allowing glycol to flow through the interlaced coil, extending the compressor "off" cycle. The pump is activated whenever the Supervisaire® senses a room load.



At outside temperatures below 40°F to 45°F (depending on unit selection and room load) the Free-Cool system will match the capacity of the refrigeration system. Both compressors are off, the glycol pump is on, and the glycol solenoid valves respond to room load.



<b>Humitronic Humidifier</b>	<p>The Humitronic steam boiler provides 100% particle-free steam, while operating with greater efficiency and less maintenance than any evaporative, infrared or immersion humidifier. The operating principle is simple: an electric current is passed through water in a non-conductive cylinder, generating heat and boiling water to steam.</p> <p>The Humitronic is designed to operate with cold, hard water, and since the water itself is the heating element, the unit cannot burn out. Water droplets and minerals are contained within the disposable plastic cylinder, eliminating any routine cleaning or maintenance.</p> <p>Output capacity is adjustable from four to twenty pounds per hour. Efficiency remains constant throughout the life of the cylinder. Standard controls include an Auto/Off/Drain Switch and a High Water Level Alarm Light. A built-in strainer is standard.</p>
<b>Electric Reheat</b>	<p>Enclosed finned-tube electric heating elements are standard on Ecosaire® systems and are designed to maintain room dry bulb conditions during dehumidification. Due to the unique Ecosaire® dehumidification cycle, however, reheat is required only if the unit is capable of overcooling the room with one compressor operating. The second-stage compressor is activated only on a call for further cooling.</p>
<b>Hot-Gas Reheat</b>	<p>On down flow water and glycol-cooled systems, a hot-gas heat recovery coil is available. It is capable of maintaining room temperature during the dehumidification cycle and may be selected in lieu of the standard electric reheat coil.</p>
<b>Hot-Water Reheat</b>	<p>Hot-water reheat is available on down flow air, water, glycol and chilled-water systems. The coil is constructed of copper tubes expanded into aluminum fins.</p>
<b>High-Pressure Water-Regulating Valves</b>	<p>For installation of water-cooled units at sites with high water pressure, the unit can be fitted with water-regulating valves rated at 300 psig to match the pressure capabilities of the condensers.</p>
<b>Three-Way Water-Regulating Valves</b>	<p>Water and glycol-cooled units may also be fitted with three-way water-regulating valves where it is necessary to maintain a constant system flow rate.</p>
<b>Smoke Detector / Firestat</b>	<p>A factory-mounted smoke detector and firestat combination is available to shut the system down when either a high return-air temperature or smoke is present.</p>
<b>Firestat</b>	<p>Ecosaire® may be provided with a factory-mounted firestat, which will automatically shut down the system at a preset return-air temperature and activate the alarm system.</p>

<b>Two Disconnect Switch Options</b>	A factory-mounted non-locking or shunt-trip disconnect switch eliminates the need for a field-supplied disconnect. The operating lever protrudes through the safety screen and is accessible when the access door is opened. The shunt trip deactivates the disconnect switch whenever the electrical access panel is removed and can be wired to a remote power conditioner for automatic shutdown.
<b>Underfloor Water Detector</b>	An underfloor water detector is highly recommended with chilled-water, water-cooled or glycol systems. This electronic sensing probe is connected to the Supervisaire® Control and has built-in logic for automatic reset.
<b>Custom Colors</b>	The standard color is light gray, but Ecosaire® can be finished to match any computer hardware on request.
<b>Flood-Back Condensers</b>	Air-cooled installations down to -40°F operation can be provided with flood-back condensers with heated and insulated receivers and head pressure control valve.
<b>High Ambient Condensers</b>	High-ambient air-cooled condensers are constructed of the same high quality materials as the standard condensers and are rated at 105°F ambient.
<b>Condensate Pump</b>	When a drain is not conveniently located, either a factory-installed or field-installed condensate pump is available. The pump is rated at 185 gph at 22 ft. head and is complete with pump, motor, stainless-steel reservoir, and float switch.
<b>Adjustable Floor Stand</b>	An adjustable floor stand, available in heights from 8 to 27 inches, can be used to support the unit's weight or to allow installation prior to the raised floor.
<b>Dual Pumps</b>	Glycol and Free-Cool systems requiring optimum system protection can be supplied with dual full-sized pumps. When the flow switch senses a loss of flow, the controls will automatically start the standby pump and activate a visual and audible alarm on the dual-pump control panel. The control panel includes an alarm silence switch, pump-run-indicator lights, and lead/lag switch.
<b>Extended 4-Year Compressor Warranty</b>	Available for your added protection and security, the extended warranty provides a replacement compressor.

**ECOSAIRE AIR-COOLED DATA****PERFORMANCE DATA****NET CAPACITY DATA Btu/hr**

<b>MODEL</b>	<b>28A</b>	<b>36A</b>	<b>41A</b>	<b>46A</b>	<b>56A</b>	<b>66A</b>	<b>76A</b>	<b>86A</b>
<b>80°F DB / 67°F WB (50% RH)</b>								
Total Capacity	114,400	129,700	147,400	194,700	226,200	266,000	312,000	409,900
Net Sensible Capacity	105,100	101,000	133,500	163,300	191,100	216,000	265,800	298,900
<b>75°F DB / 62.5°F WB (50% RH)</b>								
Total Capacity	103,300	113,900	133,500	174,400	205,900	238,200	284,300	358,100
Net Sensible Capacity	97,700	102,800	128,900	159,600	183,700	212,300	249,100	306,300
<b>72°F DB / 60°F WB (50% RH)</b>								
Total Capacity	97,700	111,200	127,000	167,000	200,300	229,000	275,000	339,600
Net Sensible Capacity	92,200	99,100	119,600	154,000	181,000	210,500	247,300	293,300

**FAN SECTION**

Air Volume – CFM	6,800	6,800	9,750	9,500	12,198	13,398	15,198	15,699
Fan Motor HP	1.5	1.5	3	3	2	3	3	3
External Static - Inches of water	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Quantity of Fans	2	2	2	2	3	3	3	3
RPM	712	744	803	863	762	799	869	844

**COMPRESSOR, SCROLL**

Quantity	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Refrigerant	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22
RPM	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600

**EVAPORATOR COIL, A-FRAME**

Face Area – Sq. Ft.	20.1	20.1	20.1	20.1	31.5	31.5	31.5	31.5
Rows	2	2	2	3	3	3	3	4
Face Velocity – FPM	338.3	338.3	485.1	472.6	387.2	425.3	482.4	493.6
Quantity	2	2	2	2	2	2	2	2

**ELECTRICAL REHEAT, THREE-PHASE**

Type	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube
Capacity – Btu/hr.	51,200	51,200	51,200	51,200	76,800	76,800	76,800	76,800
Capacity – kW	15.0	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Number of Stages	2	2	2	2	2	2	2	2

**HOT WATER REHEAT**

Capacity – BTU/hr.	60,400	60,400	60,400	60,400	104,500	104,500	104,500	104,500
GPM, 180°F EWT	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0
Pressure Drop – Ft. of Water	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

**HOT GAS REHEAT**

Capacity – BTU/hr.	68,000	78,000	94,000	95,000	138,000	142,000	144,000	144,000
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**FILTERS**

Quantity - 45% Eff.	6	6	6	6	10	10	10	10
Size (inches)	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20
Depth (inches)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Filter Surface Area – Sq. Ft.	13.3	13.3	13.3	13.3	22.2	22.2	22.2	22.2

**ECOSAIRE AIR-COOLED DATA**

<b>MODEL</b>	<b>28A</b>	<b>36A</b>	<b>41A</b>	<b>46A</b>	<b>56A</b>	<b>66A</b>	<b>76A</b>	<b>86A</b>
<b>HUMIDIFIER</b>								
Capacity – Lb./hr.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
KW	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
<b>OVERALL UNIT DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Height (inches)	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8
Width (inches)- Down Flow	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Width (inches) - Up Flow	46	46	46	46	46	46	46	46
<b>UP FLOW PLENUM DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	21	21	21	21	21	21	21	21
<b>FLOOR STAND HEIGHT</b>								
Height Limit (inches)	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27
<b>UNIT CONNECTION SIZES</b>								
Liquid Line - ODS (2/unit)	5/8	5/8	5/8	5/8	7/8	7/8	7/8	7/8
Hot Gas Line - ODS (2/unit)	7/8	7/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8
Humidifier – Compression	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Condensate Drain – Hose	1	1	1	1	1	1	1	1
Condensate Pump – SAE Flare	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Hot-Water Reheat FPT Inlet, MPT Outlet	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4
Weight – Approx. Lb.	1690	1690	1720	1750	2100	2100	2100	2100

UE prefix designates down flow.

OE prefix designates up flow.

FE prefix designates up flow with grille.

**AIR-COOLED CONDENSER SELECTION (Model)**

Design Ambient	28A	36A	41A	46A	56A	66A	76A	86A
95 Deg F	CMD12	CMD14	CMD18	CLD23	CLD026	CLD035	CLD040	CLD045
100 Deg F	CMD18	CMD18	CMD23	CLD030	CLD035	CLD040	CLD045	CLD057
105 Deg F	CMD23	CLD026	CLD030	CLD040	CLD045	CLD054	CLD061	CLD075
110 Deg F	CLD035	CLD040	CLD045	CLD057	CLD066	CLD075	CLD099	CLD113

**AIR-COOLED CONDENSER DATA**

95 Deg F	MODEL	CMD12	CMD14	CMD18	CMD23	CLD026	CLD035	CLD040	CLD045
No. of Fans		1 x 2	1 x 2	1 x 3	1 x 3	1 x 2	1 x 3	1 x 2	1 x 3
Circuits		2	2	2	2	2	2	2	2
Motor H.P.		1/2	1/2	1/2	1/2	1	1	1	1
Fan Diameter - Inches		20	20	20	20	30	30	30	30
RPM		1140	1140	1140	1140	825	825	825	825
Direction		Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet OD		7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
Outlet OD		7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8
Weight		532	566	727	789	1091	1460	1490	1609

100 Deg F	MODEL	CMD18	CMD18	CMD23	CLD030	CLD035	CLD040	CLD045	CLD057
No. of Fans		1 x 3	1 x 3	1 x 3	1 x 2	1 x 3	1 x 3	1 x 3	1 x 4
Circuits		2	2	2	2	2	2	2	2
Motor H.P.		1/2	1/2	1/2	1	1	1	1	1
Fan Diameter - Inches		20	20	20	30	30	30	30	30
RPM		1140	1140	1140	825	825	825	825	825
Direction		Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet OD		7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
Outlet OD		7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8
Weight		727	727	789	1159	1460	1490	1609	2019

105 Deg F	MODEL	CMD23	CLD026	CLD030	CLD040	CLD045	CLD054	CLD061	CLD075
No. of Fans		1 x 3	1 x 2	1 x 2	1 x 3	1 x 3	1 x 4	1 x 4	1 x 5
Circuits		2	2	2	2	2	2	2	2
Motor H.P.		1/2	1	1	1	1	1	1	1
Fan Diameter - Inches		20	30	30	30	30	30	30	30
RPM		1140	825	825	825	825	825	825	825
Direction		Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet OD		7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
Outlet OD		7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8
Weight		789	1091	1159	1490	1609	1915	2071	2540

110 Deg F	MODEL	CLD035	CLD040	CLD045	CLD057	CLD066	CLD075	CLD099	CLD113
No. of Fans		1 x 3	1 x 2	1 x 3	1 x 4	1 x 5	1 x 5	2 x 4	2 x 4
Circuits		2	2	2	2	2	2	2	2
Motor H.P.		1	1	1	1	1	1	1	1
Fan Diameter - Inches		30	30	30	30	30	30	30	30
RPM		825	825	825	825	825	825	825	825
Direction		Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet OD		7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
Outlet OD		7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8
Weight		1460	1490	1609	2019	2403	2540	3029	3338

All Air-Cooled Room units shipped with nitrogen holding charge only.  
Consult the factory for technical information on non-standard air-cooled condensers.

