Vertiv™ Liebert® Air Cooled Fin/Tube Condensers with Direct Drive Propeller Fan Guide Specifications

1.0 GENERAL

1.1 Summary

These specifications describe requirements for a Liebert® Air Cooled Fin/Tube 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 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 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 condenser coil(s), housing, propeller fan(s) direct driven by individual fan motor(s), electrical controls 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. Various methods shall be available to match indoor unit type, minimum outdoor design ambient and maximum sound requirements.

2.1.1 Condenser Coil

Liebert® manufactured coil shall be constructed of copper tubes in a staggered tube pattern. Tubes are expanded into continuous, corrugated aluminum fins. The fins have full-depth fin collars completely covering the copper tubes, which are connected to heavy wall Type “L” headers. Inlet coil connector tubes pass through relieved holes in the tube sheet for maximum resistance to piping strain and vibration. Coil shall be [(single circuit) (dual circuit)]. The hot-gas and liquid lines shall be spun shut and shall include a factory-installed Schrader valve. Coils shall be factory leak-tested at a minimum of 300 psig (2068kPa), dehydrated, then filled and sealed with a low-pressure inert gas holding charge for shipment. Field relief of the Schrader valve shall indicate a leak-free system.

2.1.2 Housing

The condenser housing shall be constructed of bright aluminum sheet and divided into individual fan sections by full-width baffles. Structural support members, including coil support frame, motor and drive support, are galvanized steel for strength and corrosion resistance. Aluminum legs shall be provided to mount unit for vertical air discharge and have rigging holes for hoisting the unit into position. An electrical panel shall be inside an integral NEMA 3R weatherproof section of the housing.

2.1.3 Propeller Fan

Propeller fan shall have aluminum blades secured to corrosion protected steel hub. Fans shall be secured to the fan motor shaft by means of the keyed hub and dual setscrews. Fan diameter shall be 26" (660mm) or less. Fans shall be factory-balanced and run before shipment. Fan guards shall be heavy gauge, close-meshed steel wire with corrosion resistant polyester paint finish that shall be rated to pass a 1000-hour salt spray test.

2.1.4 Fan Motor

Fan motor shall be continuous air-over design and shall be equipped with rain shield and permanently sealed bearing. Motors shall be rigidly mounted on die-formed galvanized steel supports.

2.1.5 Electrical Controls

Electrical controls, overload protection devices and service connection terminals shall be provided, and factory wired inside the integral electrical panel section of the housing. A locking disconnect switch shall be factory-mounted and wired to the electrical panel and controlled via an externally mounted locking door handle. An indoor unit interlock circuit shall enable condenser operation whenever indoor unit compressors are active. Only supply wiring and indoor unit interlock wiring are required at condenser installation.

2.2 Specific Features by Condenser Type

2.2.1 Variable Frequency Drive (VFD) Condenser (1-4 Fan)

The VFD condenser shall have a variable frequency drive controlling one inverter duty, variable speed motor and On/Off fan motor(s) (for multiple fan models only) to vary the airflow across the coil. The VFD shall use one or more pressure transducers to sense refrigerant pressure to adjust fan speed to a positive head pressure control range. The inverter duty motor shall have permanently lubricated ceramic ball bearings. The Liebert® variable frequency drive control system shall provide overload protection for the variable speed motor. On/Off fan motor(s) shall have individual internal overload protection and shall be controlled by ambient air thermostat(s) increasing/decreasing condenser capacity in stepped increments. Motors shall have a TEAO enclosure and a full speed of 1140RPM @ 60Hz (950RPM @ 50Hz). An internal Surge Protective Device (SPD) shall protect the VFD from power surges. Alarm contacts for the SPD and VFD shall be provided for monitoring of system components.

The VFD Control system shall provide positive start-up and operation in ambient temperature as low as -[0°F (–17.8°C)] [–20°F (–28.9°C) with optional, low ambient VFD heater kit]. The Vertiv™ Liebert® Air Cooled Condenser shall have a ____ volt, ____ ph ____ Hz power supply.

2.2.2 Fan Speed Control (FSC) Condenser (1 Fan)

The FSC condenser shall have a fan speed controller sensing refrigerant pressure and varying the speed of a FSC duty motor. Motor shall be single-phase and include built-in overload protection. Motor shall have an ODP enclosure and have a full speed of 1100RPM @ 60Hz (920RPM @ 50Hz).

