Vertiv™ Liebert® CWA
Thermal Wall
Guide Specifications

1.0 GENERAL

1.1 Summary

These specifications describe requirements for a Thermal Management system. The system shall be designed to control temperature in rooms containing electronic equipment, with good insulation and vapor barrier. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the room.

1.2 Design Requirements

The Thermal Management system shall be a Liebert self-contained, factory assembled unit. Standard 60 Hz units shall be CSA-certified to the harmonized U.S. and Canadian product safety standard, "CSA C22.2 No 236/UL 1995 for Heating and Cooling Equipment" and are marked with the CSA c-us logo.

1.3 Submittals

Submittals shall be provided with the agreement of the proposal and shall include: Single Line Diagrams; Dimensional, Electrical and Capacity Data; Piping; and Electrical Connection Drawings.

1.4 Serviceability/Access

All service and maintenance shall be performed through the Gallery side of the unit, including any component removal (except the chilled water coil). No side access shall be required. All electrical and piping connections are made through the top of the unit.

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.

1.6 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." The system shall be designed and manufactured according to world-class quality standards.

2.0 PRODUCT

2.1 Cabinet Section

2.1.1 Frame

The unit frame section shall be constructed of 10-gauge and 12-gauge riveted structure.

2.1.2 Panels

Panels shall be painted steel with matte black finish. A hinged control access panel shall open to a second front panel which is a protective enclosure for all high voltage components.

2.1.3 Horizontal Air Discharge

The supply air shall exit from the front (data hall side) of the unit.

2.1.4 Discharge Grills

Discharge grills shall have mesh pattern 2" (51 mm) x 7.5" (191 mm) and chrome color.

2.1.5 Filters

The filter chamber shall be located on the gallery side of the chilled water coil cabinet. Filters shall be removable from the gallery side of the unit.

- **Filter Type, 4 in. MERV8 or MERV11**

  Filters shall be deep pleated, 4" (102 mm) filters with an ASHRAE 52.2-2007 MERV8 or MERV11 rating.

  - Extra Filter Set

    ____ extra set(s) of filters shall be provided per system.

- **Filter Clog**

  The filter clog shall sound alarm when unit filters need to be changed (included with filter option).

2.2 Air Side/Fan Section

2.2.1 Standard Axial Fan

Standard Axial fans shall be integral direct driven and Electronically Commutated DC motors commonly referred to as an EC fan. The fan speed shall be variable and automatically regulated by the Vertiv™ Liebert® iCOM™ control through all modes of operation. The fans shall be located to blow air over the coil to ensure even air distribution and maximum coil performance. Fan motors shall be nominal 4.69 hp (3.5kW) each, with a maximum operating speed of 1200 rpm. (Quantity of 4, 2 fans in the top module and 2 fans in the bottom module.)

2.2.2 High Airflow, High Efficiency Fan—Optional

High airflow, high efficiency fans shall be Electronically Commutated DC motors commonly referred to as an EC fan. The fan speed shall be variable and automatically regulated by the Liebert® iCOM™ control through all modes of operation. The fans shall be located to blow air over the slab coil to ensure even air distribution and maximum coil performance. Fan motors shall be nominal 4.96 hp (3.70 kW) each, with a maximum operating speed of 1420 rpm. (Quantity of 6, 3 fans in the top module and 3 fans in the bottom module.)

2.3 Water Side/System Piping

2.3.1 Unit Water Circuit (Coil, Piping, and Valves)

Chilled water system, which includes bottom and top modules with coils, valves, and piping shall be designed for a maximum system water pressure of 270 PSIG (1861 kPa).

2.3.2 Chilled Water Coil

The chilled water coil shall be slab design for horizontal airflow and have 101.2 sq. ft. (9.4 sq. m) face area, _____ (4, 6, or 8) rows deep. It shall be constructed of copper tubes and aluminum fins with a maximum face velocity of _____ ft. per minute (_____ m/s) at _____ CFM (_____ CMH). A stainless-steel condensate drain pan shall be provided.

2.3.3 Chilled Water Control Valves

The water circuit shall include valves located in the top module: one valve for the top coil and one valve for the bottom coil. The motorized ball valves shall be modulating type that provide proportional control in response to room temperature and humidity as sensed by the microprocessor control. Valves shall be designed for up to 400 PSIG (2758 kPa) water pressure rating. Valve close-off pressure differential shall be 100 PSI (689 kPa). Transparent sight glasses shall be factory installed to allow for viewing of valve position.