**ECOSAIRE WATER-COOLED DATA****PERFORMANCE DATA****NET CAPACITY DATA Btu/hr**

<b>MODEL</b>	<b>28W</b>	<b>36W</b>	<b>41W</b>	<b>46W</b>	<b>56W</b>	<b>66W</b>	<b>76W</b>	<b>86W</b>
<b>80°F DB / 67°F WB (50% RH)</b>								
Total Capacity	121,800	136,100	154,800	204,000	241,000	280,800	336,100	430,200
Net Sensible Capacity	107,000	104,700	136,300	167,000	196,600	223,400	275,000	311,800
<b>75°F DB / 62.5°F WB (50% RH)</b>								
Total Capacity	110,700	121,300	140,000	183,600	222,500	254,900	306,500	380,300
Net Sensible Capacity	100,500	104,700	132,600	163,300	191,100	219,700	265,800	311,800
<b>72°F DB / 60°F WB (50% RH)</b>								
Total Capacity	105,100	115,800	134,400	177,100	209,600	243,800	293,500	367,300
Net Sensible Capacity	95,900	102,800	127,000	158,600	187,400	219,700	256,500	311,800

**FAN SECTION**

Air Volume – CFM	6800	6,800	9,750	9,500	12,198	13,398	15,198	15,699
Fan Motor HP	1.5	1.5	3	3	2	3	3	3
External Static - Inches of water	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Quantity of Fans	2	2	2	2	3	3	3	3
RPM	712	744	803	863	762	799	869	844

**COMPRESSOR, SCROLL**

Quantity	2	2	2	2	2	2	2	2
Refrigerant	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22
RPM	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600

**EVAPORATOR COIL, A-FRAME**

Face Area – Sq. Ft.	20.1	20.1	20.1	20.1	31.5	31.5	31.5	31.5
Rows	2	2	2	3	3	3	3	4
Face Velocity – FPM	338.3	338.3	485.1	472.6	387.2	425.3	482.4	498.3
Quantity	2	2	2	2	2	2	2	2

**ELECTRICAL REHEAT, THREE-PHASE**

Type	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube
Capacity – Btu/hr.	51,200	51,200	51,200	51,200	76,800	76,800	76,800	76,800
Capacity – kW	15.0	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Number of Stages	2	2	2	2	2	2	2	2

**HOT WATER REHEAT**

Capacity – BTU/hr.	60,400	60,400	60,400	60,400	104,500	104,500	104,500	104,500
GPM, 180°F EWT	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0
Pressure Drop – Ft. of Water	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

**HOT GAS REHEAT**

Capacity – BTU/hr.	68,000	78,000	94,000	95,000	138,000	142,000	144,000	144,000
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**FILTERS**

Quantity - 45% Eff.	6	6	6	6	10	10	10	10
Size (inches)	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20
Depth (inches)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Filter Surface Area – Sq. Ft.	13.3	13.3	13.3	13.3	22.2	22.2	22.2	22.2

**HUMIDIFIER**

Capacity – Lb./hr.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
KW	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8

**ECOSAIRE WATER-COOLED DATA**

<b>MODEL</b>	<b>28W</b>	<b>36W</b>	<b>41W</b>	<b>46W</b>	<b>56W</b>	<b>66W</b>	<b>76W</b>	<b>86W</b>	
<b>REFRIGERANT CONDENSERS</b>									
Quantity	2	2	2	2	2	2	2	2	
Type – Cleanable Shell and Tube									
Max. Tube Working Press. - PSI	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	
Max. Tube Temp. - °F	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	
Max. Shell Working Press. - PSI	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	
Maximum Shell Temp. - °F	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	
<b>WATER REGULATING VALVES</b>									
Flow	2/3 Way	2/3 Way	2/3 Way	2/3 Way	2/3 Way	2-Way	2/3 Way	2/3 Way	
Quantity	2	2	2	2	2	2	2	2	
Size (inches)	1	1	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	
<b>GLYCOL-COOLED CONDENSER REQUIREMENTS</b>									
<b>85 Deg F EWT</b>	<b>GPM</b>	28.6	36.3	48.8	55.9	52.8	71.3	72.5	97.9
	Pressure Drop - psig	3.9	7.2	8.7	11.8	8.9	17.3	14.2	26.9
	Pressure Drop (ft. of water)	8.9	16.7	20.0	27.1	20.5	39.7	32.5	61.9
<b>75 Deg F EWT</b>	<b>GPM</b>	16.2	19.8	25.0	40.3	29.4	37.4	41.0	52.4
	Pressure Drop - psig	0.9	1.4	1.7	6.6	2.1	4.1	4.4	8.2
	Pressure Drop (ft. of water)	2.0	3.2	3.9	15.2	4.9	9.3	10.1	18.9
<b>65 Deg F EWT</b>	<b>GPM</b>	11.4	13.7	17.0	25.9	20.6	25.7	28.9	36.2
	Pressure Drop - psig	0.5	0.6	0.8	6.5	1.1	1.7	1.2	2.6
	Pressure Drop (ft. of water)	1.1	1.4	1.9	15.0	2.4	4.0	2.8	6.0
<b>OVERALL UNIT DIMENSIONS</b>									
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4	
Width - Down Flow	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	
Width - Up Flow	46	46	46	46	46	46	46	46	
Height (inches)	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	
<b>UP FLOW PLENUM DIMENSIONS</b>									
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4	
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	
Height (inches)	21	21	21	21	21	21	21	21	
<b>FLOOR STAND HEIGHT</b>									
Height Limit (inches)	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	
<b>CONNECTION SIZES</b>									
Cond. Inlet (1/unit) MPT	1-1/2	1-1/2	2	2	2	2	2	2	
Cond. Outlet (1/unit) MPT	1-1/2	1-1/2	2	2	2	2	2	2	
Humidifier – Compression	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	
Condensate Drain – FPT	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	
Condensate Pump – SAE Flare	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
HW Reheat FPT Inlet, MPT Outlet	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
Weight – Approx. Lb.	1,750	1,775	1,800	1,820	2,250	2,280	2,315	2,440	

\*\*Consult the factory for technical information on non-standard condensers.

300 psi and three-way valve available on request.

UE prefix designates down flow.

OE prefix designates up flow.

FE prefix designates up flow with grille.

**ECOSAIRE GLYCOL-COOLED DATA****PERFORMANCE DATA****NET CAPACITY DATA Btu/hr**

MODEL	28G	36G	41G	46G	56G	66G	76G	86G
<b>80°F DB / 67°F WB (50% RH)</b>								
Total Capacity	114,400	123,200	140,900	185,500	215,100	253,000	302,800	385,800
Net Sensible Capacity	105,100	98,200	131,700	159,600	185,500	212,300	262,100	293,300
<b>75°F DB / 62.5°F WB (50% RH)</b>								
Total Capacity	98,700	108,400	127,000	167,000	198,500	229,000	275,000	339,600
Net Sensible Capacity	95,900	101,000	124,000	155,900	180,000	206,800	247,300	298,900
<b>72°F DB / 60°F WB (50% RH)</b>								
Total Capacity	93,100	104,700	120,600	158,600	189,200	219,700	262,100	326,600
Net Sensible Capacity	90,300	97,300	116,900	150,300	178,100	204,900	238,000	287,800

**FAN SECTION**

Air Volume – CFM	6,800	6,800	9,750	9,500	12,198	13,398	15,198	15,699
Fan Motor HP	1.5	1.5	3	3	2	3	3	3
External Static - Inches of water	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Quantity of Fans	2	2	2	2	3	3	3	3
RPM	712	744	803	863	762	799	869	844

**COMPRESSOR, SCROLL**

Quantity	2	2	2	2	2	2	2	2
Refrigerant	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22
RPM	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600

**EVAPORATOR COIL, A-FRAME**

Face Area – Sq. Ft.	20.1	20.1	20.1	20.1	31.5	31.5	31.5	31.5
Rows	2	2	2	3	3	3	3	4
Face Velocity – FPM	338.3	338.3	485.1	472.6	387.2	425.3	482.4	498.3
Quantity	2	2	2	2	2	2	2	2

**ELECTRICAL REHEAT, THREE-PHASE**

Type	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube
Capacity – Btu/hr.	51,200	51,200	51,200	51,200	76,800	76,800	76,800	76,800
Capacity – kW	15.0	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Number of Stages	2	2	2	2	2	2	2	2

**HOT WATER REHEAT**

Capacity – BTU/hr.	60,400	60,400	60,400	60,400	104,500	104,500	104,500	104,500
GPM, 180°F EWT	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0
Pressure Drop – Ft. of Water	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

**HOT GAS REHEAT**

Capacity – BTU/hr.	68,000	78,000	94,000	95,000	138,000	142,000	144,000	144,000
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**FILTERS**

Quantity - 45% Eff.	6	6	6	6	10	10	10	10
Size (inches)	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20
Depth (inches)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Filter Surface Area – Sq. Ft.	13.3	13.3	13.3	13.3	22.2	22.2	22.2	22.2

**HUMIDIFIER**

Capacity – Lb./hr.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
KW	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8

**ECOSAIRE GLYCOL-COOLED DATA**

<b>MODEL</b>	<b>28G</b>	<b>36G</b>	<b>41G</b>	<b>46G</b>	<b>56G</b>	<b>66G</b>	<b>76G</b>	<b>86G</b>
<b>REFRIGERANT CONDENSERS</b>								
Quantity	2	2	2	2	2	2	2	2
Type – Cleanable Shell and Tube								
Max. Tube Working Press. - PSI	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Max. Tube Temp. - °F	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0
Max. Shell Working Press. - PSI	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Maximum Shell Temp. - °F	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
<b>GLYCOL REGULATING VALVES</b>								
Type	2- Way	2- Way	2- Way	2- Way	2- Way	2- Way	2- Way	2- Way
Quantity	2	2	2	2	2	2	2	2
Size (inches)	1	1	1-1/4	1-1/4	1-1/2	2	2	2
<b>GLYCOL-COOLED CONDENSER REQUIREMENTS</b>								
<b>ROOM UNIT</b>								
<b>95 Deg F Ambient</b>								
GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Pressure Drop - psig	1.7	2.9	2.7	7.2	5.8	3.2	6.6	10.5
Pressure Drop - ft. of water	4.0	6.6	6.2	16.5	13.3	7.4	15.6	24.2
<b>100 Deg F Ambient</b>								
GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Pressure Drop - psig	1.7	2.9	2.7	7.2	5.8	3.2	6.8	10.5
Pressure Drop - ft. of water	4.0	6.6	6.2	16.5	13.3	7.4	15.6	24.2
<b>105 Deg F Ambient</b>								
GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Pressure Drop - psig	1.7	2.9	2.7	7.2	5.8	3.2	6.8	10.5
Pressure Drop - ft. of water	4.0	6.6	6.2	16.5	13.3	7.4	15.6	24.2
<b>110 Deg F Ambient</b>								
GPM	31.5	36.9	45.5	67.2	88.1	117.8	161.7	193.8
Pressure Drop - psig	5.1	6.2	6.6	16.5	16.3	9.7	22.2	29.8
Pressure Drop - ft. of water	11.8	14.3	15.2	38.0	37.5	22.3	51.2	68.4
<b>OVERALL UNIT DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width - Down Flow	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Width - Up Flow	46	46	46	46	46	46	46	46
Height (inches)	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8
<b>UP FLOW PLENUM DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	21	21	21	21	21	21	21	21
<b>FLOOR STAND HEIGHT</b>								
Height Limit (inches)	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27
<b>CONNECTION SIZES</b>								
Cond. Inlet (1/unit) MPT	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2	2
Cond. Outlet (1/unit) MPT	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2	2
Humidifier – Compression	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Condensate Drain – FPT	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Condensate Pump – SAE Flare	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HW Reheat FPT Inlet, MPT Outlet	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Weight – Approx. Lb.	1,750	1,775	1,800	1,820	2,250	2,280	2,315	2,440

**ECOSAIRE GLYCOL-COOLED DATA****OUTDOOR GLYCOL (FLUID) COOLER SELECTION\* (Model)**

Design Ambient	28G	36G	41G	46G	56G	66G	76G	86G
95 Deg F	FMD13-E14	FMD14-E14	FMD20-E14	FLD026-E17	FLD028-E23	FLD035-E26	FLD043-E35	FLD053-E52
100 Deg F	FMD18-E14	FMD20-E14	FMD23-E14	FLD030-E17	FLD040-E26	FLD045-E35	FLD056-F39	FLD070-E70
105 Deg F	FLD026-E13	FLD028-E17	FLD035-E17	FLD045-E23	FLD056-E35	FLD070-E35	FLD085-F39	FLD106-E52
110 Deg F	FLD028-E17	FLD035-E17	FLD040-E17	FLD056-E35	FLD070-E35	FLD085-E46	FLD105-F87	FLD120-E70

**GLYCOL COOLER DATA\*\***

95 DEG F MODEL	FMD13-E14	FMD14-E14	FMD20-E14	FLD026-E17	FLD028-E23	FLD035-E26	FLD043-E35	FLD053-E52
No. of Fans	1 x 2	1 x 2	1 x 3	1 x 2	1 x 2	1 x 3	1 x 3	2 x 2
Circuits	1	1	1	1	1	1	1	2
Motor H.P.	1/2	1/2	1/2	1	1	1	1	1
Fan Dia. - Inches	20	20	20	30	30	30	30	30
RPM	1140	1140	1140	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2-1/2	2
Outlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2-1/2	2
Weight	435	453	593	873	894	1168	1256	1425
Pressure Drop-psig	4.2	4.9	7.5	9.4	8.3	10.5	10.5	5.6
Pressure Drop-Ft. Water	9.7	11.3	17.3	21.7	19.1	24.2	24.2	12.9

