Vertiv™ Liebert® MC Condensers
Vertiv™ Liebert® Air-Cooled with Microchannel Coils and EC Fans
Guide Specifications

1.0 GENERAL

1.1 Summary

These specifications describe requirements for a Liebert® Air-Cooled condenser for a Liebert Thermal Management system. The condenser shall be designed to reject waste heat to outdoor air and to control refrigerant head pressure as indoor equipment loading and outdoor ambient conditions change.

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

Standard 60Hz units are 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.

The condenser model number shall be: _____

1.2 Design Requirements

The Liebert® Air-Cooled condenser shall be a factory-assembled unit, complete with integral electrical panel, designed for outdoor installation. The condenser shall be a draw-through design.

The condenser shall have a total heat rejection capacity of _____ kW (kBtuh) rated at an outdoor ambient of _____ °F (°C) and a midpoint condensing temperature of _____ °F (°C) and a refrigerant flow to produce a subcooling of 5°F (2.8°C).

The unit is to be supplied for operation using a _____ volt_____ phase, _____Hz power supply.

1.3 Submittals

Submittals shall be provided with the proposal and shall include: 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 1000V, 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.

2.0 PRODUCT

2.1 Standard Features-All Condensers

Condenser shall consist of microchannel condenser coil(s), propeller fan(s) direct-driven by individual fan motor(s), electrical controls, housing and mounting legs. The Vertiv™ Liebert® Air-Cooled condenser shall provide positive refrigerant head pressure control to the indoor cooling unit by adjusting heat rejection capacity. Microchannel coils shall provide superior heat transfer, reduce air-side pressure drop, increase energy efficiency and significantly reduce the system refrigerant volume required. EC fans and fan operating techniques shall provide reduced maximum sound levels. Various methods shall be available to match indoor unit type, maximum outdoor design ambient and maximum sound requirements.

2.2 Condenser Coil

2.2.1 Aluminum Microchannel Coil

Liebert microchannel coils shall be constructed of aluminum microchannel tubes, fins and manifolds. Tubes shall be flat and contain multiple, parallel flow microchannels and span between aluminum headers. Full-depth louvered aluminum fins shall fill spaces between the tubes. Tubes, fins and aluminum headers shall be oven brazed to form a complete refrigerant-to-air heat exchanger coil. Copper stub pipes shall be electric resistance welded to aluminum coils and joints protected with polyolefin to seal joints from corrosive environmental elements. Coil assemblies shall be factory leak-tested at a minimum of 300 psig (2068kPag). Hot gas and liquid lines shall be copper and shall be brazed using nitrogen gas flow to the stub pipes with spun closed ends for customer piping connections. Complete coil/piping assembly shall be then filled and sealed with an inert gas holding charge for shipment.

2.2.2 Aluminum Microchannel Coil with E-Coat (Optional)

Aluminum microchannel coil with E-coat 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. E-coat shall increase coil corrosion protection and shall reduce heat rejection capacity degradation to less than 10% after a severe 2000 hour 5% neutral salt spray test (ref. ASTM B117). The coating process shall ensure complete coil encapsulation.

2.3 Fan Motor/Blade Assembly

The fan motor/blade assembly shall have an external rotor motor, fan blades and fan/finger guard. Fan blades shall be constructed of cast aluminum or glass-reinforced polymeric material. Fan guards shall be heavy gauge, close meshed steel wire, coated with a black corrosion resistant finish. Fan terminal blocks shall be located in an IP54 enclosure located on the top of the fan motor. Fan assemblies shall be factory-balanced, tested before shipment and mounted securely to the condenser structure.

2.3.1 EC Fan Motor

The EC Fan motors shall be electronically commutated for variable speed operation and shall have ball bearings. The EC fans shall provide internal overload protection through built-in electronics. Each EC fan motor shall have a built-in controller and communication module, linked via RS485 communication wire to each fan and the Premium Control Board, allowing each fan to receive and respond to precise fan speed inputs from the Premium Control Board.

2.4 Electrical Controls

Electrical controls and service connection terminals shall be provided and factory wired inside the attached control panel section. A locking disconnect switch shall be factory-mounted and wired to the electrical panel and controlled via an externally mounted locking and lockable door handle.

Only high-voltage supply wiring and low voltage indoor unit communication/interlock wiring are required at condenser installation.

