

# Vertiv™ Liebert® Mini-Mate Variable Capacity 3, 4, and 5 Ton Guide Specifications

## 1.0 GENERAL

### 1.1 Summary

These specifications describe requirements for a ceiling mounted thermal management system. The system shall be designed to control temperature conditions in rooms containing electronic equipment, with good insulation and vapor barrier. The system is also available with an optional humidity control package.

The manufacturer shall design and furnish all equipment in the quantities and configurations shown on the project drawings.

### 1.2 Design Requirements

The thermal management system shall be a Liebert® Mini-Mate Variable Capacity factory assembled unit. On direct expansion models, the refrigeration system shall be split, with the compressor located in a remote condensing unit.

The evaporator section shall be designed for above dropped ceiling installation. Condensing units shall be designed for outdoor installation. Refer to Section 2.8.2 for condensing unit guide specifications.

The system shall have a net total cooling capacity of \_\_\_\_\_ BTU/hr (kW) and a net sensible cooling capacity of \_\_\_\_\_ BTU/hr (kW), based entering air conditions of \_\_\_\_\_°F (°C) dry bulb and \_\_\_\_\_°F (°C) wet bulb. Net capacities shall include losses due to fan motor heat. The system cooling capacity shall be factory certified per ASHRAE127-2007 testing.

The unit is to be supplied for operation on a \_\_\_\_\_ volt, \_\_\_\_\_ phase, \_\_\_\_\_ Hz power supply.

System shall be supplied with CSA Certification to the harmonized U.S. and Canadian product safety standard CSA C22.2 No 236/UL 1995 for “Heating and Cooling Equipment” and marked with the CSA c-us logo (60 Hz only).

The system model number(s) shall be:

Evaporator\_\_\_\_\_

Condensing Unit \_\_\_\_\_

### 1.3 Submittals

Submittals shall be provided after the agreement of the proposal and shall include: single line diagrams; dimensional, electrical and capacity data; piping and electrical connection drawings.

### 1.4 Quality Assurance

The specified system shall be factory tested before shipment. Testing shall include but shall not be limited to: quality control checks, hi-pot test (two times rated voltage plus 1,000 volts, per NRTL agency requirements), and metering calibration tests. The system shall be designed and manufactured according to world class quality standards. The manufacturer shall be ISO 9001 certified.

## 1.5 Acceptable Alternatives

Acceptable alternatives shall be permitted with engineer's prior approval only. Contractor to submit a detailed summary form listing all variations to include size deviations, electrical load differences, functional and component changes and savings to end user.

## 2.0 PRODUCT

### 2.1 Standard Features/All Systems

#### 2.1.1 Evaporator Cabinet Construction

The cabinet and chassis shall be constructed of heavy gauge galvanized steel and shall be serviceable from one side only for routine maintenance. Mounting brackets shall be integral to the cabinet design. Internal cabinet insulation shall meet ASHRAE 62.1 requirements for Mold Growth, Humidity and Erosion, tested per UL 181 and ASTM 1338 standards.

#### 2.1.2 Remote Sensors

The unit shall be supplied with remote temperature and humidity sensors. The sensors shall be factory provided in an aesthetically pleasing housing with a 30 ft. (9 m), shielded cable and shall be field mounted and field wired to the unit electrical panel.

#### 2.1.3 Air Distribution 4 and 5 Ton Models

The fan shall be plug/plenum type, with motorized impeller, single inlet and dynamically balanced. The drive package shall be direct drive, electronically commutated (EC) and variable speed. The fan speed shall be automatically regulated by the Vertiv™ Liebert® iCOM™ control through all modes of operation. The fans shall be located to draw air over the coil to ensure even air distribution and maximum coil performance.

The evaporator system shall be capable of delivering \_\_\_CFM (CMH) at \_\_\_ inches (mm) of external static pressure. The fan motor shall be \_\_\_hp (W), maximum rating.

System shall be suitable for ducted supply and return air distribution or bottom supply grille and ducted return air distribution. Supply air location shall be field selectable, configured in one of three outlet locations: back of cabinet, right side, or bottom of cabinet. The bottom supply configuration will require an additional kit (ordered and shipped separately). Refer to 2.10.10 Air Filter Box/Duct Flange 4 and 5 Ton Models Only, and 2.10.12 Bottom Discharge Grille 4 Ton and 5 Ton Models Only.