**SYSTEM PRESSURE DROP AND FLOW**

GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Total Pressure Drop - psig	5.9	7.8	10.2	16.6	14.1	13.7	17.3	16.1
Total Pressure Drop - Ft. of Water	13.7	17.9	23.5	38.2	32.4	31.6	39.8	37.1

**PUMP DATA\*\*\***

Pump HP	1	1	2	3	3	3	5	5
Pump Head-psig	39.0	32.6	48.7	51.7	50.8	44.3	50.8	49.5
Pump Heat-Ft Water	90.0	75.0	112.0	119.0	117.0	102.0	117.0	114.0
Available Head-psig	33.1	24.8	38.5	35.1	36.7	30.6	33.5	33.4
Available Head-Ft. Water	76.3	57.1	88.5	80.8	84.6	70.4	77.2	76.9

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	7.7	7.7	8.5	10.5	14.1	15.8	20.8	21.1
Expansion Tank****	1	1	1	2	2	2	2	2

100 DEG F MODEL	FMD18-E14	FMD20-E14	FMD23-E14	FLD030-E17	FLD040-E26	FLD045-E35	FLD056-E39	FLD070-E70
No. of Fans	1 x 3	1 x 3	1 x 3	1 x 2	1 x 3	1 x 3	2 x 2	1 x 5
Circuits	1	1	1	1	1	1	1	1
Motor H.P.	1/2	1/2	1/2	1	1	1	1	1
Fan Dia. - Inches	20	20	20	30	30	30	30	30
RPM	1140	1140	1140	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2	2-1/2
Outlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2	2-1/2
Weight	582	593	631	927	1192	1287	1506	1980
Pressure Drop-psig	4.4	5.2	9.7	12.4	6.5	6.2	9.0	4.0
Pressure Drop-Ft. water	10.1	12.0	22.4	26.6	15.0	14.3	20.8	9.2

**ECOSAIRE GLYCOL-COOLED DATA**

<b>GLYCOL COOLER</b>	<b>28G</b>	<b>36G</b>	<b>41G</b>	<b>46G</b>	<b>56G</b>	<b>66G</b>	<b>76G</b>	<b>86G</b>
<b>100 DEG F MODEL</b>	<b>FMD18-E14</b>	<b>FMD20-E14</b>	<b>FMD23-E14</b>	<b>FLD030-E17</b>	<b>FLD040-E26</b>	<b>FLD045-E35</b>	<b>FLD056-E39</b>	<b>FLD070-E70</b>

**SYSTEM PRESSURE DROP AND FLOW**

GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Total Pressure								
Drop - psig	6.1	8.1	12.4	19.6	12.3	9.4	15.8	14.5
Total Pressure								
Drop - ft. of water	14.1	18.8	28.6	45.1	28.3	21.7	36.4	33.4

**PUMP DATA\*\*\***

Pump HP	1	1	2	3	3	3	5	5
Pump Head-psig	39.0	32.6	48.7	51.7	50.8	44.3	50.8	49.5
Pump Heat-ft. water	90.0	75.0	112.0	119.0	117.0	102.0	117.0	114.0
Available Head-psig	32.9	24.5	36.3	32.1	38.5	34.9	35.0	35.0
Available Head-ft. water	75.9	56.4	83.4	73.9	88.7	80.3	80.6	80.6

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	8.5	8.5	11.4	14.1	15.6	20.8	23.3	34.3
Expansion Tank****	1	1	1	2	2	2	2	2

**105 DEG F MODEL**

	<b>FLD026-E13</b>	<b>FLD28-E17</b>	<b>FLD035-E17</b>	<b>FLD045-E23</b>	<b>FLD056-E35</b>	<b>FLD070-E35</b>	<b>FLD085-F39</b>	<b>FLD106-E52</b>
No. of Fans	1 x 2	1 x 2	1 x 3	1 x 3	2 x 2	1 x 5	2 x 3	2 x 4
Circuits	1	1	1	1	2	1	2	2
Motor H.P.	1	1	1	1	1	1	1	1
Fan Dia. - Inches	30	30	30	30	30	30	30	30
RPM	825	825	825	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	1-1/2	2	1-1/2	2	2	2
Outlet MPT	1-1/2	1-1/2	1-1/2	2	1-1/2	2	2	2
Weight	873	894	1168	1287	1506	1980	2131	2503
Pressure Drop-psig	6.2	4.9	7.6	7.7	5.3	9.8	12.7	9.7
Pressure Drop-ft. water	14.3	11.3	17.5	17.8	12.2	22.6	29.3	22.4

**SYSTEM PRESSURE DROP AND FLOW**

GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Total Pressure								
Drop - psig	7.9	7.8	10.3	14.9	11.1	13.0	19.5	20.2
Total Pressure								
Drop - ft. of water	18.3	17.9	23.7	34.3	25.5	30.0	44.9	46.6

**PUMP DATA\*\*\***

Pump HP	1	1	2	3	3	3	5	5
Pump Head-psig	39.0	32.6	48.7	51.7	50.8	44.3	50.8	49.5
Pump Heat-ft. water	90.0	75.0	112.0	119.0	117.0	102.0	117.0	114.0
Available Head-psig	31.1	24.8	38.4	36.8	39.7	31.3	31.3	29.3
Available Head-ft. water	71.7	57.1	88.3	84.7	91.5	72.0	72.1	67.4

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	10.5	14.1	15.6	20.8	28.1	34.3	34.4	41.3
Expansion Tank****	1	1	1	2	2	2	3	3

**ECOSAIRE GLYCOL-COOLED DATA**

<b>GLYCOL COOLER</b>	<b>28G</b>	<b>36G</b>	<b>41G</b>	<b>46G</b>	<b>56G</b>	<b>66G</b>	<b>76G</b>	<b>86G</b>
<b>110 DEG F MODEL</b>	<b>FLD028-E17</b>	<b>FLD035-E17</b>	<b>FLD040-E17</b>	<b>FLD056-E35</b>	<b>FLD070-E35</b>	<b>FLD080-F44</b>	<b>FLD105-F87</b>	<b>FLD120-E70</b>
No. of Fans	1 x 2	1 x 3	1 x 3	2 x 2	1 x 5	2 x 3	2 x 4	2 x 4
Circuits	1	1	1	2	1	2	2	2
Motor H.P.	1	1	1	1	1	1	1	1
Fan Dia. - Inches	30	30	30	30	30	30	30	30
RPM	825	825	825	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	2	1-1/2	2-1/2	2	2	2-1/2
Outlet MPT	1-1/2	1-1/2	2	1-1/2	2-1/2	2	2	2-1/2
Weight	894	1168	1192	1506	1980	2006	2503	2754
Pressure Drop-psig	6.8	8.8	12.9	7	12.2	8.9	3.4	11.7
Pressure Drop-ft. water	15.7	20.3	29.8	16.1	28.1	20.5	7.8	27

**SYSTEM PRESSURE DROP AND FLOW**

GPM	31.5	36.9	45.5	67.2	88.1	117.8	161.7	193.8
Total Pressure Drop - psig	11.9	15.0	19.5	23.5	28.5	18.8	25.6	41.5
Total Pressure Drop - ft. of water	27.5	34.6	45.0	54.1	65.6	42.8	59.0	95.4

**PUMP DATA\*\*\***

Pump HP	1.0	2.0	3.0	3.0	5.0	5.0	7.5	10.0
Pump Head-psig	29.5	43.4	51.7	49.5	51.3	50.0	48.7	53.0
Pump Heat-ft. water	68.0	100.0	119.0	114.0	118.0	115.0	112.0	122.0
Available Head-psig	17.6	28.4	32.2	26.0	22.6	31.4	23.1	11.8
Available Head-ft. water	40.5	65.4	74.0	59.9	52.4	72.2	53.0	26.6

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	14.1	15.6	15.6	28.1	34.3	25.8	34.2	55.0
Expansion Tank****	1	1	2	2	3	2	2	4

\* Consult the factory for technical information on non-standard fluid-coolers.

\*\* Based on 40% glycol solution.

\*\*\* Optional HP pumps and dual pumps available on request.

\*\*\*\* Expansion Tank sized for 100 feet of piping run.

300 psi and three-way valve available on request.

Optional ASME expansion tank available on request.

UE prefix designates down flow.

OE prefix designates up flow.

FE prefix designates up flow with grille.

**ECOSAIRE FREE-COOL DATA****PERFORMANCE DATA****NET CAPACITY DATA Btu/hr**

<b>MODEL</b>	<b>28F</b>	<b>36F</b>	<b>41F</b>	<b>46F</b>	<b>56F</b>	<b>66F</b>	<b>76F</b>	<b>86F</b>
<b>80°F DB / 67°F WB (50% RH)</b>								
Total Capacity	96,500	107,000	126,900	187,500	208,000	255,800	316,200	354,750
Net Sensible Capacity	91,000	101,300	121,750	179,000	208,000	232,500	281,850	326,250
<b>75°F DB / 62.5°F WB (50% RH)</b>								
Total Capacity	91,500	102,700	120,300	175,400	197,500	234,700	292,500	335,600
Net Sensible Capacity	88,250	97,900	117,100	170,200	191,800	228,900	275,300	324,400
<b>72°F DB / 60°F WB (50% RH)</b>								
Total Capacity	86,500	97,000	113,500	166,000	187,500	222,500	261,000	321,350
Net Sensible Capacity	86,500	97,000	113,500	166,000	187,500	222,500	261,000	321,350

**FREE-COOL CAPACITY DATA****@75°F DB / 62.5°F WB (50% RH)****45°F EGT**

Total Capacity	134,000	139,000	169,000	194,000	261,500	282,000	295,000	312,000
Net Sensible Capacity	132,800	136,000	161,900	188,800	257,850	277,200	289,350	303,850

**50°F EGT**

Total Capacity	112,500	116,500	141,500	162,500	219,000	236,500	248,000	278,500
Net Sensible Capacity	109,500	113,250	137,750	157,650	214,600	232,100	244,000	272,400

**55°F EGT**

Total Capacity	90,500	94,000	114,500	130,500	176,500	190,500	199,500	214,000
Net Sensible Capacity	87,800	90,500	111,300	126,500	171,300	186,400	192,900	206,600

**FREE-COOL CAPACITY DATA****@ 72°F DB / 60°F WB (50% RH)****45°F EGT**

Total Capacity	120,500	125,000	151,500	174,500	235,000	254,000	265,500	275,000
Net Sensible Capacity	120,500	125,000	151,500	174,500	235,000	254,000	265,500	275,000

**50°F EGT**

Total Capacity	99,000	103,000	125,000	142,500	192,500	208,000	218,500	221,500
Net Sensible Capacity	99,000	103,000	125,000	142,500	192,500	208,000	218,500	221,500

**55°F EGT**

Total Capacity	77,000	79,500	97,000	111,000	150,500	161,500	169,500	178,500
Net Sensible Capacity	77,000	79,500	97,000	111,000	150,500	161,500	169,500	178,500

**FAN SECTION, DIRECT-DRIVE****DOWN FLOW/BELT-DRIVE UP FLOW**

Air Volume – CFM	6,800	6,800	9,750	9,500	14,200	14,000	15,198	15,450
Fan Motor HP	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ext. Static Press. " of Water	.5	.5	.5	.5	.5	.5	.5	.5
Fan Assemblies	2	2	2	2	3	3	3	3
RPM – Down Flow	953	953	945	959	925	945	915	900

**COMPRESSOR, SCROLL**

Quantity	2	2	2	2	2	2	2	2
Refrigerant	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22
RPM	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600

**ECOSAIRE FREE-COOL DATA**

<b>MODEL</b>	<b>28F</b>	<b>36F</b>	<b>41F</b>	<b>46F</b>	<b>56F</b>	<b>66F</b>	<b>76F</b>	<b>86F</b>
<b>FREE-COOL</b>								
<b>EVAPORATOR/CHILLED WATER COIL</b>								
Face Area – Sq. Ft.	19.5	19.5	19.5	19.5	30.9	30.9	30.9	30.9
Rows	4	4	4	5	4	5	5	5
Face Velocity – FPM	348.7	348.7	500.0	487.1	459.5	453.1	491.8	500.0
Quantity	2	2	2	2	2	2	2	2
<b>FREE-COOL REQUIREMENTS</b>								
GPM	33.0	37.0	41.0	60.0	60.0	66.0	82.0	87.0
<b>ELECTRIC REHEAT, THREE-PHASE</b>								
Type	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube
Capacity – BTU/hr.	51,200	51,200	51,200	51,200	76,800	76,800	76,800	76,800
Capacity – kW	15.0	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Number of Stages	2	2	2	2	2	2	2	2
<b>FILTERS</b>								
Quantity, 45% Eff.	6	6	6	6	10	10	10	10
Size (inches)	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20
Depth (inches)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Filter Surface Area – Sq. Ft.	13.3	13.3	13.3	13.3	22.2	22.2	22.2	22.2
<b>HUMIDIFIER</b>								
Capacity – Lb./hr.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
KW	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
<b>REFRIGERANT CONDENSERS**</b>								
Quantity	2	2	2	2	2	2	2	2
Type – Cleanable Shell and Tube								
Max. Tube Working Press. - PSI	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Max. Tube Temp. - °F	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0
Max. Shell Working Press. - PSI	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Maximum Shell Temp. - °F	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
<b>GLYCOL REGULATING VALVES</b>								
Type	2- Way	2- Way	2- Way	2- Way	2- Way	2- Way	2- Way	2- Way
Quantity	2	2	2	2	2	2	2	2
Size (inches)	1	1	1-1/4	1-1/4	1-1/2	2	2	2