2.4.1 EC Fan Speed & Premium Control

The EC Fan/Premium Control System shall include an electronic control board, EC fan motor(s) with internal overload protection, refrigerant and ambient temperature thermistors and refrigerant pressure transducers. The Premium Control Board shall communicate directly with the indoor unit's Vertiv™ Liebert® iCOM™ control via field supplied CANbus communication wires and via field-supplied low-voltage interlock wires. The control board shall use sensor and communication inputs to maintain refrigerant pressure by controlling each EC fan on the same refrigerant circuit to the same speed. The Premium Control Board shall be rated to a temperature of -30°F to 125°F (-34.4°C to 51.7°C). The premium control shall be factory-set for (fan speed) (fan speed with Vertiv™ Liebert® Lee-Temp™) (fan speed with Vertiv™ Liebert® DSE receivers) control.

2.4.2 Locking Disconnect

A locking-type disconnect switch shall be factory-mounted and wired to the electrical panel. The switch shall be accessible from the outside of the unit with the door closed, and shall prevent access to the high-voltage electrical components until switched to the Off position. The locking disconnect shall be lockable in support of lockout/tag-out safety programs.

2.4.3 Short Circuit Current Rating

The electrical panel shall provide at least 65,000A SCCR.

2.4.4 575V Option

The secondary electrical enclosure shall contain a factory wired transformer and fusing to support 575V input power. All internal wiring shall be provided to connect main and secondary electrical enclosures. High-voltage supply and low voltage indoor unit communication/interlock connections shall be made in the main electrical enclosure.

2.5 Cabinet

The condenser cabinet shall be constructed of bright aluminum sheet and divided into individual fan sections by full width baffles. Internal structural support members, including coil support frame, shall be galvanized steel for strength and corrosion resistance. Panel doors shall be provided on two sides of each coil/fan section to permit coil cleaning. An electrical panel shall be contained inside a factory mounted, NEMA 3R weatherproof electrical enclosure. Units with the 575V option shall include a second factory mounted, NEMA 3R weatherproof electrical enclosure opposite the main electrical enclosure.

2.6 Mounting Legs

2.6.1 Standard Aluminum Legs

Aluminum legs shall be provided to mount unit for vertical air discharge with rigging holes for hoisting the unit into position. Standard height is 18in. (457mm).

2.6.2 Optional Galvanized Steel Legs with Bracing

Condensers shall be shipped with [36in. (914mm)] [48in. (1219mm)] [60in. (1524mm)] mounting legs with stabilization bracing. Legs, bracing and hardware shall be galvanized steel.

2.7 Condenser Accessories

2.7.1 Vertiv™ Liebert® Lee-Temp™ Receiver Kit

Liebert® Lee-Temp™ Receiver Kit shall contain an insulated, heated receiver tank with sight glasses, mounting plate, mounting hardware, pressure relief valve, rota-lock valve for refrigerant charge isolation and piping assembly with head pressure operated 3-way valve and check valve.

Components shall be field assembled to the condenser. The 3-way valve shall sense refrigerant head pressure and adjust the flooding charge in the condenser coil to adjust the condenser heat rejection capacity. The Liebert® Lee-Temp heater shall be 150W, shall include an integral thermostat to maintain refrigerant temperature at a minimum of 85°F (29°C) and shall require a separate power supply of [(208/230-1-60) (120-1-60 volt)].

The Vertiv™ Liebert® Lee-Temp™ Kit shall function with Vertiv™ Liebert® MC variable speed fan motors and electronic controls that lower fan speed in lower outdoor ambient temperatures for maximum energy efficiency. This system shall allow system startup and positive head pressure control with ambient temperatures as low as -30°F (-34.4°C).

2.7.2 Fusible Plug Kit

A fusible plug kit shall be field-installed on the liquid line for compliance with building codes requiring refrigerant relief during high temperature and building fire conditions.

2.7.3 IBC/OSHPD Seismic Certification and IBC Wind/Snow Load Complaint

IBC/OSHPD Seismic Certification and IBC Wind/Snow Load Compliant condensers shall be provided with any applicable bracing and field installation instructions. Condensers shall bear a label certifying compliance with IBC/OSHPD requirements.

3.0 EXECUTION

3.1 Installation of Condenser

3.1.1 General

Install condenser in accordance with manufacturer's installation instructions. The unit shall be installed plumb and level, firmly anchored in location indicated and maintain manufacturer's recommended clearances.

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. Install and wire per local and national codes.

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 Refrigerant Charging

Charge completed cooling system in accordance with manufacturer's refrigerant charging instructions.

3.1.5 Field Quality Control

Start cooling units in accordance with manufacturer's startup 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.

3.1.6 Seismic IBC/OSHPD (Optional)

Install condenser 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. Wiring and piping 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.