2.3.4 Internal Piping Connections Between Modules

Internal Supply and Return Chilled Water Connections Between Modules

The Vertiv™ Liebert® CWA Top and Bottom modules shall be shipped with a holding charge of nitrogen. The supply and return piping that connect the top and bottom modules shall be field brazed connections.

Internal Condensate Connections Between Modules

The Liebert® CWA Top and Bottom module condensate drain hoses shall be connected in the field with factory provided hose clamps.

Internal Condensate Pump Piping Drain Line Connection Between Modules

The Liebert® CWA Top and Bottom module piping for optional condensate pump copper drain lines shall be field brazed together.

2.3.5 Customer Piping Connections

Customer Supply and Return Chilled Water Piping Connections

The supply and return chilled water connections shall be 4-1/8 in. OD CU and field brazed.

Flanged Customer Supply and Return Chilled Water Piping Connections - Optional

The optional, factory installed, supply and return chilled water flanged connections shall be 150 lb. Class steel pipe rated at 270 psi minimum to improve ease of customer connection to field supplied flanges and piping.

Condensate Customer Drain Connection

The factory provided condensate drain connection shall be ¾" FPT. Field to provide condensate drain from the unit per local code.

Condensate Pump Drain Connection

The factory provided condensate pump drain connection at the top of the unit shall be ½" OD CU. Field to provide connection per local code.

2.4 Electrical Components

2.4.1 Short Circuit Current Rating (SCCR)

The electrical panel shall provide at least 65,000A SCCR. Short circuit current rating (SCCR) is the maximum short circuit current a component or assembly can safely withstand when protected by a specific overcurrent protective device(s) or for a specified time.

2.4.2 Supply Air Sensor

The supply air temperature sensor shall provide real-time, direct feedback to the cooling unit to provide a consistent supply air temperature by adjusting the chilled water valve accordingly to maintain setpoint. The supply air temperature sensor will provide real-time monitoring of discharge air temperature on all other units.

2.4.3 Return Air Temperature and Humidity Sensors

The return air temperature and humidity sensor shall be included as standard on the Vertiv™ Liebert® CWA unit. Sensors are used for monitoring temperatures for safety and alarming purposes and may be used for optional unit control.

2.4.4 Common Alarm Contact Signal

One normally open type programmable common alarm is provided to interface user-selected alarms with a remote alarm monitoring device.

2.4.5 Remote Shutdown Terminal

The remote shutdown terminal shall provide the customer with a location to remotely shut down the unit, complying with the National Fire Code.

2.4.6 Locking Disconnect Switch

Locking Disconnect and Quick-Start Enabled

The locking type disconnect shall be a fused disconnect switch that can be accessed by opening the accent panel. Access to the high voltage electric panel compartment can be obtained only with the switch in the Off position. Fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on.

Each Liebert® CWA shall have the Chilled Water Quick-Start feature enabled. After a loss of power, normally the Vertiv™ Liebert® iCOM™ control application takes approximately 60 seconds to reboot to allow the unit to provide airflow and cooling. Once the feature is enabled, the end user may configure a specific airflow output percent and cooling capacity output percent as desired. The unit shall operate at these configured values within approximately 10 seconds after a power restoration all while the Liebert® iCOM™ controller is rebooting. After the Liebert® iCOM™ has fully booted, the unit will continue normal operation.

Locking Disconnect, Quick-Start Enabled, and Capacitive Buffer—Optional

The locking type disconnect shall be a fused disconnect switch that can be accessed by opening the accent panel. Access to the high voltage electric panel compartment can be obtained only with the switch in the Off position. Fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on.

Each Liebert® CWA shall have the Chilled Water Quick-Start feature enabled. After a loss of power, normally the Liebert® iCOM™ control application takes approximately 60 seconds to reboot to allow the unit to provide airflow and cooling. Once the feature is enabled, the end user may configure a specific airflow output percent and cooling capacity output percent as desired. The unit shall operate at these configured values within approximately 10 seconds after a power restoration all while the Liebert® iCOM™ controller is rebooting. After iCOM has fully booted, the unit will continue normal operation.