MODEL	28F	36F	41F	46F	56F	66F	76F	86F
<b>GLYCOL-COOLED CONDENSER REQUIREMENTS</b>								
<b>ROOM UNIT</b>								
<b>95 Deg F Ambient</b>								
GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Pressure Drop - psig	1.7	2.9	2.7	7.2	5.8	3.2	6.6	10.5
Pressure Drop - ft. of water	4.0	6.6	6.2	16.5	13.3	7.4	15.6	24.2
<b>100 Deg F Ambient</b>								
GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Pressure Drop - psig	1.7	2.9	2.7	7.2	5.8	3.2	6.8	10.5
Pressure Drop - ft. of water	4.0	6.6	6.2	16.5	13.3	7.4	15.6	24.2
<b>105 Deg F Ambient</b>								
GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Pressure Drop - psig	1.7	2.9	2.7	7.2	5.8	3.2	6.8	10.5
Pressure Drop - ft. of water	4.0	6.6	6.2	16.5	13.3	7.4	15.6	24.2
<b>110 Deg F Ambient</b>								
GPM	31.5	36.9	45.5	67.2	88.1	117.8	161.7	193.8
Pressure Drop - psig	5.1	6.2	6.6	16.5	16.3	9.7	22.2	29.8
Pressure Drop - ft. of water	11.8	14.3	15.2	38.0	37.5	22.3	51.2	68.4
<b>OVERALL UNIT DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	109-1/4	109-1/4	109-1/4
Width - Down Flow	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Width - Up Flow	46	46	46	46	46	46	46	46
Height (inches)	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8
<b>UP FLOW PLENUM DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	21	21	21	21	21	21	21	21
<b>FLOOR STAND HEIGHT</b>								
Height Limit (inches)	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27
<b>CONNECTION SIZES</b>								
Cond. Inlet (1/unit) MPT	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2	2
Cond. Outlet (1/unit) MPT	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2	2
Humidifier – Compression	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Condensate Drain – FPT	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Condensate Pump – SAE Flare	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HW Reheat FPT Inlet, MPT Outlet	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Weight – Approx. Lb.	1,750	1,775	1,800	1,820	2,250	2,280	2,315	2,440

\*\* Consult the factory for technical information on non-standard condensers.

\*\*\* Based on 40% glycol solution, 110°F inlet temperature, 95°F ambient.

300 psi valve available on request.

Optional ASME expansion tank available on request.

UE prefix designates down flow.

OE prefix designates up flow.

FE prefix designates up flow with grille.

**ECOSAIRE FREE-COOL DATA****OUTDOOR GLYCOL (FLUID) COOLER SELECTION\* (Model)**

Design Ambient	28F	36F	41F	46F	56F	66F	76F	86F
95 Deg F	FMD13-E14	FMD14-E14	FMD20-E14	FLD026-E17	FLD028-E23	FLD035-E26	FLD043-E35	FLD053-E52
100 Deg F	FMD18-E14	FMD20-E14	FMD23-E14	FLD030-E17	FLD040-E26	FLD045-E35	FLD056-F39	FLD070-E70
105 Deg F	FLD026-E13	FLD028-E17	FLD035-E17	FLD045-E23	FLD056-E35	FLD070-E35	FLD085-F39	FLD106-E52
110 Deg F	FLD028-E17	FLD035-E17	FLD040-E17	FLD056-E35	FLD070-E35	FLD085-E46	FLD105-F87	FLD120-E70

**GLYCOL COOLER DATA\*\***

95 DEG F MODEL	FMD13-E14	FMD14-E14	FMD20-E14	FLD026-E17	FLD028-E23	FLD035-E26	FLD043-E35	FLD053-E52
No. of Fans	1 x 2	1 x 2	1 x 3	1 x 2	1 x 2	1 x 3	1 x 3	2 x 2
Circuits	1	1	1	1	1	1	1	2
Motor H.P.	1/2	1/2	1/2	1	1	1	1	1
Fan Dia. - Inches	20	20	20	30	30	30	30	30
RPM	1140	1140	1140	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2-1/2	2
Outlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2-1/2	2
Weight	435	453	593	873	894	1168	1256	1425
Pressure Drop-psig	4.2	4.9	7.5	9.4	8.3	10.5	10.5	5.6
Pressure Drop-Ft. Water	9.7	11.3	17.3	21.7	19.1	24.2	24.2	12.9

**SYSTEM PRESSURE DROP AND FLOW**

GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Total Pressure Drop - psig	5.9	7.8	10.2	16.6	14.1	13.7	17.3	16.1
Total Pressure Drop - Ft. of Water	13.7	17.9	23.5	38.2	32.4	31.6	39.8	37.1

**PUMP DATA\*\*\***

Pump HP	1	1	2	3	3	3	5	5
Pump Head-psig	39.0	32.6	48.7	51.7	50.8	44.3	50.8	49.5
Pump Heat-Ft Water	90.0	75.0	112.0	119.0	117.0	102.0	117.0	114.0
Available Head-psig	33.1	24.8	38.5	35.1	36.7	30.6	33.5	33.4
Available Head-Ft. Water	76.3	57.1	88.5	80.8	84.6	70.4	77.2	76.9

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	7.7	7.7	8.5	10.5	14.1	15.8	20.8	21.1
Expansion Tank****	1	1	1	2	2	2	2	2

100 DEG F MODEL	FMD18-E14	FMD20-E14	FMD23-E14	FLD030-E17	FLD040-E26	FLD045-E35	FLD056-E39	FLD070-E70
No. of Fans	1 x 3	1 x 3	1 x 3	1 x 2	1 x 3	1 x 3	2 x 2	1 x 5
Circuits	1	1	1	1	1	1	1	1
Motor H.P.	1/2	1/2	1/2	1	1	1	1	1
Fan Dia. - Inches	20	20	20	30	30	30	30	30
RPM	1140	1140	1140	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2	2-1/2
Outlet MPT	1-1/2	1-1/2	1-1/2	2	2	2	2	2-1/2
Weight	582	593	631	927	1192	1287	1506	1980
Pressure Drop-psig	4.4	5.2	9.7	12.4	6.5	6.2	9.0	4.0
Pressure Drop-Ft. water	10.1	12.0	22.4	26.6	15.0	14.3	20.8	9.2

**ECOSAIRE FREE-COOL DATA**

<b>GLYCOL COOLER</b>	<b>28F</b>	<b>36F</b>	<b>41F</b>	<b>46F</b>	<b>56F</b>	<b>66F</b>	<b>76F</b>	<b>86F</b>
<b>100 DEG F MODEL</b>	<b>FMD18-E14</b>	<b>FMD20-E14</b>	<b>FMD23-E14</b>	<b>FLD030-E17</b>	<b>FLD040-E26</b>	<b>FLD045-E35</b>	<b>FLD056-E39</b>	<b>FLD070-E70</b>

**SYSTEM PRESSURE DROP AND FLOW**

GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Total Pressure								
Drop - psig	6.1	8.1	12.4	19.6	12.3	9.4	15.8	14.5
Total Pressure								
Drop - ft. of water	14.1	18.8	28.6	45.1	28.3	21.7	36.4	33.4

**PUMP DATA\*\*\***

Pump HP	1	1	2	3	3	3	5	5
Pump Head-psig	39.0	32.6	48.7	51.7	50.8	44.3	50.8	49.5
Pump Heat-ft. water	90.0	75.0	112.0	119.0	117.0	102.0	117.0	114.0
Available Head-psig	32.9	24.5	36.3	32.1	38.5	34.9	35.0	35.0
Available Head-ft. water	75.9	56.4	83.4	73.9	88.7	80.3	80.6	80.6

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	8.5	8.5	11.4	14.1	15.6	20.8	23.3	34.3
Expansion Tank****	1	1	1	2	2	2	2	2

<b>105 DEG F MODEL</b>	<b>FLD026-E13</b>	<b>FLD28-E17</b>	<b>FLD035-E17</b>	<b>FLD045-E23</b>	<b>FLD056-E35</b>	<b>FLD070-E35</b>	<b>FLD085-F39</b>	<b>FLD106-E52</b>
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No. of Fans	1 x 2	1 x 2	1 x 3	1 x 3	2 x 2	1 x 5	2 x 3	2 x 4
Circuits	1	1	1	1	2	1	2	2
Motor H.P.	1	1	1	1	1	1	1	1
Fan Dia. - Inches	30	30	30	30	30	30	30	30
RPM	825	825	825	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	1-1/2	2	1-1/2	2	2	2
Outlet MPT	1-1/2	1-1/2	1-1/2	2	1-1/2	2	2	2
Weight	873	894	1168	1287	1506	1980	2131	2503
Pressure Drop-psig	6.2	4.9	7.6	7.7	5.3	9.8	12.7	9.7
Pressure Drop-ft. water	14.3	11.3	17.5	17.8	12.2	22.6	29.3	22.4

**SYSTEM PRESSURE DROP AND FLOW**

GPM	22.3	26.4	32.2	45.9	57.4	77.7	102.9	123.6
Total Pressure								
Drop - psig	7.9	7.8	10.3	14.9	11.1	13.0	19.5	20.2
Total Pressure								
Drop - ft. of water	18.3	17.9	23.7	34.3	25.5	30.0	44.9	46.6

**PUMP DATA\*\*\***

Pump HP	1	1	2	3	3	3	5	5
Pump Head-psig	39.0	32.6	48.7	51.7	50.8	44.3	50.8	49.5
Pump Heat-ft. water	90.0	75.0	112.0	119.0	117.0	102.0	117.0	114.0
Available Head-psig	31.1	24.8	38.4	36.8	39.7	31.3	31.3	29.3
Available Head-ft. water	71.7	57.1	88.3	84.7	91.5	72.0	72.1	67.4

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	10.5	14.1	15.6	20.8	28.1	34.3	34.4	41.3
Expansion Tank****	1	1	1	2	2	2	3	3

**ECOSAIRE FREE-COOL DATA**

<b>GLYCOL COOLER</b>	<b>28F</b>	<b>36F</b>	<b>41F</b>	<b>46F</b>	<b>56F</b>	<b>66F</b>	<b>76F</b>	<b>86F</b>
<b>110 DEG F MODEL</b>	<b>FLD028-E17</b>	<b>FLD035-E17</b>	<b>FLD040-E17</b>	<b>FLD056-E35</b>	<b>FLD070-E35</b>	<b>FLD080-F44</b>	<b>FLD105-F87</b>	<b>FLD120-E70</b>
No. of Fans	1 x 2	1 x 3	1 x 3	2 x 2	1 x 5	2 x 3	2 x 4	2 x 4
Circuits	1	1	1	2	1	2	2	2
Motor H.P.	1	1	1	1	1	1	1	1
Fan Dia. - Inches	30	30	30	30	30	30	30	30
RPM	825	825	825	825	825	825	825	825
Direction	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Inlet MPT	1-1/2	1-1/2	2	1-1/2	2-1/2	2	2	2-1/2
Outlet MPT	1-1/2	1-1/2	2	1-1/2	2-1/2	2	2	2-1/2
Weight	894	1168	1192	1506	1980	2006	2503	2754
Pressure Drop-psig	6.8	8.8	12.9	7	12.2	8.9	3.4	11.7
Pressure Drop-ft. water	15.7	20.3	29.8	16.1	28.1	20.5	7.8	27

**SYSTEM PRESSURE DROP AND FLOW**

GPM	31.5	36.9	45.5	67.2	88.1	117.8	161.7	193.8
Total Pressure Drop - psig	11.9	15.0	19.5	23.5	28.5	18.8	25.6	41.5
Total Pressure Drop - ft. of water	27.5	34.6	45.0	54.1	65.6	42.8	59.0	95.4

**PUMP DATA\*\*\***

Pump HP	1.0	2.0	3.0	3.0	5.0	5.0	7.5	10.0
Pump Head-psig	29.5	43.4	51.7	49.5	51.3	50.0	48.7	53.0
Pump Heat-ft. water	68.0	100.0	119.0	114.0	118.0	115.0	112.0	122.0
Available Head-psig	17.6	28.4	32.2	26.0	22.6	31.4	23.1	11.8
Available Head-ft. water	40.5	65.4	74.0	59.9	52.4	72.2	53.0	26.6

**INTERNAL VOLUME - GAL**

Room Unit	5.2	5.2	5.2	5.2	3.0	4.0	4.0	4.9
Glycol Cooler	14.1	15.6	15.6	28.1	34.3	25.8	34.2	55.0
Expansion Tank****	1	1	2	2	3	2	2	4

\* Consult the factory for technical information on non-standard fluid-coolers.