#### 2.1.4 Air Distribution 3 Ton Models

The fan shall be a centrifugal type, double width, double inlet with electronically commutated (EC) direct drive motor. The fan speed shall be variable and automatically regulated by the Liebert® iCOM™ control through all modes of operation. The fan shall be located to maximize one-side service access.

The evaporator system shall be capable of delivering \_\_\_CFM (CMH) at \_\_\_ inches (mm) of external static pressure. The fan motor shall be \_\_\_hp (W), maximum rating.

System shall be suitable for supply and return air plenum or ducted supply and return air distribution. Refer to Air Filter Box/Duct Flange 3 Ton Models Only, and Air Distribution Plenum 3 Ton Models Only (ordered and shipped separately).

#### 2.1.5 Disconnect Switch, Non-Locking (5,000 amps SCCR) 4 and 5 Ton Models

The non-automatic, non-locking, molded case circuit breaker shall be factory mounted in the high voltage section of the electrical panel. The switch handle shall be accessible from the front of the indoor unit. The short circuit current rating for the evaporator unit shall be 5,000 amps.

#### 2.1.6 Disconnect Switch, Locking (5,000 amps SCCR) – 3 Ton Models

The non-automatic, locking, molded case circuit breaker shall be factory mounted in the high voltage section of the electrical panel. The switch handle shall be accessible from the front of the indoor unit. Access to the high voltage electric panel shall only be obtained with the switch in the Off position, and the handle shall be lockable to support lockout/tagout safety programs. The short circuit current rating for the evaporator unit shall be 5,000 amps.

## 2.1.7 Unit Controls, Protections, and Communication Terminals

The Vertiv™ Liebert® Mini-Mate shall include Vertiv™ Liebert® iCOM™ control with remote 9-in. color touchscreen display, a filter clog switch, common alarm contact, and remote shutdown contacts. Filter clog switch shall be adjustable outside the cabinet and shall activate an iCOM alarm when the pressure drop across the filters exceeds the customer adjustable level. Common Alarm Contact shall be one set of normally open contacts which shall close for remote indication of alarms. Remote Shutdown Contact shall enable unit shutdown based on external input.

## 2.2 Liebert® iCOM™ microprocessor control with remote 9-in. Color touchscreen

The Liebert® iCOM™ shall be microprocessor based with a remote 9-in. color touchscreen display and shall be mounted in an ergonomic, aesthetically pleasing housing. The controls shall be menu driven. The system shall display user menus for active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in percentage of each function, date and time), total run hours, various sensors, display setup, and service contacts. A password shall be required to make system changes. Service menus shall include setpoints, standby settings (lead/lag), timers/sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards, and diagnostics/service mode.

- Password Protection - The Liebert® iCOM™ shall contain two unique passwords to protect against unauthorized changes. An auto hide/show feature allows the user to see applicable information based on the login used.
- Unit Backup and Restore - The user shall be able to create safe copies of important control parameters. The Liebert® iCOM™ shall have the capacity for the user to automatically back up unit configuration settings to internal memory or USB storage drive. Configuration settings may be transferred to another unit for a more streamlined unit startup.
- Parameter Download - The Liebert® iCOM™ shall enable the user to download a report that lists parameter names, factory default settings, and user programmed settings in .csv format for remote reference.
- Parameter Search - The Liebert® iCOM™ shall have search fields for efficient navigation and parameter lookup.
- Setup Wizards - The Liebert® iCOM™ shall contain step-by-step tutorials or wizards to provide easy setup of the control. This shall be for 4 ton and 5-ton models only.
- Context Sensitive Help - The Liebert® iCOM™ shall have an onboard help database. The database shall provide context sensitive help to assist with setup and navigation of the menus.
- Display Setup - The user shall have the ability to configure the Liebert® iCOM™ information based on the specific user's preference. Language, units of measure, screen contrast, home screen layout, backlight timer and the hide/show of certain readouts shall be configurable through the display.
- Additional Readouts - The Liebert® iCOM™ shall permit the user to configure custom widgets on the main screen. Widget options shall include items such as fan speed, call for cooling, call for free-cooling, maintenance status, call for electric reheat, call for dehumidification, call for humidification, airflow, static pressure, fluid flow rate, and cooling capacity.
- Status LED's - The Liebert® iCOM™ shall provide the user with the unit's operating status using an integrated LED. The LED shall indicate if the unit has an active alarm; if the unit has an active alarm that has been acknowledged; or if the unit is On, Off or in standby status.
- Event Log - The Liebert® iCOM™ shall automatically store the last 400 unit only events (messages, warnings, and alarms).