The unit shall be equipped with a capacitive buffer to provide the iCOM with a minimum of three minutes of ride-through power. The capacitive buffer shall provide power to the Liebert® iCOM™ control with embedded Unity functionality for continuous connectivity to Building Management System/Building Automation Systems (where applicable). This functionality is not available with valve configured for spring return closed.

Dual Locking Disconnects with ATS Control and Quick-Start Enabled—Optional

The Vertiv™ Liebert® CWA unit shall be provided with two manual locking disconnect switches. The locking type disconnects shall be fused disconnect switches that can be accessed by opening the accent panel. Access to the high voltage electric panel compartment can be obtained only with the switches in the Off position. Fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on.

The unit shall include reversing starter with ATS (automatic transfer switch) control.

The ATS control will be capable of the following features:

- Determine if power is available in both primary and secondary sources.
- Allow for selection of which source is primary and which source is secondary.
- Ability to automatically switch from primary to secondary source, in the event of primary power loss.
- Ability to automatically switch secondary to primary source when primary power returns.
- Ability to remove unit from active power source if there is:
    - Voltage Imbalance
    - Phase Loss
    - Over/Under Voltage
    - Over/Under Frequency
- Capability for 3rd party interface monitoring and control

Vertiv™ Liebert® iCOM™ control will pull key information from the ATS control, allowing for easy interpretation of the current operation without needing to open the unit's front panel, potentially interrupting operation.

Each Liebert® CWA shall have the Chilled Water Quick Start feature enabled. After a loss of power, normally the iCOM control application takes approximately 60 seconds to reboot to allow the unit to provide airflow and cooling. Once the feature is enabled, the end user may configure a specific airflow output percent and cooling capacity output percent as desired. The unit shall operate at these configured values within approximately 10 seconds after a power restoration all while the iCOM controller is rebooting. After the iCOM has fully booted, the unit will continue normal operation.

Dual Locking Disconnect with ATS Control, Capacitive Buffer, and Quick-Start Enabled - Optional

The Liebert® CWA unit shall be provided with two manual locking disconnect switches. The locking type disconnects shall be fused disconnect switches that can be accessed by opening the accent panel. Access to the high voltage electric panel compartment can be obtained only with the switches in the Off position. Fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on.

The unit shall include reversing starter with ATS (automatic transfer switch) control.

The ATS control will be capable of the following features:

- Determine if power is available in both primary and secondary sources.
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- Ability to automatically switch secondary to primary source when primary power returns.
- Ability to remove unit from active power source if there is:
  - Voltage Imbalance
  - Phase Loss
  - Over/Under Voltage
  - Over/Under Frequency
- Capability for 3rd party interface monitoring and control

Vertiv™ Liebert® iCOM™ control will pull key information from the ATS control, allowing for easy interpretation of the current operation without needing to open the unit's front panel, potentially interrupting operation.

The unit shall be equipped with a capacitive buffer to provide the Liebert® iCOM™ with a minimum of three minutes of ride-through power. The capacitive buffer shall provide power to the Liebert® iCOM™ control with embedded Unity functionality for continuous connectivity to Building Management System/Building Automation Systems (where applicable). This functionality is not available with valve configured for spring return closed.

Each Vertiv™ Liebert® CWA shall have the Chilled Water Quick-Start feature enabled. After a loss of power, normally the iCOM control application takes approximately 60 seconds to reboot to allow the unit to provide airflow and cooling. Once the feature is enabled, the end user may configure a specific airflow output percent and cooling capacity output percent as desired. The unit shall operate at these configured values within approximately 10 seconds after a power restoration all while the iCOM controller is rebooting. After the iCOM has fully booted, the unit will continue normal operation.

3.0 CONTROLS

3.1 Vertiv™ Liebert® iCOM™ Microprocessor Control With 7 In. Color Touchscreen

The Liebert® iCOM™ shall be microprocessor based with a 7 in., high definition, capacitive, color touchscreen display and shall be mounted in an ergonomic, aesthetically pleasing housing. The display and housing shall be viewable while the front panel is open or closed. 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. The Liebert® iCOM™ control shall provide Ethernet/RS-485 ports dedicated for BMS connectivity (i.e. Base-Comms).