\*\* Based on 40% glycol solution.

\*\*\* Optional HP pumps and dual pumps available on request.

\*\*\*\* Expansion Tank sized for 100 feet of piping run.

300 psi and three-way valve available on request.

Optional ASME expansion tank available on request.

UE prefix designates down flow.

OE prefix designates up flow.

FE prefix designates up flow with grille.

**ECOSAIRE DUAL-COOL DATA****PERFORMANCE DATA****NET CAPACITY DATA Btu/hr**

<b>MODEL</b>	<b>28D</b>	<b>36D</b>	<b>41D</b>	<b>46D</b>	<b>56D</b>	<b>66D</b>	<b>76D</b>	<b>86D</b>
<b>75°F DB / 62.5°F WB (50% RH)</b>								
Total Capacity	180,650	198,000	223,500	220,000	335,500	350,000	369,000	390,000
Net Sensible Capacity	176,200	193,700	197,500	199,000	303,500	315,000	326,000	347,500
Flow GPM	36.0	40.0	44.0	44.0	68.0	70.0	74.0	78.0
Pressure Drop PSI	13.4	14.8	19.0	8.9	8.9	9.8	10.5	12.1
Pressure Drop - Ft. of Water	27.1	25.5	29.2	14.5	13.5	15.2	16.3	18.8

**72°F DB, 60°F WB (50% RH)**

Total Capacity	147,000	160,000	177,000	180,000	269,500	284,000	289,000	325,000
Net Sensible Capacity	147,000	160,000	177,000	180,000	269,500	284,000	289,000	325,000
Flow GPM	29.0	32.0	35.0	36.0	54.0	56.0	58.0	60.0
Pressure Drop PSI	9.2	11.1	12.7	6.3	5.9	6.6	7.1	8.2
Pressure Drop - Ft. of Water	27.1	25.5	29.2	14.5	13.5	15.2	16.3	18.8

**FAN SECTION, DIRECT-DRIVE****DOWN FLOW/BELT-DRIVE UP FLOW**

Air Volume – CFM	6,800	6,800	9,750	9,500	14,200	14,000	15,198	15,450
Fan Motor HP	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ext. Static Press. _” of Water	.5	.5	.5	.5	.5	.5	.5	.5
Fan Assemblies	2	2	2	2	3	3	3	3
RPM – Down Flow	953	953	945	959	925	945	915	900

**DUAL-COOL EVAPORATOR/CHILLED WATER COIL**

Face Area – Sq. Ft.	19.5	19.5	19.5	19.5	30.9	30.9	30.9	30.9
Rows	4.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0
Face Velocity – FPM	348.7	348.7	500.0	487.1	459.5	453.1	491.8	500.0
Quantity	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

**COMPRESSOR, SCROLL**

Quantity	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Refrigerant	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22
RPM	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600

**WATER REGULATING VALVE**

Valve Type	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way
Valve Size	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2
Valve CV	37	37	37	37	57	57	57	57

**ELECTRICAL REHEAT, THREE-PHASE**

Type	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube
Capacity – BTU/hr.	51,200	51,200	51,200	51,200	76,800	76,800	76,800	76,800
Capacity – kW	15.0	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Number of Stages	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

**FILTERS**

Quantity, 45% Eff.	6	6	6	6	10	10	10	10
Size (inches)	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20
Depth (inches)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Filter Surface Area – Sq. Ft.	13.3	13.3	13.3	13.3	22.2	22.2	22.2	22.2

MODEL	28D	36D	41D	46D	56D	66D	76D	86D
<b>HUMIDIFIER</b>								
Capacity - Lb./hr.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
KW	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
<b>OVERALL UNIT DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8
<b>UP FLOW PLENUM DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	21	21	21	21	21	21	21	21
<b>FLOOR STAND HEIGHT</b>								
Height Limit (inches)	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27
<b>CONNECTION SIZES</b>								
Chilled Water Line - FPT		1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/2	1-1/2
Humidifier - Compression		1/4	1/4	1/4	1/4	1/4	1/4	1/4
Condensate Drain - FPT		3/4	3/4	3/4	3/4	3/4	3/4	3/4
Condensate Pump - SAE Flare		1/2	1/2	1/2	1/2	1/2	1/2	1/2
HW Reheat FPT Inlet, MPT Outlet		1/2	1/2	1/2	3/4	3/4	3/4	3/4
Weight - Approx. Lb.		1,250	1,300	1,370	1,580	1,600	1,715	1,765

Units rated at 44°F EWT/54°F LWT.  
 UE prefix designates down flow  
 OE prefix designates ducted up flow  
 FE prefix designates up flow with grille

**ECOSAIRE CHILLED WATER DATA****PERFORMANCE DATA****NET CAPACITY DATA Btu/hr**

<b>MODEL</b>	<b>28C</b>	<b>36C</b>	<b>41C</b>	<b>46C</b>	<b>56C</b>	<b>66C</b>	<b>76C</b>	<b>86C</b>
<b>80°F DB / 67°F WB (50% RH)</b>								
Total Capacity	207,800	255,600	329,100	410,900	431,400	515,800	569,900	663,800
Net Sensible Capacity	130,400	165,400	217,200	258,500	287,100	338,700	365,500	418,000
Flow GPM	42.4	52.4	68.0	84.6	89.8	106.6	118.0	137.0
Pressure Drop PSI	11.3	5.7	9.0	9.1	7.0	9.5	7.4	9.7
Pressure Drop - Ft. of Water	25.8	13.2	20.8	21.1	16.2	21.9	17.1	22.4

**75°F DB / 62.5°F WB (50% RH)**

Total Capacity	141,900	168,200	213,000	274,500	277,700	335,200	376,100	442,600
Net Sensible Capacity	107,800	135,400	177,900	209,700	236,500	277,600	299,000	340,400
Flow GPM	29.2	35.0	44.8	57.4	59.0	70.4	79.2	92.8
Pressure Drop PSI	6.0	2.9	4.4	4.6	3.5	4.6	3.7	4.8
Pressure Drop - Ft. of Water	13.9	6.7	10.1	10.6	8.0	10.6	8.5	11.2

**72°F DB, 60°F WB (50% RH)**

Total Capacity	115,685	139,268	176,870	224,080	223,615	276,937	302,671	361,060
Net Sensible Capacity	97,625	123,986	163,460	189,572	213,007	254,403	267,413	306,294
Flow GPM	22.2	25.8	33.8	42.6	44.6	52.8	58.0	67.2
Pressure Drop PSI	3.8	1.8	2.7	2.8	2.1	2.7	2.1	2.7
Pressure Drop - Ft. of Water	8.8	4.2	6.2	6.4	4.8	6.2	4.9	6.2

**FAN SECTION**

Air Volume – CFM	4,800	6,400	9,200	8,900	14,200	14,200	14,000	14,500
Fan Motor HP Each	1.5	1.5	3	3	3	3	3	3
Fan Assemblies	2	2	2	2	3	3	3	3
RPM	762	807	836	910	833	833	913	924
External Static - inches of water	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

**WATER REGULATING VALVE**

Valve Type	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way	2/3-Way
Valve Size	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2
Valve CV	37	37	37	37	57	57	57	57

**CHILLED WATER COIL, A-FRAME**

Face Area – Sq. Ft.	20.1	20.1	20.1	20.1	31.5	31.5	31.5	31.5
Rows	3	3	3	5	3	3	5	5
Face Velocity – FPM	238.8	318.4	457.7	442.8	450.8	444.4	444.4	460.3

**ELECTRICAL REHEAT, THREE-PHASE**

Type	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube	Fin-Tube
Capacity – BTU/hr.	51,200	51,200	51,200	51,200	76,800	76,800	76,800	76,800
Capacity – kW	15.0	15.0	15.0	15.0	22.5	22.5	22.5	22.5
Number of Stages	2	2	2	2	2	2	2	2

**HOT WATER REHEAT**

Capacity – BTU/hr.	60,400	60,400	60,400	60,400	104,500	104,500	104,500	104,500
GPM, 180°F EWT	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0
Pressure Drop - Ft. of Water	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

**ECOSAIRE CHILLED WATER DATA**

<b>MODEL</b>	<b>28C</b>	<b>36C</b>	<b>41C</b>	<b>46C</b>	<b>56C</b>	<b>66C</b>	<b>76C</b>	<b>86C</b>
<b>FILTERS</b>								
Quantity, 45% Eff.	6	6	6	6	10	10	10	10
Size (inches)	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20	16 x 20
Depth (inches)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Filter Surface Area – Sq. Ft.	13.3	13.3	13.3	13.3	22.2	22.2	22.2	22.2
<b>HUMIDIFIER</b>								
Capacity - Lb./hr.	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
KW	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
<b>OVERALL UNIT DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8	81-7/8
<b>UP FLOW PLENUM DIMENSIONS</b>								
Length (inches)	69-1/4	69-1/4	69-1/4	69-1/4	102-1/4	102-1/4	102-1/4	102-1/4
Width (inches)	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8	35-1/8
Height (inches)	21	21	21	21	21	21	21	21
<b>FLOOR STAND HEIGHT</b>								
Height Limit (inches)	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27	8 to 27
<b>CONNECTION SIZES</b>								
Chilled Water Line - FPT	1.0	1.0	1.0	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2
Chilled Water Outlet - FPT	1.0	1.0	1.0	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2
Humidifier - Compression	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Condensate Drain - FPT	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Condensate Pump - SAE Flare	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Air-Cooled Condenser Lines	See Air-Cooled Data							
Water-Cooled Condenser Lines	See Water-Cooled Data							
Glycol-Cooled Condenser Lines	See Fluid-Cooled Data							
Units rated at 44°F EWT/54°F LWT.								

\*\*\* 300 psi and 2-way valve available on request.

UE prefix designates down flow

OE prefix designates ducted up flow

FE prefix designates up flow with grille

**ELECTRICAL DATA****AIR, WATER, GLYCOL-COOLED UNITS (2 COMPRESSORS)**

ELECTRIC REHEAT		YES			YES			NO			NO		
HUMIDIFIER		YES			NO			YES			NO		
POWER SUPPLY 3 Phase 60 HZ		208-230	460	575	208-230	460	575	208-230	460	575	208-230	460	575
MODEL	AMPS												
28	FLA	86.2	41.0	33.1	86.2	41.0	33.1	63.5	30.7	24.8	44.6	22.2	18.0
	MCA	101	48	39	101	48	39	73	35	29	49	25	20
	MFS	110	50	45	110	50	45	80	40	35	60	30	25
36	FLA	90.6	43.2	34.9	90.6	43.2	34.9	67.9	32.9	26.6	49.0	24.4	19.8
	MCA	106	51	41	106	51	41	78	38	31	54	27	22
	MFS	125	60	45	125	60	45	90	45	35	70	35	25
41	FLA	106.6	51.0	39.7	106.6	51.0	39.7	83.9	40.7	31.4	65.0	32.2	24.6
	MCA	123	59	46	123	59	46	95	46	36	71	35	27
	MFS	125	70	50	125	70	50	110	50	40	90	45	35
46	FLA	122.8	59.2	47.7	122.8	59.2	47.7	100.1	48.9	39.4	81.2	40.4	32.6
	MCA	141	68	55	141	68	55	112	55	45	89	45	36
	MFS	150	80	60	150	80	60	125	70	50	110	60	45
56	FLA	149.7	71.5	57.6	149.7	71.5	57.6	106.1	51.8	41.8	87.2	43.3	35.0
	MCA	174	83	67	174	83	67	120	59	47	96	48	39
	MFS	200	100	80	200	100	80	150	70	60	125	60	50
66	FLA	169.7	81.6	65.6	169.7	81.6	65.6	126.1	61.9	49.8	107.2	53.4	43.0
	MCA	196	94	76	196	94	76	141	69	56	117	59	47
	MFS	225	110	90	225	110	90	175	80	70	150	70	60
76	FLA	174.3	83.8	67.6	174.3	83.8	67.6	130.7	64.1	51.8	111.8	55.6	45.0
	MCA	201	97	78	201	97	78	146	72	58	123	61	50
	MFS	225	110	90	225	110	90	175	90	70	150	80	60
86	FLA	205.1	99.2	79.8	205.1	99.2	79.8	161.5	79.5	64.0	142.6	71	57.2
	MCA	235	114	92	235	114	92	181	89	72	157	79	63
	MFS	250	125	110	250	125	110	225	110	90	200	100	80