- Service Contact Information - The Vertiv™ Liebert® iCOM™ shall have the ability to store the local service or sales contact information.
- Upgradeable - Liebert® iCOM™ upgrades shall be performed through a USB connection.
- Timers/Sleep Mode – The menu shall allow various customer settings for turning on/off unit.
- Menu Layout - The menus shall be divided into two main menu screens: User and Service. The User screen shall contain the menus to access parameters required for basic unit control and setup. The Service screen shall be designed for service personnel and provides access to advanced control setup features and diagnostic information.
- Sensor Calibration – The menus shall allow unit sensors to be calibrated with external sensors.
- Maintenance/Wellness Settings - The menus shall allow reporting of potential component problems before they occur.
- Options Setup - The menus shall provide operation settings for the installed components.
- Various Sensors - The menus shall allow setup and display of optional custom sensors. The control shall include four customer accessible analog inputs for field provided sensors. The analog inputs shall accept a 4 to 20mA signal. The user shall be able to change the input to 0 to 5 VDC or 0 to 10 VDC. The gains for each analog input shall be programmable from the front display. The analog inputs shall be able to be monitored from the front display.
- Diagnostics/Service Mode - The Liebert® iCOM™ shall be provided with self-diagnostics to aid in troubleshooting. Control inputs shall be indicated as On or Off at the front display. Control outputs shall be able to be turned On or Off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.
- **Base-Comms for BMS Connectivity** – The Liebert® iCOM™ controller shall provide one Ethernet port and RS-485 port dedicated for BMS connectivity. Provides ground fault isolated RS-485 Modbus, BACnet IP and Modbus IP network connectivity to building management systems for unit monitoring and management. Also, provides ground fault isolated 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for network management systems, HTTP for web page viewing, SMTP for email, and SMS for mobile messaging. The iCOM controller shall support dual IP on one network and one 485 protocol simultaneously. This shall apply to 3 Ton units only.

## 2.3 Alarms

All unit alarms shall be annunciated through both audio and visual cues, clearly displayed on the screen, automatically recorded in the event log and communicated (4 and 5 ton require optional communication card) to the customer's building management system/building automation system. The Liebert® iCOM™ shall activate an audible and visual alarm in the event of any of the following conditions:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- EC Fan Fault
- Change Filters
- Loss of Air Flow

- Loss of Power
- Humidifier Problem
- High Water (drain pan)
- High Head Pressure
- High Discharge Temperature (Compressor)
- Low Suction Pressure
- Custom Alarms

Custom alarm inputs shall be provided to indicate facility specific events. Custom alarms can be identified with programmable labels. Frequently used alarm inputs shall include:

- Smoke Detected (requires optional smoke sensor)
- Standby Unit On

Each alarm (unit and custom) shall be separately enabled or disabled, selected to activate the common alarm and programmed for a delay of 0 to 255 seconds.

## 2.4 Vertiv™ Liebert® iCOM™ Control Methods And Options

The Liebert® iCOM™ shall be factory set to allow precise monitoring and control of the condition of the air entering and leaving the unit. This control shall include predictive methods to control air flow and cooling capacity based control sensors installed. Proportional and tunable PID shall also be user selectable options.

### 2.4.1 Controlling Sensor Options

The Liebert® iCOM™ shall be flexible in the sense that it shall allow controlling the capacity and fan from multiple different sensor selections. The sensor selections shall be:

#### Cooling Capacity

- Remote
- Return

#### Fan Speed

- Remote
- Return
- Manual (for diagnostics or to receive a signal from the BMS through Liebert remote monitoring devices or analog input)

### 2.4.2 Temperature Compensation

The Liebert® iCOM™ shall have the ability to adjust the capacity output based on return temperature conditions to meet SLA guidelines while operating to highest efficiency.