- **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 backup 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 Directory**—The Liebert® iCOM™ shall provide a directory that lists all parameters in the control. The list shall provide Line ID numbers, parameter labels, and current parameter values.
- **Parameter Search**—The Liebert® iCOM™ shall have search fields for efficient navigation and parameter lookup.
- **Context-Sensitive Help**—The Liebert® iCOM™ shall have an on-board 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 hot water reheat, call for electric reheat, call for dehumidification, call for humidification, airflow, static pressure, fluid flow rate, and cooling capacity.
- **Status LEDs**—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 Liebert® iCOM™ shall have the ability to store the local service or sales contact information.

- **Upgradeable**— Vertiv™ Liebert® iCOM™ firmware 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 personal 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.
- **Auxiliary Boards**—The menus shall allow setup of optional expansion boards.
- **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 5VDC or 0 to 10VDC. 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. The microcontroller board shall be diagnosed and reported as pass/not pass. 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 Liebert® iCOM™ controller can support dual IP on a single network and one 485 protocol simultaneously.

3.2 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 to the customer's Building Management System/Building Automation System. The 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
- Fan Fault
- Change Filters
- Loss of Air Flow

- Loss of Power
- 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:

- Leak Under Floor
- Smoke Detected
- 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.

3.3 iCOM Control Methods And Options

The Vertiv™ 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.

3.3.1 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
  - Supply
  - Remote
  - Return
- Fan Speed
  - Supply
  - Remote
  - Return
  - Manual (for diagnostics or to receive a signal from the BMS through Liebert remote monitoring devices or analog input)
  - Static Pressure

3.3.2 Temperature Compensation

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

3.4 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 equipped with Liebert® iCOM™ using the U2U (Unit to Unit) network. There shall be three 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 derived 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 (Independent):** The Vertiv™ Liebert® iCOM™ calculates the worse-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. All sensor readings are shared.
- **Teamwork Mode 3**: Optimized Aisle (Optimized Aisle): May be applied in large and small rooms with varying heat loads. Optimized Aisle is the most efficient teamwork mode that allows the unit to match cooling capacity with heat load. In the Optimized Aisle mode, the fans operate in parallel. Fans can be controlled exclusively by remote temperature or using static pressure with a secondary remote temperature sensor(s) as an override to ensure that the inlet rack temperature is being met. Cooling (Compressors, Vertiv™ Liebert® Economizer or Vertiv™ Liebert® EconoPhase) is controlled by off unit supply air conditions. The Liebert® iCOM™ calculates the average or worst-case sensor reading (user selectable) for heating, cooling, humidification, and dehumidification. Based on the demand within the group, units will be allowed to operate within that mode until room conditions are satisfied. This is the best form of control for a room with an unbalanced load.

3.5 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.

3.6 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 3–Optimized Aisle mode with remote temperature sensors. In Teamwork Mode 3, Cascade mode will stage units On based on the temperature and humidity readings and their deviation from setpoint. Cascade mode coordinates the fan speed dynamically to save energy and to meet cooling demands. For instance, with a iCOM group of six units and only 50% of the heat load, the iCOM shall operate only four units at 80% fan speed and leave the other two units in standby. As the heat load increases, the 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.

3.7 Virtual Master

As part of the robust architecture of the Liebert® iCOM™ control, it shall allow for a virtual master that coordinates operation. The Virtual Master function shall provide smooth control operation if the group's communication is compromised. When the lead unit which is in charge of component staging in teamwork, unit staging, and standby rotation becomes disconnected from the network, the Liebert® iCOM™ automatically assigns a virtual master. The virtual master shall assume the same responsibilities as the master until communication is restored.

3.8 Virtual Back-Draft Damper

The Liebert® iCOM™ shall allow the use of a virtual backdraft damper, eliminating the need for a mechanical damper. This shall allow the fans of a stand-by unit to spin in reverse at a low speed (15% or less) to act as a damper.

3.9 Wired Supply Sensor

Each iCOM shall have one factory supplied and connected supply air sensor that may be used as a controlling sensor or reference. When multiple sensors are applied for control purposes, the user shall be able to control based on a maximum or average temperature reading.

3.10 System Auto Restart

The auto restart feature shall automatically restart the system after a power failure. Time delay shall be programmable. An optional capacitive buffer may be provided for continuous control operation through a power outage.