**ELECTRICAL DATA**

**CHILLED WATER UNITS**

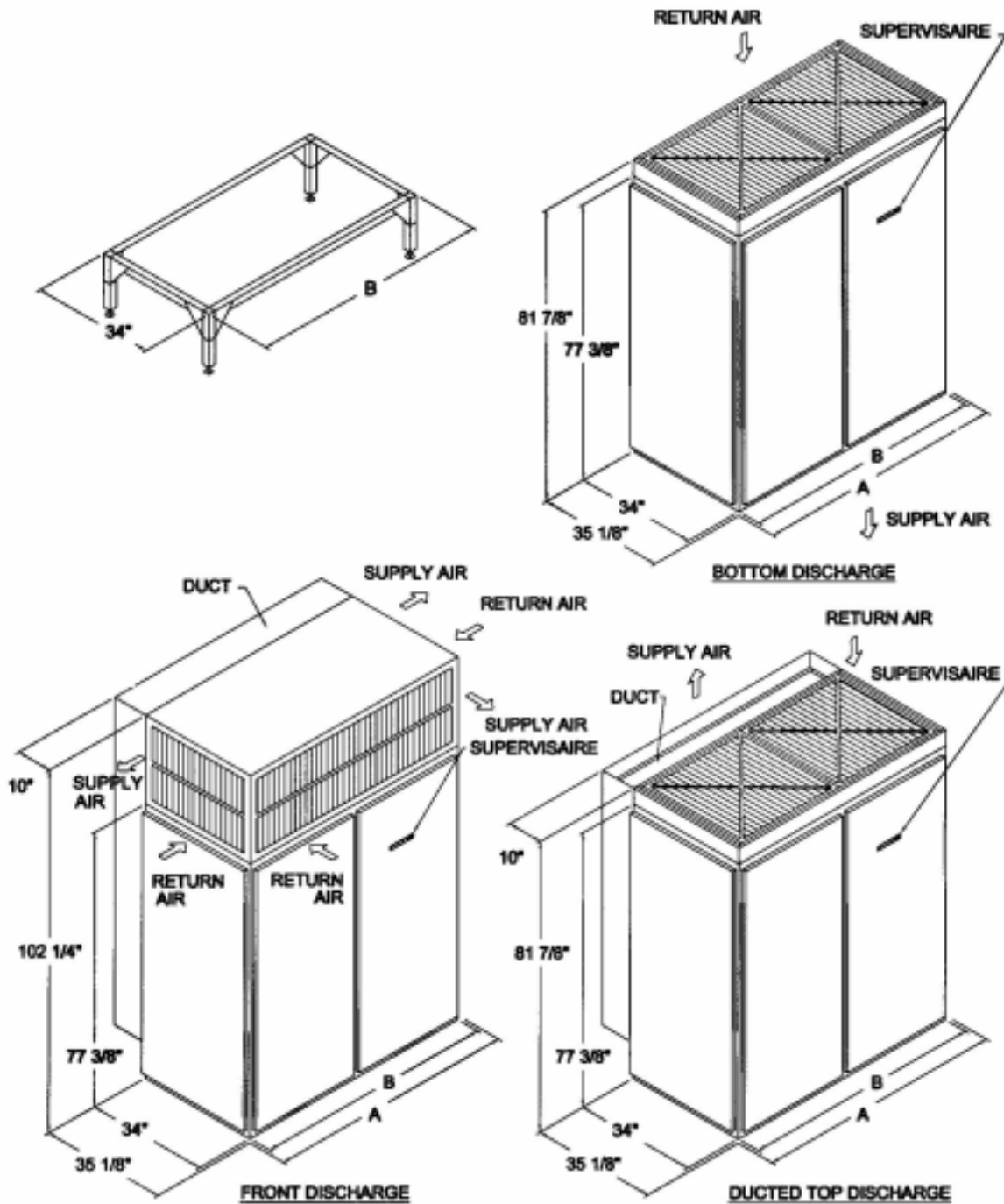
ELECTRIC REHEAT		YES			YES			NO			NO		
HUMIDIFIER		YES			NO			YES			NO		
POWER SUPPLY 3 Phase 60 HZ		208-230	460	575	208-230	460	575	208-230	460	575	208-230	460	575
MODEL	AMPS												
28	FLA	71.5	32.8	26.5	52.6	24.2	19.7	29.9	13.9	11.4	11.0	5.4	4.6
	MCA	88	41	33	65	30	24	36	17	14	13	6	6
	MFS	90	45	35	70	35	25	40	20	15	15	15	15
36	FLA	71.5	32.8	26.5	52.6	24.2	19.7	29.9	13.9	11.4	11.0	5.4	4.6
	MCA	88	41	33	65	30	24	36	17	14	13	6	6
	MFS	90	45	35	70	35	25	40	20	15	15	15	15
41	FLA	80.5	37.2	30.1	61.6	28.6	23.3	38.9	18.3	15.0	20.0	9.8	8.2
	MCA	98	46	37	75	35	28	46	22	18	23	11	10
	MFS	100	50	40	80	40	30	50	25	20	25	15	15
46	FLA	80.5	37.2	30.1	61.6	28.6	23.3	38.9	18.3	15.0	20.0	9.8	8.2
	MCA	98	46	37	75	35	28	46	22	18	23	11	10
	MFS	100	50	40	80	40	30	50	25	20	25	15	15
56	FLA	101.3	46.5	37.6	82.5	37.9	30.8	38.9	18.2	15	20.0	9.7	8.2
	MCA	124	57	46	100	46	38	46	22	18	22	11	9
	MFS	125	60	50	110	50	40	50	25	20	25	15	15
66	FLA	110.3	51.0	41.2	91.5	42.4	34.4	47.9	22.7	18.6	29.0	14.2	11.8
	MCA	133	62	50	110	51	41	55	26	22	32	16	13
	MFS	150	70	60	125	60	45	60	30	25	35	20	15
76	FLA	110.3	51.0	41.2	91.5	42.4	34.4	47.9	22.7	18.6	29.0	14.2	11.8
	MCA	133	62	50	110	51	41	55	26	22	32	16	13
	MFS	150	70	60	125	60	45	60	30	25	35	20	15
86	FLA	110.3	51.0	41.2	91.5	42.4	34.4	47.9	22.7	18.6	29.0	14.2	11.8
	MCA	133	62	50	110	51	41	55	26	22	32	16	13
	MFS	150	70	60	125	60	45	60	30	25	35	20	15

**ELECTRICAL DATA**

**FREE-COOL AND DUAL-COOL UNITS (2 COMPRESSORS)**

ELECTRIC REHEAT		YES			YES			NO			NO		
HUMIDIFIER ELECTRODE STEAM		YES			NO			YES			NO		
POWER SUPPLY 3 Phase 60 HZ		208-230	460	575	208-230	460	575	208-230	460	575	208-230	460	575
MODEL	AMPS												
28	FLA	77.7	34.7	29.1	77.7	34.7	29.1	74.3	31.9	27.2	55.4	23.4	20.4
	MCA	82.6	36.5	30.7	82.6	36.6	30.7	79.1	33.8	28.8	60.2	25.3	22.0
	MFS	100	40	35	100	40	35	90	40	35	70	25	25
36	FLA	77.7	37.2	30.6	77.7	37.2	26.6	74.3	36.9	30.2	47.8	28.4	23.4
	MCA	82.6	39.7	32.5	82.6	39.7	32.5	79.1	39.4	32.2	60.2	30.9	25.4
	MFS	100	45	40	100	45	35	90	45	40	70	35	30
41	FLA	79.1	37.2	30.9	79.1	37.2	30.9	77.1	36.9	30.8	58.2	28.4	24.0
	MCA	84.3	39.7	32.9	84.3	39.7	32.9	82.3	39.4	32.9	63.4	30.9	26.1
	MFS	100	45	40	100	45	40	100	45	40	80	40	30
46	FLA	99.9	49.7	38.4	90.5	43.6	34.7	99.9	49.7	38.4	81.0	41.2	31.6
	MCA	107.9	53.8	41.4	98.6	47.7	37.7	107.9	53.8	41.4	89.0	45.3	34.6
	MFS	125	70	50	125	50	45	125	70	50	110	60	45
56	FLA	121.3	58.1	47.5	121.3	58.1	47.5	111.3	55.7	45.2	92.4	47.2	38.4
	MCA	129.7	62.5	50.9	129.7	62.5	50.9	119.7	60.1	48.6	100.8	51.5	41.8
	MFS	150	70	60	150	70	60	150	70	50	125	60	50
66	FLA	129.7	60.0	47.8	129.7	60.0	47.8	128.1	59.5	45.8	109.2	51.0	39.0
	MCA	140.2	64.8	51.2	140.2	64.8	51.2	138.6	64.3	49.3	119.7	55.8	42.5
	MFS	175	80	60	175	80	60	175	80	60	150	70	50
76	FLA	138.3	71.1	58.0	134.8	65.8	53.9	138.3	71.1	58.0	119.4	62.6	51.2
	MCA	150.1	77.4	63.0	146.5	72.1	58.9	150.1	77.4	63.0	131.2	68.9	56.2
	MFS	175	100	80	175	90	70	175	100	80	175	90	70
86	FLA	164.7	75.5	65.2	148.0	68.0	57.5	164.7	75.5	65.2	145.8	67.0	58.4
	MCA	179.8	82.3	71.1	163.0	74.8	63.4	179.8	82.3	71.1	160.9	73.8	64.3
	MFS	225	100	90	200	100	80	225	100	90	200	100	80

**DIMENSIONAL DRAWINGS**



**NOTE**

1. MINIMUM SERVICE CLEARANCE IS 24" ON LEFT AND FRONT OF UNIT. PROVIDE 36" WHENEVER POSSIBLE TO FACILITATE SERVICE. NO CLEARANCE IS NECESSARY AT THE REAR. PROVIDE A MINIMUM OF 18" TO 24" ON THE RIGHT END OF FREE-COOL AND DUAL-COOL UNITS ONLY.
2. FOR DIMENSION A AND B, REFER TO PERFORMANCE DATA TABLE.

**GUIDE SPECIFICATIONS**

The computer room air conditioning shall be a factory-assembled Ecosaire® (self-contained system) (split-system), with (down flow) (ducted up flow) (front) air discharge and draw-through fans.

The system shall be specifically designed for computer room conditions and shall include dual refrigeration circuits, reheat section, humidifier, multiple direct-drive blowers and all controls necessary for complete operation. The computer room unit shall be designed to dehumidify only when necessary by automatically reducing the air flow and shall be capable of dehumidification with only one compressor operating. It shall have a sensible cooling capacity of \_\_\_\_\_ Btuh and a total cooling capacity not to exceed \_\_\_\_\_ Btuh, based on an entering air temperature of \_\_\_\_\_ °F dry bulb and \_\_\_\_\_ °F wet bulb. It shall be capable of controlling room conditions to within  $\pm 0.5^{\circ}\text{F}$  and  $\pm 2$  percent rh.

**STANDARD FEATURES / ALL SYSTEMS****Cabinet**

The cabinet shall be designed for (down flow) (ducted up flow) (front) air discharge. The cabinet and frame shall be constructed of heavy-gauge, heliarc-welded, cold-rolled steel. All interior panel air surfaces shall be insulated with 1/2 inch, 1.5 pound density black-mat-coated fiberglass insulation. The access panels shall be lined with 1/2-inch coated fiberglass to provide double insulation for reduced noise level. The main colour shall be black and access panels shall be \_\_\_\_\_ to match the computer hardware (specify). All access panels shall be hinged and removable. Access panels shall allow easy service entry from the front and left side. The electrical, compressor and humidifier compartments shall allow inspection without interrupting the air flow. All service connections shall be made through the base of down flow units.

**Supply Fan Assemblies**

There shall be multiple dwdi, forward-curved centrifugal blowers located in the draw-through position. They shall be constructed of heavy-gauge, corrosion-resistant steel and shall be statically and dynamically balanced before shipment. Each shall be driven by an independent drip-proof motor with Class B insulation and permanently lubricated ball bearings rated for the life of the unit. Each shall have internal overload protection.

Down flow fan assemblies shall include direct-drive motors and shall be located 23 inches above the bottom of the unit to reduce back pressure for maximum air flow. They shall be easily removed from the front of the unit without disturbing the refrigeration circuit. Up flow fan assemblies shall be fitted with bell-drive motors.