### 2.4.3 Humidity Control

Dew point and relative humidity control methods shall be available (based on user preference) for humidity control within the space.

## 2.5 Multi-Unit Coordination

Liebert® iCOM™ teamwork shall save energy by preventing multiple units in an area from operating in opposing modes. Teamwork allows the control to optimize a group of connected units equipped with

Liebert® iCOM™ using the U2U (unit-to-unit) network. Field wiring shall be required between units' Liebert® iCOM™ display modules. There shall be two modes of teamwork operation:

- Teamwork Mode 1 (Parallel): Is best in small rooms with balanced heat loads. The controlling temperature and humidity sensor readings of all units in operation (fan On) are collected to be used for an average or worst case sensor reading (user selectable). The master unit shall send the operating requirements to all operating units in the group. The control band (temperature, fan and humidity) is divided and shared among the units in the group. Each unit will receive instructions on how to operate from the master unit based on how far the system deviates from the setpoints. Evaporator fans and cooling capacity are ramped in parallel.
- Teamwork Mode 2: The Vertiv™ Liebert® iCOM™ calculates the worst case demand for heating, cooling humidification, and dehumidification. Based on the greatest demand within the group, each unit operates independently, meaning that the unit may respond to the thermal load and humidity conditions based on the units controlling sensors.

## 2.6 Standby/Lead-Lag

The Liebert® iCOM™ shall allow planned rotation to keep equal run time on units and provide automated emergency rotation of operating and standby units.

## 2.7 Standby Unit Cascading

The Liebert® iCOM™ cascade option shall allow the units to turn On and Off based on heat load when utilizing Teamwork Mode 1-Parallel, and remote temperature sensors. Cascade mode shall coordinate the fan speed dynamically to save energy and to meet cooling demands. For instance, with a Liebert® iCOM™ group of six units and only 50% of the heat load, the Liebert® iCOM™ shall operate only four units at 80% fan speed and leave the other two units in standby. As the heat load increases, the Liebert® iCOM™ shall automatically respond to the new load and bring on another unit, increasing the units in operation to five. As the heat load shifts up or down, the control shall meet the needs by cascading units On or putting them back into standby.

## 2.8 Remote Monitoring

All alarms shall be communicated to the Liebert site monitoring system with the following information: date and time of occurrence, unit number and present temperature and humidity. Optional communication card is required on 4 and 5 ton models.

## 2.9 Direct Expansion System Components

### 2.9.1 Indoor Evaporator Unit 4 and 5 Ton Models

The evaporator section shall include evaporator coil, thermostatic expansion valve and filter drier. The evaporator coil shall have 5.6 sq. ft. (0.52 sq. m) face area, four rows deep. It shall be constructed of internally rifled copper tubes and lanced type aluminum fins and have a maximum face velocity of 482 FPM (2.45 m/s) at \_\_\_\_\_ CFM (\_\_\_\_ CMH). An externally equalized thermostatic expansion valve shall control refrigerant flow. The evaporator coil shall be factory charged with nitrogen and sealed. The system shall be field charged with field supplied R-410A refrigerant.

The coil assembly shall be mounted in a condensate drain pan with internally trapped drain line. The evaporator drain pan shall include a factory installed float switch to shut down the evaporator upon high water condition.

### 2.9.2 Indoor Evaporator Unit – 3 Ton Models

The evaporator section shall include evaporator coil, thermostatic expansion valve, and filter drier. The evaporator coil shall have 3.1 sq. ft. (0.29 sq. m) face area, three rows deep. It shall be constructed of internally rifled copper tubes and lanced type aluminum fins and have a maximum face velocity of 408 FPM (2.07 m/s) at \_\_\_\_\_ CFM (\_\_\_\_ CMH). An externally equalized thermostatic expansion valve shall control refrigerant flow. The evaporator coil shall be factory charged with nitrogen and sealed. The system shall be field charged with field supplied R-410A refrigerant.