3.11 Sequential Load Activation

On initial startup or restart after power failure, each operational load shall be sequenced with a minimum of one second delay to minimize total inrush current.

3.12 CW Quick-Start

Each Vertiv™ Liebert® CWA shall have the Chilled Water Quick-Start feature enabled. After a loss of power, normally the iCOM control application takes approximately 60 seconds to reboot to allow the unit to provide airflow and cooling if Quick-Start feature is not enabled. Once the feature is enabled, the end user may configure a specific airflow output percent and cooling capacity output percent, as desired. The unit shall operate at these configured values within approximately 10 seconds after a power restoration all while the iCOM controller is rebooting. After Vertiv™ Liebert® iCOM™ has fully booted, the unit will continue normal operation.

3.13 Adaptive PID - CW Auto-Tuning

Liebert® iCOM™ shall support the use of Liebert's auto-tuning feature called Adaptive PID. Adaptive PID may be used for fan speed control or cooling capacity control. With Adaptive PID selected, Liebert® iCOM™ shall automatically recognize oscillations across multiple subsystems relating to the PI tuning associated with either mode of control and correct those oscillations with zero human intervention. This feature allows for better overall system operation and responds well to increasing/decreasing system load.

3.14 Supply Sensor Aggregation

Each Liebert® iCOM™ controller shall support the Supply Sensor Aggregation feature. Supply Sensor Aggregation allows for the use of additional remote 2T temperature sensors that are used to calculate an aggregated supply air temperature value which may be used for cooling capacity control. Each Liebert® iCOM™ controller can support up to five additional remote 2T sensors for supply sensor aggregation. Sensors must be ordered separately and may be in addition to WIRED REMOTE 2T sensor application.

4.0 MISCELLANEOUS OPTIONS

4.1 IBC Seismic Bracing SDS 0.75 - Optional

The Vertiv™ Liebert® CWA cabinet shall include factory installed bracing, must be in compliance with IBC2018, CBC 2019, Ip 1.0 and Sds 0.75 requirements, based on third-party analytic certification. A certificate of compliance is available upon request. Unit must be installed per factory installation instructions to fully comply with certification. IBC Sds 0.75 Seismic Bracing option shall be compatible with units that have Standard Axial Fan or High Airflow, High Efficiency Fan.

4.2 IBC Seismic Bracing SDS 2.5 - Optional

The Liebert® CWA cabinet shall include factory installed bracing must be in compliance with IBC2018, CBC 2019, Ip 1.0 and Sds 2.5 requirements, based on third-party analytic certification. A certificate of compliance is available upon request. Unit must be installed per factory installation instructions to fully comply with certification. IBC Sds 2.5 Seismic Bracing option shall be compatible with units that have Standard Axial Fan or High Airflow, High Efficiency Fan.

4.3 Total Harmonic Distortion Mitigation (THD) – Optional

The requirement for total harmonic distortion (THD) mitigation is application dependent. It is recommended that start-up measurements be conducted to evaluate if current THD levels are within acceptable limits. This option may be necessary in applications where the computer room air conditioner units operate on backup power sources, such as a generator, and the blower current exceeds 33% of the generator load capacity. THD mitigation may be required if the EC blower load constitutes a significant percentage of the UPS capacity (in installations with a UPS) or if the blower load represents a substantial portion of the utility service power, especially in installations with a weak power supply. The THD mitigation option shall be factory-installed in the Liebert® CWA unit.

4.4 Power Monitoring - Optional

The unit shall be equipped with factory-programmed/installed power meter to monitor power characteristics for either individual component or total unit. The power meter allows the user to monitor meter connection status, input under voltage, input RMS voltage leg-to-leg and leg-to ground, input current for each phase, energy consumption in kilowatt hours and instantaneous power in watts. In multi-unit applications, a phase loss protection routine shall place a unit into standby mode in the event that phase loss is detected.

4.5 Static Pressure Fan Control - Optional

A pressure transducer shall be factory installed in the unit and wired to an analog input on the Vertiv™ Liebert® iCOM™ control. The pressure ports on the transducer will be factory supplied with two sections of 50 ft. (15.2 m) tubing to be used for low and high side tubing with snubber installed close to the transducer on the high side. Tubing will be coiled and tied to the unit.

NOTE: Air probe is not provided.