The fan speed control system shall provide positive start-up and operation in ambient temperature as low as -20°F (-28.9°C). The Vertiv™ Liebert® Air Cooled Condenser shall have a ____ volt, 1 ph, ____ Hz power supply.

2.2.3 Fan Speed Control (FSC) Condenser (2, 3 or 4 Fans)

The FSC condenser shall have a fan speed controller sensing refrigerant pressure and varying the speed of an FSC duty motor. Additional fan motors shall be fixed speed, cycled On/Off by ambient air thermostats to further vary the airflow across the coil. The FSC motor shall be single-phase and include built-in overload protection. FSC motor shall have an ODP enclosure and a full speed of 1100RPM @ 60Hz (920RPM @ 50Hz). The fixed speed motors shall be three-phase and have individual internal overload protection. Fixed speed motors shall have a TEAO enclosure and a full speed of 1140RPM @ 60Hz (950RPM @ 50Hz).

The Vertiv™ Liebert® Lee-Temp control system shall provide positive start-up and operation in ambient temperature as low as -20°F (-28.9°C). The Vertiv™ Liebert® Air Cooled Condenser shall have a ____ volt, 3 ph, ____ Hz power supply.

2.2.4 Fan Speed Control (FSC) Condenser (6 & 8 Fans)

The FSC condenser shall have two fan speed controllers, each sensing the refrigerant pressure of its associated refrigerant circuit and independently varying the speed of the FSC duty motor. Additional motors shall be fixed speed, cycled On/Off by ambient air thermostats to further vary the airflow across the coil. The FSC motors shall be single-phase and include built-in overload protection. FSC motors shall have an ODP enclosure and a full speed of 1100RPM @ 60Hz (920RPM @ 50Hz). The fixed speed motors shall be three-phase and have individual internal overload protection. Fixed speed motors shall have a TEAO enclosure and a full speed of 1140RPM @ 60Hz (950RPM @ 50Hz).

The fan speed control system shall provide positive start-up and operation in ambient temperature as low as -20°F (-28.9°C). The Vertiv™ Liebert® Air Cooled Condenser shall have a ____ volt, 3 ph, ____ Hz power supply.

2.2.5 Vertiv™ Liebert® Lee-Temp Condensers (All Fan Quantities)

Liebert® Lee-Temp condensers shall consist of fixed speed fan motor(s), controlled by internal contactor(s). Fans shall run full speed whenever compressors are running. The fixed speed motors shall be three-phase and provide individual internal overload protection. Fixed speed motors shall have a TEAO enclosure and a full speed of 1140RPM @ 60Hz (950RPM @ 50Hz).

Each refrigerant circuit shall have an insulated, heated receiver tank with sight glasses, pressure relief valve, rotalock 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) (300W)], include an integral thermostat to maintain refrigerant temperature at a minimum of 85°F (29°C) and requires a separate power supply of [(208/230-1-60) (120-1-60 volt) (200/230-1-50) (110-1-50)].

This system shall allow system start-up and positive head pressure control with ambient temperatures as low as -30°F (-34.4°C).

2.2.6 Vertiv™ Liebert® Quiet-Line Condensers (All Fan Quantities)

Liebert® Quiet-Line condensers shall consist of fixed speed fan motor(s), controlled by internal contactor(s). One fan per refrigerant circuit shall run at full speed with the compressor(s). Additional fan motors may be full speed or cycled based on ambient temperatures. Motors shall have a TEAO enclosure, provide individual overload protection and have a full speed of 570RPM @ 60Hz (475RPM @ 50Hz).

Each refrigerant circuit shall have an insulated, heated receiver tank with sight glasses, pressure relief valve, rotalock 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) (300W)], include an integral thermostat to maintain refrigerant temperature at a minimum of 85°F (29°C) and requires a separate power supply of [(208/230-1-60) (120-1-60 volt) (200/230-1-50) (110-1-50)].

This system shall allow system start-up and positive head pressure control with ambient temperatures as low as -30°F (-34.4°C).

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 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 Field Quality Control

Start cooling units in accordance with 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.