The coil assembly shall be mounted in a condensate drain pan with internally trapped drain line. The evaporator drain pan shall include a factory installed float switch to shut down the evaporator upon high water condition.

### 2.9.3 Outdoor Air-Cooled Prop Fan Condensing Unit

The condensing unit shall be designed for outdoor use with either roof or ground level mounting. The condensing unit is constructed of galvanized and galvaneal painted steel for corrosion resistance. Removable exterior panels shall allow access to the electric panel or refrigeration components for service or maintenance. Both inlet and outlet air grilles shall be heavy duty steel with a durable polyester coating.

Condensing unit components shall include a condenser coil, a direct drive propeller type fan, a variable capacity digital scroll compressor, high pressure switch, high compressor discharge temperature switch, Vertiv™ Liebert® Lee-Temp insulated receiver with internal heater and head pressure control valve, and liquid line solenoid valve. The condensing coil shall be constructed of copper tubes and aluminum fins.

High head pressure switch shall protect the unit from abnormal refrigerant pressure conditions. Switch and sensor inputs shall be integrated with Liebert® iCOM™ for compressor protection while maintaining system and evaporator blower operation, displaying alarms at the wall display and providing system shutdown when required.

A pressure balancing valve shall be factory installed to reduce the chance of opening the high pressure relief valve due to excessive refrigerant migration to the receiver due to changing outdoor temperatures during off cycles.

All components shall be factory-assembled, charged with nitrogen and sealed. System shall be field charged with field supplied R-410A refrigerant. No internal piping, brazing, or dehydration shall be required. Condensing unit shall be designed for 95°F (35°C) ambient and shall be capable of starting and continuous operation down to -30°F (-34.4°C).

(Option) The condensing unit shall be designed to operate at a sound level less than 58 dBA – 5 ton only.

(Option) The condensing unit shall be designed to provide stated system capacity at 105°F (40.5°C) ambient — 3 ton and 5 ton only.

(Option) The coils shall be epoxy coated for extended coil life in corrosive environments, such as coastal areas. Factory applied E-coat using immersion and baking process shall provide a flexible epoxy coating to all coil surfaces. Coil color shall be black and shall be protected from solar UV ray degradation with a factory applied UV topcoat.

### 2.9.4 Indoor Water/Glycol Cooled Condensing Unit

The water/glycol condensing unit shall include a two-stage scroll compressor, high pressure switch, coaxial condenser, water regulating valve, and liquid line solenoid valve. A non-automatic, non-locking, molded case disconnect switch shall be factory mounted in the high voltage section of the electrical panel. The switch handle shall be accessible from the unit front. The cabinet and chassis shall be constructed of heavy gauge galvanized steel and shall be serviceable from one side. Mounting brackets shall be integral to the cabinet design and be designed for ceiling mounting.



High pressure switch shall protect the unit from abnormal refrigerant pressure conditions and shall deactivate the compressor and annunciate an alarm at the wall controller. The blower shall continue to circulate air. The wall controller shall be used to manually restart the compressor function after the automatic pressure switch resets. Three high head pressure alarms in a rolling 12-hour period shall lock out the manual restart feature until power is cycled to the evaporator unit.

The refrigerant piping shall be spun-closed and filled with a nitrogen holding charge. Field relief of the Schrader valves shall indicate a leak-free system. Evaporator and condensing unit shall be field piped using copper lines, brazed, evacuated and field charged with field-supplied R-410A refrigerant.

The water/glycol condensing unit shall be equipped with a coaxial condenser having a total system pressure drop of \_\_\_\_\_ ft. of water (kPa) and a flow rate of \_\_\_\_\_ GPM (l/s) with \_\_\_\_\_ °F (°C) entering water/glycol temperature.

The condenser circuit shall be pre-piped with a 2-way or 3-way regulating valve which is head-pressure actuated. The condenser water/glycol circuit shall be designed for a static operating pressure of 350 PSI (2413kPa).

### 2.9.5 Digital Scroll High Temperature Protection

The control shall monitor digital scroll temperature during unit operation. A compressor temperature limit shall be imposed to help prevent damage to the compressor. If the temperature reaches the maximum temperature limit, the compressor shall be locked out and an alarm shall be annunciated on the local display and through remote monitoring. After the initial lockout, the control shall continue to monitor compressor temperature during the off cycle and shall re-enable the circuit once a safe operating temperature is reached (minimum 30-minute lockout). After five high discharge temperature alarms within a rolling 4-hour period, the control shall lock out the compressor until power is cycled to the evaporator unit.