4.6 Backdraft Barrier Plate Kit For Standard Axial Fan - Optional

Backdraft Barrier Plate Kit for use with Standard Axial Fans shall be used to block airflow for unit or fan section not in operation. Kit includes two plates. Multiple quantities may be selected per desired application.

4.7 Backdraft Barrier Plate Kit For High Airflow, High Efficiency Fan - Optional

Backdraft Barrier Plate Kit for use with High Airflow, High Efficiency Fans shall be used to block airflow for unit or fan section not in operation. Kit includes three plates. Multiple quantities may be selected per desired application.

4.8 Standard Axial Fan Handover Spares Kit - Optional

Standard Axial Fan Handover Spares Kit shall include critical spare parts (two Standard Axial Fans, fuses, Liebert® iCOM™ unit control board, and display) for 460V Liebert® CWA.

4.9 Standard Axial Fan (with THD Program) Handover Spares Kit - Optional

Standard Axial Fan Handover Spares Kit shall include critical spare parts (two Standard Axial Fans programmed for use with THD, fuses, Vertiv™ Liebert® iCOM™ unit control board, and display) for 460V Vertiv™ Liebert® CWA.

4.10 High Airflow, High Efficiency Fan Handover Spares Kit - Optional

High Airflow, High Efficiency Fan Handover Spares Kit shall include critical spare parts (two High Airflow, High Efficiency Fans, fuses, Liebert® iCOM™ unit control board, and display) for 460V Liebert® CWA.

4.11 High Airflow, High Efficiency Fan (with THD Program) Handover Spares Kit - Optional

High Airflow, High Efficiency Fan Handover Spares Kit shall include critical spare parts (two High Airflow, High Efficiency Fans programmed for use with THD, fuses, Liebert® iCOM™ unit control board and display) for 460V Liebert® CWA.

4.12 Gravity Condensate Connection Conversion Kit - Optional

Gravity Condensate Connection Conversion Kit shall include all parts necessary to alter the standard gravity drain of the Liebert® CWA to allow either right hand or left hand gravity condensate drain connection from the unit when viewed from the Gallery Side. Some components from the standard assembly must be used for the conversion connection.

4.13 High Temperature Sensor - Optional

This sensor shall be factory-installed in the unit and shall be factory set to 125ºF (52ºC). It shall immediately shut down the environmental control system when activated. The sensor shall be mounted with the sensing element in the return air. This sensor is not meant to replace any fire detection system that may be required by local or national codes.

4.14 Smoke Sensor - Optional

The smoke sensor samples the return air, shuts down the unit upon activation, and sends visual and audible alarms. Dry contacts are available for a remote customer alarm. The smoke sensor includes a "supervision" contact closure. This smoke sensor is not intended to function as or replace any room smoke detection system that may be required by local or national codes.

4.15 Condensate Pump, Dual Float - Optional

The condensate pump shall be complete with integral dual-float switch, pump, motor assembly, and reservoir. The secondary float shall send a signal to the Liebert® iCOM™, which will display the condensate pump alarm and shut down the unit upon high water condition. An additional dedicated normally open contact signal shall also be provided. The condensate pump shall be factory installed in the Liebert® CWA bottom module.

4.16 Remote Humidifier Contact - Optional

A pair of normally open contacts shall be provided for connection to a remote humidifier that allow the unit's humidity controller to control a humidifier outside the unit. Power to operate the remote humidifier does not come from the unit.

4.17 Remote Temperature and Humidity Sensors - Optional

Remote temperature and humidity sensor shall be provided in a vented case for mounting in the room to be conditioned. Includes 30 ft. (9m), 60 ft. (18m), 90 ft. (27m), 120 ft. (36m), or 150 ft. (45m) of cable supplied for connecting sensors to unit. Units are supplied without internal return air temperature and humidity sensors when remote sensor is selected.

4.18 Low Voltage Terminal Package - Optional

Factory-installed and factory-wired terminals shall be provided.

- **Remote Shutdown Terminals** - Two additional pairs of terminals provide the customer with additional locations to remotely shut-down the unit by field-installed devices or controls.
- **Extra Common-Alarm Contacts** - Two additional pairs of terminals provide the customer with normally-open contacts for remote indication of unit alarms.
- **Main-Fan Enabled Contact** - On Main Fan Enable, one set of normally-open contacts will close for remote indication of fan operation.
- **Vertiv™ Liebert® Liqui-Tect™ Shutdown** - 1 pair of dry contacts for the Liebert® Liqui-Tect™ sensor signal will provide unit shut down. (Liqui-Tect sensor is not included.)