**Filters**

The filter frames shall be removable and shall allow for easy replacement. The disposable filters shall be rated not less than 45 percent efficient by the ASHRAE 52-78 method.

**Refrigeration System**

The refrigeration system shall be completely factory assembled with type L copper tubing and shall consist of two independent circuits each with its own direct-expansion evaporator coil, filter/dryer, sight glass/moisture indicator, adjustable externally equalized tx valve, manual-reset high-pressure switch, low-pressure switch, quick-connect refrigeration service valves, hermetic compressor and liquid-line solenoid valve. Water-cooled, glycol-cooled, and Free-Cool units shall include shell and tube condensers.

**Evaporator Coils**

The evaporator coils shall be an A-frame design and shall be constructed of seamless copper tubing expanded into aluminum fins. The coils shall be pressure tested to 150 psig. They shall be the direct expansion type with independent circuits for each compressor. Each coil shall be mounted in an independent stainless steel drain pan.

**High-Efficiency Compressors**

The coil shall be designed for \_\_\_\_\_ cfm per ton to insure \_\_\_\_\_ percent sensible cooling capacity. It shall have a minimum face area of \_\_\_\_\_ sq. ft. and a maximum face velocity of \_\_\_\_\_ ft. per min. An adjustable air bypass shall be provided to adjust the temperature and humidity conditions at the unit outlet.

There shall be two hermetic Scroll compressors. Each shall include inherent motor protection, anti-slug protection, oil strainer, crankcase heater, internal pressure relief, resilient suspension and quick-connect refrigeration service valves with gauge ports on suction and discharge lines. Either compressor shall be serviceable with the unit in operation without disturbing the performance or air flow.

**Electrical**

The electrical panel shall be located out of the air stream to allow service while the unit is in operation and shall be divided into high and low-voltage sections. The high-voltage section shall be protected by a safety screen and shall contain all fuses, contactors and transformers. Each high-voltage circuit shall be individually protected by high-interrupting-capacity fuses.

**Supervisaire® Microprocessor**

All unit functions shall be controlled by the Supervisaire® microprocessor. The Supervisaire® shall be capable of controlling room conditions within the following parameters:

- Temperature set point 85 to 80°F
- Temperature control band ±0.5 to ±3°F
- Humidity set point 30 to 70 percent rh
- Humidity control band ±2 to ±9 percent rh

The Supervisaire® display panel shall include a membrane switch pad with eight momentary-on control switches: On/Off, Test, Display, Set, Increase, Decrease, Reset (Alarm) and Recall (Alarm). Basic mode display shall be provided by coloured LEDs as follows: System On, Cool, Free-Cool, Heat, Humidify, Dehumidify, Manual and Alarm Present.

A four-line, 32-character, alphanumeric LCD shall display 25 system-parameter setting screens, 30 alarm-message screens, and six system-status screens. The parameters shall be set with the Increase/Decrease Switches.

Alarms shall include: Loss of Air Flow, Change Filters, Water Under Floor, Customer Alarm, Special Alarms 1 & 2, Fire, Compressors-1 and 2 High and Low Pressure, Change Humitronic Cylinder, Loss of Power, Replace Battery, High and Low Room Temperature, High and Low Room Humidity, Coils-1 and 2 High and Low Temperature, and High and Low Supply Water Temperature. Sensor fault alarms shall be provided for Special Temperature, Humidity, Water Temperature, Coil 1 and 2 Temperature.

The alarm memory shall save the data for up to 50 alarms including the alarm message, time and date of occurrence, time and date of alarm correction, room temperature and humidity at occurrence, and relay status at occurrence. The lithium battery backup shall protect the set points and alarm history and shall maintain the real-time clock. The lithium batteries shall have an inactive life of eight to ten years and an active life of six to eight years.

Compressor and electric reheat sequencing shall automatically switch the lead compressor or electric heating elements with every fifty starts of the respective component.

Adjustable sequential load activation shall allow the time delay between stages to be set between 20 and 180 seconds in order to reduce inrush current and/or vary the response time.

Adjustable sequential auto restart shall allow each unit on multi-unit installations to be sequenced on at different times to reduce inrush current.

**STANDARD FEATURES / INDIVIDUAL SYSTEMS****Air-Cooled Condenser  
and Controls — Standard**

The air-cooled condenser shall be sized to provide the specified cooling capacity at an outdoor ambient of \_\_\_\_\_ °F. The condenser casing shall be constructed of heavy-gauge G90 galvanized steel. The structural supports, coil frame, motor supports and mounting legs shall be constructed of galvanized steel. The coil shall be dual-circuited and shall be constructed of seamless copper tubes expanded into aluminum fins and shall be pressure tested at 425 psig. Fan blades shall be aluminum riveted to a zinc-plated steel hub. Each fan shall be separated by a full-width baffle. The unit shall include a single-phase, variable-speed motor. All other motors on units with two or more fans shall be three-phase. They shall be drip-proof with permanently-lubricated ball bearings and inherent overload protection and with weather shield installed.

The condenser control system shall be complete with all transformers, fan contactors, control relay, fan-cycling temperature switches, high and low-voltage terminal strips and pressure-actuated motor speed controllers factory mounted in a heavy-duty, weatherproof enclosure. The fan speed controllers shall automatically maintain the condensing temperature of either circuit to provide low-ambient operation to -20°F. The control box is to be field-mounted to the condenser.

**Air-Cooled Condenser  
and Controls — Low Ambient**

The air-cooled condenser shall be sized to provide the specified cooling capacity at an outdoor ambient of \_\_\_\_\_ °F. The condenser casing, structural supports and mounting legs shall be constructed of heavy-gauge galvanized steel. The coil shall be dual-circuited and shall be constructed of seamless copper tubes expanded into aluminum fins and shall be pressure tested at 400 psig. Fan blades shall be aluminum riveted to a plated steel hub. Each fan shall be separated by a full-width baffle. The unit shall be provided with three-way head-pressure control valves and check valves for -40°F low-ambient operation. Liquid receivers shall be mounted on rails pre-piped with heating and insulation.

**Water-Cooled Condensers****Water-Cooled**

The water-cooled condensers shall be heavy-duty, counterflow, shell and tube exchangers. Each shall be fitted with a pressure-relief valve and a two-way, head-pressure-controlled water-regulating valve; standard shell side pressure of 150 psig, high pressure units up to 300 psig.

**Glycol-Cooled Condensers****Glycol-Cooled**

The glycol-cooled condensers shall be heavy-duty, counterflow, brazed-plate heat exchangers. Each shall be fitted with a pressure-relief valve and a two-way head pressure controlled water regulating valve; standard shell side pressure 150 psig, high pressure units up to 300 psig.

**Remote Glycol Cooler,  
Pump and Controls - Standard**

**Glycol-Cooled**

The glycol cooler shall be sized to provide the capacity specified at an outdoor ambient of \_\_\_\_\_ °F. The glycol-cooler casing shall be constructed of heavy-gauge G90 galvanized steel. The structural supports, coil frame, motor supports and mounting legs shall be galvanized steel. The coil shall be constructed of seamless copper tubes expanded into aluminum fins and shall be pressure tested at 425 psig. Fan blades shall be aluminum riveted to a zinc-plated hub. Each fan shall be separated by a full-width baffle. The unit shall include a single-phase, variable-speed motor. All other motors on units with two or more fans shall be three-phase. They shall be drip-proof with permanently-lubricated ball bearings and inherent overload protection and with weather shield installed.

The glycol circulating pump shall be 3600 rpm with a weatherproof TEFC NEMA-rated motor with inherent overload protection and a close-coupled pump with a 416 stainless steel shaft. The pumps must be designed for continuous operation with glycol solution and must have high-head performance characteristics. The pump size shall be selected in strict accordance with the manufacturer's selection tables for proper operation.

The glycol cooler and pump control system shall be complete with all transformers, fan contactors, control relay, fan-cycling temperature switches, high and low-voltage terminal strips and solid-state motor speed controller, factory mounted in a heavy-duty, weatherproof enclosure. The control box is to be field mounted to the glycol cooler. The system shall be provided with a separate weatherproof enclosure for the pump starters and an expansion-tank kit with air purger and automatic air vent for field installation.

**Remote Glycol Cooler,  
Pump and Controls -  
Low Ambient**

The glycol cooler shall be sized to provide the capacity specified at an outdoor ambient of \_\_\_\_\_ °F. The glycol-cooler casing, structural supports and mounting legs shall be constructed of heavy-gauge galvanized steel. The coil shall be constructed of seamless copper tubes expanded into aluminum fins and shall be pressure tested at 400 psig. Fan blades shall be aluminum riveted to a plated steel hub. Each fan shall be separated by a full-width baffle. The unit shall include a single-phase, variable-speed motor. All other motors on units with two or more fans shall be three-phase. They shall be drip-proof with permanently-lubricated ball bearings and inherent overload protection and with weather shield installed.

The glycol circulating pump shall consist of a weatherproof TEFC NEMA-rated motor with inherent overload protection and a close-coupled pump with a stainless steel shaft. The pumps must be designed for continuous operation with glycol solution and must have high-head performance characteristics. The pump size shall be selected in strict accordance with the manufacturer's selection tables for proper operation.

The glycol cooler control system shall be complete with all fan contactors, and high and low-voltage terminal strips factory mounted in a weatherproof enclosure. The control box is factory mounted to the glycol cooler. The pump-package control system shall be complete with all transformers, pump contactors, control relays, temperature switches, and high and low-voltage terminal strips factory mounted in a heavy-duty weatherproof enclosure and mounted to the pump-package frame.

**Free-Cool**

The glycol-cooled unit shall be fitted with glycol Free-Cool economizer coil and all controls necessary to provide winter cooling without compressor operation. The coil shall be constructed of seamless copper tubing expanded into aluminum fins. It shall be fully integrated with the A-frame evaporator coil and shall consist of two independent circuits. The coil shall be rated at \_\_\_\_\_ Btuh total and sensible cooling capacity with \_\_\_\_\_ °F entering glycol solution. The coil shall require \_\_\_\_\_ gpm and shall not exceed \_\_\_\_\_ feet-of-water pressure drop when in the Free-Cool mode of operation.

**Free-Cool**

The glycol flow to the Free-Cool coil shall be controlled by two independent solenoid valves. The glycol-cooled condenser shall be fitted with two-way, head-pressure-controlled regulating valves. Glycol-cooler controls shall limit the incoming glycol temperature from falling below 45°F.

**Dual-Cool**

The (air-cooled) (water-cooled) (glycol-cooled) unit shall be fitted with an interlaced Dual-Cool coil and all controls necessary to provide either refrigeration cooling or chilled-water cooling. It shall provide automatic changeover from one mode to the other depending on the flow and temperature of the chilled-water source. The chilled-water coil shall be fully integrated with the dual-circuited A-frame evaporator coil. It shall be rated at \_\_\_\_\_ Btuh total \_\_\_\_\_ sensible with \_\_\_\_\_ degree entering water temperature and \_\_\_\_\_ degree leaving water temperature at \_\_\_\_\_ gpm. Water pressure drop shall not exceed \_\_\_\_\_ psi in the chilled-water mode. Chilled-water flow shall be controlled by a motorized proportional three-way valve with a factory-installed bypass, flow switch and chilled-water temperature sensor. The coil, valve and piping shall have a working-pressure rating of 400 psig.

**Chilled-Water**

The A-frame chilled-water coil shall be constructed of seamless copper tubing expanded into aluminum fins and shall be rated at 400 psig. It shall distribute water throughout the full face area and shall be mounted in independent stainless steel drain pans. The coil shall be two-way factory piped to a motorized, proportional, three-way chilled-water valve rated at 400 psig. It shall be field convertible to three-way piping.

**OPTIONS****Humitronic® Humidifier**

The unit shall be fitted with a lattice-electrode steam humidifier. It shall provide particle-free steam to the air stream without moisture carryover and shall be designed to operate with cold, hard water. The electrodes shall be enclosed within a disposable plastic cylinder and shall not require periodic cleaning. Output capacity shall be adjustable from four to twenty lb./hr. and efficiency shall remain constant throughout the life of the cylinder. Standard controls shall include an Auto/Off/Drain Switch and a High Water Level Alarm Light. A built-in strainer shall be standard.

**Electric Reheat**

The unit shall be fitted with three-phase, low-watt-density electric heating elements located at the coil discharge. They shall be constructed of spiral aluminum-coated steel fins brazed to a copper-coated steel tube encasing the heating element, and shall be capable of withstanding moist conditions. The reheat section shall be capable of maintaining room dry-bulb temperature during dehumidification. U.L. approved high-limit safety switches shall prevent overheating.