### 2.9.6 Digital Scroll Sensor Failure

The control shall monitor the status of the digital scroll sensor(s). If the control senses the thermistor becomes disconnected, shorted or the reading goes out of range, the user will be notified through an event on the local display and remote monitoring.

## 2.10 Factory Installed Options

### 2.10.1 Steam Generating Humidifier

The Thermal Management system shall be equipped with a steam generating humidifier that is controlled by the microprocessor control system. It shall be complete with disposable canister, all supply and drain valves, 1-in. (25.4mm) air gap on fill line, inlet strainer, steam distributor and electronic controls. The need to change canister shall be annunciated on the wall mounted controller. The humidifier shall have a capacity of \_\_\_\_\_ lb/hr (kg/h). An LED light on the humidifier assembly shall indicate cylinder full, overcurrent detection, fill system fault and end of cylinder life conditions. The canister flush water shall not drain into the coil drain pan due to risk of aggressive corrosion of the evaporator coil. The humidifier wand shall be mounted over the coil drain pan.

### 2.10.2 Electric Reheat

The electric reheat shall be low watt density, 304/304 stainless steel, finned tubular and shall be capable of controlling room dry bulb temperature conditions when the system is calling for dehumidification or heating. The reheat section shall include a UL/CSA recognized safety switch to protect the system from overheating. The capacity of the reheat coils shall be \_\_\_\_\_ BTU/HR (kW), with unit input voltage of \_\_\_\_\_ V, controlled in one stage. A ground current detector shall be factory installed to shut down the entire unit if a ground fault in the reheat system is detected.

### 2.10.3 SCR Electric Reheat – 4 Ton and 5 Ton DX Evaporators Only

SCR Electric Reheat option shall be an electric reheat element controlled by a variable output Silicon Controlled Rectifier (SCR) control. The SCR reheat shall provide precise temperature control while minimizing energy input utilizing iCOM control and digital scroll. Reheat capacity shall be 15 kW to offset the cooling capacity on 5 ton models and 10 kW on 4 ton models.

### 2.10.4 Disconnect Switch, Locking (65,000 amps SCCR) 4 and 5 Ton Models Only

The non-automatic, locking, molded case circuit breaker shall be factory mounted in the high voltage section of the electrical panel. The switch handle shall be accessible from the front of the indoor unit and shall have a lockable handle to support lockout/tagout safety programs. The short circuit current rating for the evaporator unit shall be 65,000 amps.

### 2.10.5 High Temperature Sensor

The high temperature sensor shall immediately shut down the system when high temperatures are detected. The high temperature sensor shall be mounted with the sensing element in the return air.

### 2.10.6 Smoke Sensor

The smoke sensor shall immediately shut down the environmental control system and activate the alarm system when activated. The sensing element shall sense the return air conditions. This smoke sensor shall not function or replace any room smoke detector that may be required by local or national codes.

### 2.10.7 IS-Unity-DP-CMS Card – 4 and 5 Ton Models Only

The IS-UNITY-DP-CMS card shall provide mobile cloud access, remote access to the unit level display via the world wide web and building management system (BMS) access via BACnet/Modbus IP and BACnet/Modbus 485. Card shall be factory installed in the IntelliSlot card housing on outside of cabinet.

### 2.10.8 Low Voltage Terminal Package

The Low Voltage Terminal Package shall include:

- Two additional remote input shutdown terminals
- Two extra common alarm N/O output contacts
- One main fan auxiliary N/O output contact
- One remote humidifier N/O output contact
- One Vertiv™ Liebert® Liqui-Tect™ input terminals (Liebert® Liqui-Tect™ priced separately)

### 2.10.9 SHIP LOOSE ACCESSORIES

#### 2.10.10 Air Filter Box/Duct Flange – 4- and 5-Ton Models Only

The evaporator section shall be supplied with an optional air filter box kit for use with ducted installations. Two filters shall be included 4 in. x 20 in. x 20 in. (102 mm x 508 mm x 508 mm) each, pleated type, with a MERV 8 rating, based on ASHRAE 52.2-2007. A duct flange shall be supplied for use on the supply air opening of the unit.