4.19 LT460 Liebert® Liqui-Tect™ Sensor (Factory Installed) - Optional

LT460 Liebert® Liqui-Tect™ zone water sensor cable shall be factory wired and secured in the bottom of the Vertiv™ Liebert® CWA Bottom Module. The LT460 provides zone leak coverage within the bottom module by utilizing a leak detection cable. A cable termination sensor box is powered by 24 VAC from the Liebert® CWA unit with two Form-C dry contact common alarm relay outputs rated at 24 VAC, 3 Amp to remotely signal leak detected, loss of power and cable fault. The leak cable consists of a four-conductor cable, with two conductors being jacketed with CL2P rated covering. The two remaining conductors are covered with porous non-conductive polymers. The cable is UL-listed with a CL2P rating. The end of the cable is terminated in matching male and female connectors for easy connection of cables from end to end. Accuracy of the leak cable is linear and within 1% of the length of the cable.

4.20 Liebert® Liqui-Tect™ Sensors (Maximum Of 2 Per Unit) - Optional

Liqui-Tect sensor(s) model _____ shall be field installed and connected to Liebert® CWA unit. The water sensor is a hermetically sealed solid-state device with no moving parts. When the sensor detects the presence of moisture, the alarm system is activated.

____ (quantity) solid state water sensors shall be provided for installation.

4.21 Vertiv™ Liebert® vNSA Network Switch - Optional

The Liebert® vNSA network switch is designed for networking multiple iCOM unit-level controllers together. There shall be two different styles of the vNSA14 panel available:

- Liebert® vNSA14—enclosure with network switches only
- Liebert® vNSA14 iCOM™-H - enclosure with network switches and 9-in. iCOM color touchscreen display

Each offering shall be housed inside a steel enclosure secured with a key lock and contain two network switches, providing a total of 14 Ethernet ports available for iCOM controller unit-to-unit networking. The Liebert® vNSA requires field supplied, hard wiring, 16AWG, 100-240VAC universal (12V, 1.5A) single-phase input power supply for 120V or 230V operation with factory supplied power connector.

4.22 Remote 2T Sensor(s) - Optional

Remote 2T sensors may be used for remote monitoring and control application such as supply sensor aggregation. A maximum of 10 sensors for WIRED 2T and maximum of five for supply sensor application per unit.

As part of the U2U network, these WIRED 2T sensors shall be shared and used to control the cooling units and provide greater flexibility, visibility, and control to respond to changes in the conditioned space. When the sensors are used for control, the user may set the control to be based off a maximum or average of a selected highest temperature reading.

5.0 EXECUTION

5.1 Installation Of Thermal Management Units

The customer or the customer's representative shall be responsible for the following.

5.1.1 General

Install Thermal Management units in accordance with the manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated and maintain the manufacturer's recommended clearances.

5.1.2 Electrical Wiring

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

5.2 Piping Connections

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

5.2.1 Supply, Return, and Drain Water Piping

Connect water supply, water return, and drains to air conditioning unit. Provide pitch and trap as manufacturer's instructions and local codes require.

5.3 Field Quality Control

Start cooling units in accordance with the manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements. These specifications describe requirements for a computer room environmental control system. The system shall be designed to maintain temperature and humidity conditions in the rooms containing electronic equipment.

The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements.

5.3.1 Warranty Start-up and Control Programming

Install the indoor unit in accordance with manufacturer's installation instructions provided with seismic option. Firmly anchor maintaining manufacturer's recommended clearances. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection and attachment to non-building structures must be outlined and approved by the Engineer of Record for the projection or building. Electrical, pipe, and duct connections must permit movement in three dimensions and isolate the unit from field connections. Electrical conduit shall be flexible, having at least one bend between the rigid connection at the unit cabinet and the connection to rigid conduit or foundation. The piping flexible connection or loop must be suitable for the operation pressure and temperature of the system. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

Engage manufacturer's field service technician to provide warranty start-up supervision and assist in programming of unit(s) controls and ancillary panels supplied by them.