**Hot-Gas Reheat**

A hot-gas reheat coil shall be furnished complete with three-way hot-gas valve and a refrigerant check valve. The coil shall be constructed of copper tubes expanded into aluminum fins. The hot-gas reheat coil shall maintain room temperature during the dehumidification cycle only. (Available on down flow water-cooled and glycol-cooled units only).

<b>Hot-Water Reheat</b>	A hot-water coil shall be furnished to maintain room temperature during dehumidification. The coil shall be complete with two-way valve and Y-strainer. The coil shall be constructed of copper tubes expanded into aluminum fins. (Available on down flow units only).
<b>Disconnect Switch</b>	A factory mounted non-fused locking disconnect switch shall be located in the high-voltage electrical section. The operating lever shall protrude through the outer access door with the operating lever installed outside.
<b>Shunt-Trip Disconnect</b>	A factory mounted shunt-trip disconnect switch shall be located in the high-voltage section. It shall automatically switch to the off position whenever the high-voltage safety screen is removed. An operating lever shall protrude through a safety screen and shall not be accessible when the access door is closed.
<b>Firestat</b>	The unit shall be provided with a firestat to automatically shut down the system and activate the unit's alarm system at a preset return-air temperature. The sensing element shall be located in the return air stream.
<b>Smoke Detector/Firestat</b>	The unit shall be provided with a combination smoke detector and firestat to automatically shut the unit down and activate the Supervisaire® alarm system.
<b>Underfloor Water Detector</b>	The unit shall be provided with dual electronic sensing probes to sense the presence of water under the floor. They shall be connected to the Supervisaire® control and shall include built-in logic for automatic reset.
<b>Air-Cooled</b>	
In lieu of fan cycling and fan-speed control, the condenser shall be provided with three-way head-pressure control valves and check valves for -40°F low-ambient operation. Liquid receivers shall be mounted on rails and shall be heated and insulated.	
<b>Water-Cooled</b>	
<b>High-Pressure Water-Regulating Valves</b>	The unit shall be supplied with two-way high-pressure water-regulating valves rated at 300 psig to allow unit operation at up to 300 psig water pressure.
<b>Three-Way Water-Regulating Valves</b>	The unit shall be supplied with three-way water-regulating valves rated at 150 psig.

**Supervisaire®  
Remote Monitor**

**ACCESSORIES**

The cooling system shall be provided with an Ecosaire® Supervisaire® to monitor the operation of multiple air conditioning units. Consult the factory for hardware configuration.

The Supervisaire® shall be capable of modifying any parameter set point of any unit.

The printer shall provide chronological alarm information for each unit as described for the Supervisaire®, as well as a summary of environmental information as follows:

- Daily Compressor Run Time
- Free-Cool Run Time
- Present Temperature
- Present Humidity
- Daily High Temperature
- Daily Low Temperature
- Daily High Humidity
- Daily Low Humidity
- Present Average Temperature\*
- Present Average Humidity\*

\*For multiple-unit installations.

**Condensate Pump**

The unit shall be provided with a condensate pump rated at 185 gph at 22 ft. head. It shall be complete with pump, motor, stainless-steel reservoir and float switch.

**Adjustable Floor Stand**

The unit shall be provided with an adjustable floor stand. It shall be constructed of heavy-duty angle iron and supports. It shall be adjustable for heights from 8-3/8 to 15 inches, 14-3/8 to 21 inches or from 20-3/8 to 27 inches. All sizes shall include corner gussets on all legs.

**Extended Four-Year  
Compressor Warranty**

The unit shall include a four-year extended compressor warranty that provides for a complete replacement compressor for a total period of five years.

**Glycol-Cooled**

**Dual Pumps**

The glycol pump kit shall include dual pumps with automatic change-over. The stand-by pump shall automatically start upon failure of the lead pump and shall activate both a visual and audible alarm on the indoor control panel. The control panel shall also include an alarm silence switch, primary-pump selector switch and pump-run indicator lights. A flow switch shall be supplied for field installation.

**APPLICATION AND INSTALLATION GUIDELINES**

**Equipment Selection**

The computer site conditions and utilities will determine the type of environmental control units selected. A cooling load calculation based on design criteria should be performed according to standard air conditioning practice. The calculation should include the heat gains of: exterior walls and windows: areas exposed to unconditioned spaces (i.e. partitions, ceilings, floors); people; lighting; and all computer and auxiliary equipment. With this information the type, size and number of Ecosaire® units can be selected to best match the equipment configuration in the computer room. Allowances for expansion and redundancy should be considered at this time.

**Site Preparation**

While many important factors require evaluation when designing a computer room, the most important are security, expandability, location within the building, proximity of related data processing operations and proximity to outdoor air conditioning components. Computer rooms are best located in a central part of a building so as not to be effected by outside temperature and humidity. When a room must be designed with an outside wall, the wall should be insulated and windows kept to a minimum. Thermopane windows should be used to prevent condensation. Equipment access through doors, elevators, etc., as well as elevator capacity, must be carefully considered.

In order to prevent moisture-migration, the room must have a sealed vapour barrier, including the ceiling plenum. Rooms with concrete walls or floors should be painted with a rubber or plastic-base paint. Doors should seal tightly and must not have grilles in them. Light fixtures should not allow room air to escape into the ceiling plenum and must be selected to prevent overheating. Because of the small room populations in a typical computer site, outdoor air can be reduced to an absolute minimum or eliminated. If outdoor air is introduced, it should be filtered and added to the cooling and dehumidification loads.

Measures should be taken to prevent dirt and dust from affecting equipment reliability. Printers, bursters, copy machines and other paper handling equipment should be located in adjacent areas removed from disc drives and similar equipment.

In locating the outdoor units, provide for effective security and easy maintenance access. Areas subject to heavy snow and ice accumulation or public access should be avoided. Locate the units in a clean air area away from steam, hot air or fume exhausts.

Provide at least a three-foot clearance around each unit. Units installed on roofs should be mounted on steel supports in accordance with local codes. A concrete pad is sufficient for ground installations.

**GENERAL INSTALLATION REQUIREMENTS**

<b>Service Access</b>	The room layout should provide a two to three-foot service clearance in front and at the left-hand side of all units except Free-Cool and Dual-Cool units. These units require service clearance on the right-hand side as well. When necessary, the hinged access panels can be easily removed to facilitate service.
<b>Flooring</b>	The unit is best installed on an accessible raised floor system. For maximum structural support, additional floor pedestals under the Ecosaire® may be required. If desired, a separate floor stand, independent of the raised floor, can be used to support the unit. The floor stand will allow the unit to be installed prior to the raised floor and eliminates the need for cutting special openings in the floor panels under the unit. It also acts as a vibration isolator and permits easy access to all underfloor piping and wiring.
<b>Piping</b>	Underfloor piping should be installed for minimum resistance to air flow. Pipes should not be stacked on top of each other and should run parallel to the air flow whenever possible. Floor drains with wet traps should be provided in order to remove condensate and allow for emergency water leaks. Condensate drain lines should be trapped and pitched. An underfloor water detector is recommended with chilled-water, water-cooled or glycol-cooled installations.
<b>Electrical</b>	Separate electrical service is required for both the indoor and outdoor units and should comply with national and local electrical codes. Wiring should be sized for the minimum allowable voltage drop using the wire size amp values found in the electrical specifications. A manual disconnect switch must be installed according to code for both the indoor and outdoor units. This generally stipulates that it be installed within five feet and in sight of the unit. A factory-mounted non-locking or shunt-disconnect switch is suggested for the room unit in order to preserve the aesthetics of the installation. The field supplied disconnect for the outdoor unit is best installed directly on the unit. All factory and field wiring should be checked for tightness prior to start up.
<b>Air Distribution</b>	<p>Air flow within the computer room must be carefully examined. Since the major heat gain is generated by the equipment itself and is highly concentrated and unevenly distributed, supply air distribution should closely match the load distribution.</p> <p>Up flow Ecosaire® units are supplied with a factory installed plenum with either discharge grilles or duct collars. However, Ecosaire® units are generally supplied with a down flow discharge for air distribution through a raised floor plenum to floor mounted supply grilles and perforated panels. This provides the flexibility necessary to accommodate the ever changing load patterns common to computer rooms. When installing either a ducted or raised floor system, care must be exercised to eliminate air restrictions in order to allow the Ecosaire® to control the environment as designed. Ductwork must be sized and floor plenums high enough (generally 12 to 18 inches is sufficient) to ensure adequate air flow.</p> <p>There are several other considerations when installing a down flow system. The underfloor plenum should be airtight, thoroughly cleaned and smoothly finished. Any opening directly under computer equipment should be sealed if direct air flow is not desired. The supply-air discharge to the floor plenum should be centrally located for even air distribution. Multiple units should not be located too close to each other since this would reduce the effectiveness of air distribution. There should be no abrupt changes in air direction, and piping or conduit must not interfere with the air flow. Since some zoning is usually required to minimize temperature variations, there should be individual control for each major space.</p> <p>Underfloor air is distributed to the room through supply grilles and perforated floor panels located around the room in areas of high heat release. Panels located near personnel can have adjustable dampers to prevent cold drafts, but those feeding</p>

### Installation of Air-Cooled Units

conditioned air to the computers should not. These panels should be located fairly close to the equipment air inlets. Some computers require direct air injection at the bottom of the unit. Since a wide selection of supply air grilles are available, care should be taken to provide the total number of grilles required for adequate air flow based on the free area of each grille. Finally, an adjustable air bypass at the Ecosaire® coil allows the underfloor temperature and humidity to be adjusted to computer manufacturer specifications.

The refrigeration circuits in air-cooled units are supplied with a factory holding charge. Refrigeration piping, electrical connections, drain lines and humidifier water connections are field installed.

The refrigeration piping and connections should be installed by a qualified refrigeration technician in accordance with standard air conditioning and refrigeration practice. This includes using properly sized refrigeration piping, using high-temperature brazing material, bleeding nitrogen through the system while brazing, using type L copper tubing dried and cleaned in accordance with ASTM B-280, using proper piping supports and vibration isolators, and dehydrating, evacuating, charging and leak testing.

Oil traps should be installed in the hot-gas lines whenever vertical risers exceed 20 feet, and inverted traps should be installed at the condenser to prevent refrigeration migration. Factory approval is required whenever the refrigerant piping exceeds 100 feet or when the condensers must be installed below the cooling coil. Condensers must be levelled and secured to steel supports or concrete pad.

### Installation of Water-Cooled Units

The integral refrigeration circuits in Ecosaire® water-cooled units are factory-charged and ready to operate. Only electrical connections and drain lines are necessary to complete the installation.

Only one water supply and return connection is required since the condensers have been manifolded together. Manual shut-off valves should be installed for service or emergency isolation. Water lines should be insulated to prevent condensation. Poor quality water should be filtered before it enters the unit.

### Installation of Glycol-Cooled & Free-Cool Units

Glycol-cooled and Free-Cool units both have factory-charged integral refrigeration circuits. Electrical connections, drains lines, humidifier water connections and glycol piping to the pump and drycooler are field installed. The control panel and pump are mounted to the glycol cooler. Only one glycol supply and return is required since the condensers have been manifolded together. Shut-off valves should be installed at the pump, glycol cooler and room unit for service or emergency isolation. It is recommended that glycol piping within the building be insulated to eliminate the chance of condensation.

Pipe sizing must be carefully selected. The data sheets for both glycol-cooled and Free-Cool systems include a summary of pressure drops for factory-supplied components along with a standard pump hp, total pressure and pressure available for piping. Refer to the pressure drop information on copper piping. This information should be used to select the proper pipe size and to determine if the standard pump is adequate. Pressure drop information for other than copper piping is available from the supplier but must be divided by 0.80 for 40 percent glycol.

The internal volumes of the room unit, cooler, and expansion tank have also been tabulated. Together with the copper pipe volumes, the proper volume of ethylene glycol can be determined. Normally, a 40 percent solution is used since it provides freeze protection to -15°F and is adequate for most installations. Proper inhibitor must also be used to prevent the solution from becoming increasingly corrosive. Inhibitor maintenance becomes increasingly important when steel pipe is used in the installation. Do not use automotive antifreeze.

**Installation of  
Dual-Cooled Units**

Dual-Cool units include both chilled-water cooling and mechanical cooling within the same unit. They require electrical, drain and humidifier connections, plus connection to a remote field-supplied water chiller, and to the condenser-cooling source for the refrigeration section.

The refrigeration section will be either air-cooled, water-cooled or glycol-cooled. Refer to the appropriate heading in this section to determine the requirements particular to each type.

**Installation of  
Chilled-Water Units**

Ecosaire® chilled-water units are shipped from the factory ready to operate. Only electrical, chilled-water supply, humidifier water and drain connections are required to complete the installation. Manual shut-off valves should be installed on the supply and return lines for service or emergency isolation. Chilled-water lines should be insulated to prevent condensation.



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