#### 2.10.11 Air Filter Box/Duct Flange – 3 Ton Models Only

The evaporator section shall be supplied with an optional air filter box kit for use with ducted installations. One filter shall be included 4 in. x 2 in. x 20 in. (102 mm x 508 mm x 508 mm), pleated type, with a MERV 8 rating, based on ASHRAE 52.2-2007. A duct flange shall be supplied for use on the supply air opening of the unit.

**2.10.12 Bottom Discharge Grille – 4 Ton and 5 Ton Models Only**

A 3-way louvered discharge air grille, painted white, shall be added to an independent T-bar ceiling grid assembly for air discharge directly into room from bottom of unit. Kit shall include air baffle and rear discharge block off plate.

**2.10.13 Air Distribution Plenum – 3 Ton Models Only**

A molded plastic air distribution plenum with integral return air filter shall be provided. The plenum shall be field mounted to the unit bottom and adjusted to completely cover T-bar grid and a standard 24 in. x 48 in. (610 mm x 1219 mm) ceiling grid area. The plenum shall provide 3-way air distribution and bottom return air. Filter size shall be 4 in. x 16 in. x 25 in. (102 mm x 406 mm x 535 mm), deep pleated type with MERV 8 rating, based on ASHRAE 52.2-2007, and shall be removable from plenum side door.

**2.10.14 Condensate Pump**

The condensate pump shall have the capacity of \_\_\_ GPH (\_\_\_ l/h) at \_\_\_ ft. head (\_\_\_ kPa). It shall be complete with integral float switch, pump, motor assembly, discharge check valve, duct/wall mountable bracket and reservoir. A secondary float switch shall be provided to permit field wiring to the unit control to shut down the evaporator upon a high water level condition.

**2.10.15 Condensate Pump Bracket – 4 and 5 Ton Models Only**

A condensate pump bracket shall be provided to mount condensate pump directly to the end of the unit, allowing for easier installation and alignment of the condensate pump.

**2.10.16 Vertiv™ Liebert® Liqui-Tect™ 410 Point Leak Detection Sensor**

A total of \_\_\_\_\_ (quantity) solid state water sensor(s) with no moving parts and hermetically sealed to keep out dust and dirt shall be provided. The Liebert® Liqui-Tect™ 410 (LT410) shall provide a single point detection of leaks. The point detection sensor shall have two gold plated sensing probes to prevent corrosion resistance and to provide accurate readings. The LT410 shall constantly monitor points for leaks, internal faults, and power failures and warn of any abnormal conditions. Mounting brackets shall allow for sensor height adjustment and leveling. The LT410 shall provide two independent outputs to signal both a local alarm panel and a remote building management system or external equipment. The LT410 shall be rated for 24 VAC, 50/60 Hz and 0.10 amps. Liebert® Liqui-Tect™ sensor shall be field mounted and field wired to both monitoring contacts and 24 VAC supply power.

## 3.0 EXECUTION

### 3.1 Installation Of Air Conditioning Unit

#### 3.1.1 General

Install air conditioning unit in accordance with manufacturer's installation instructions. Install unit plumb and level, firmly anchored to support the unit's weight in location indicated and maintain manufacturer's recommended clearances. Do not mount units above sensitive electronic equipment to minimize risk of water overflow/leakage damage and improve maintenance/service access.

#### 3.1.2 Electrical Wiring

Install and connect electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's electrical connection diagram submittal to electrical contractor.

#### 3.1.3 Piping Connections

Install and connect devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

#### 3.1.4 Supply and Drain Water Piping

Connect water supply and drains to air conditioning unit. Unit drain shall be trapped internally and shall not be trapped externally.

#### 3.1.5 Field Supplied Pan

A field supplied pan with drain shall be installed beneath cooling units and water/glycol condensing units.

### 3.2 Field Quality Control

Startup air conditioning unit in accordance with manufacturer's startup instructions. Test controls and demonstrate compliance with requirements.