

**MUSKEGON COMMUNITY COLLEGE
REQUEST FOR PROPOSAL
Liebert CRV Precision Cooling - Thermal Management System – Main
Campus IT Server Room**

**Issue Date: Friday April 26, 2019 9am
Proposals Due Date: Wednesday, May 8, 2019 2pm**

RFP Coordinator: Amy James
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Muskegon, MI 49442
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FROM THE TIME THIS RFP IS ISSUED UNTIL AWARD NOTIFICATION IS MADE, ALL CONTACT WITH MCC REGARDING THIS RFP MUST BE MADE THROUGH THE MCC RFP COORDINATOR. NO OTHER PERSON/MCC EMPLOYEE IS EMPOWERED TO MAKE BINDING STATEMENTS REGARDING THIS RFP. VIOLATION OF THIS PROVISION MAY LEAD TO DISQUALIFICATION FROM THE BIDDING PROCESS AT MCC'S DISCRETION

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PART I INTRODUCTION

A. PURPOSE

Muskegon Community College is seeking and accepting proposals for a Liebert CRV Precision Cooling - Thermal Management System in Main Campus IT Server Room. Muskegon Community College shall select the vendor whose proposal, and oral presentation, if requested, demonstrate the capability to best fulfill the purposes of this RFP in a cost effective manner.

B. BACKGROUND

MCC was founded as Muskegon Junior College in 1926, and has been continually accredited by the Higher Learning Commission of North Central Association since 1929. MCC moved to its current campus location, an Alden B. Dow designed facility that opened to the public in 1967.

In 1995, the Stevenson Center for Higher Education opened, comprising a consortium of Ferris State University, Grand Valley State University, and Western Michigan University, designed to increase access to educational opportunities for Muskegon residents. In 2010 the Outdoor Learning Lab, a focal point of green technology and center for MCC's new Alternative and Renewable Energy certificate program opened. MCC is currently located on a 111-acre campus in Muskegon, with extension centers in Fremont, Grand Haven, Newaygo and Whitehall.

In 2013, MCC received approval and funding for a construction and renovation project involving four major areas that include: Science, Technology, Engineering, and Math (STEM) Center, MCC Muskegon Downtown Center, Health and Wellness Education Center, and a Creative and Performing Arts Center. According to MCC President, Dr. Dale Nesbary, "Muskegon Community College needs to compete on a national and global level. In addition to meeting crucial student needs, this expansion will also benefit employers and the community at large. It will help attract and retain talented individuals and equip them with the science skills to make them both more effective employees and informed residents, critical to improving the overall health of our communities. Moreover, MCC's growth from approximately 2,000 in the mid-1960s to approximately 5,000 credit-bearing students has led to the need for additional academic space in the STEM fields."

C. GENERAL TERMS AND CONDITIONS

By submitting a response to this RFP, Bidder agrees to the following terms and conditions:

1. **Proposal Due Date.** Proposals must be sealed and received by either mail or personal delivery on Wednesday, May 8, 2019 at 2:00 p.m. EST. Proposals received after the specified time will not be considered. Proposals shall be plainly marked on the outside of the envelope/box with “**Liebert CRV Precision Cooling - Thermal Management System RFP**” and with the name of the firm submitting the proposal. It is the sole responsibility of the Bidder to assure that its proposal is received by MCC prior to the time specified. One (1) original and five (5) identical copies should be submitted to the following address:

Muskegon Community College
Attn: Amy James
Room # 1123
221 S. Quarterline Rd.
Muskegon, MI 49442

2. **Bidder Questions or Clarifications.** If any Bidder contemplating submitting a proposal is in doubt as to the true meaning of any part of this RFP, it may submit to MCC a written request for an interpretation thereof. No oral explanation or instruction of any kind or nature whatsoever given before the award of a contract to a vendor shall be binding. All inquiries regarding this proposal must be written and should be submitted to:

Amy James
Director of Business Services
Room # 1123
221 S. Quarterline Rd.
Muskegon, MI 49442
E-mail: Amy.james@muskegoncc.edu

3. **Proposal Amendments.** MCC reserves the right to amend this RFP without altering the timing requirements indicated. Any changes or addenda to this RFP will be communicated in writing to all Bidders as quickly as possible.
4. **Proposal Rejection.** MCC reserves the right to reject any Bidder's response for any reason. MCC is under no obligation to award any Bidder the business, and may elect to reject all responses and pursue actions outside of this RFP process.
5. **Bidder Expenses.** Bidder is solely responsible for any expenses incurred by it for proposal preparation and submission. This includes attendance at personal interviews or other meetings.
6. **Instruction and Format Requirements.** All proposals should adhere to the instruction and format requirements outlined in this RFP and in all written supplements and amendments (such as summary of Questions and Answers), issued by MCC.

7. **Criteria for Award Consideration.** General criteria upon which proposals will be evaluated include, but are not limited to, the following:
- Specification adherence (e.g. elements, attributes, appearances)
 - Construction (e.g. installation plan, quality, design, materials)
 - Cost (e.g. initial cost, life-cycle cost)
 - Completeness, thoroughness and detail of response as reflected by the proposal's coverage of all elements in the product and work requested.
 - Warranty (e.g. equipment, installation and extended warranty option – Alternate 1)
 - Liebert Factory authorized service and Installation contractor
8. **Selection Process.** The selection process will be performed by a selection committee representing the Muskegon Community College – Physical Plant / Office of Information Technology / Business Services. This group will evaluate the proposals and make the final decision.
9. **Contract Awarded and Pricing Structure.** Proposals are to include the price per item and the price for transportation, demolition of current unit, installation and startup.
10. **Duration of Offer.** All proposal responses must indicate they are valid for a minimum of one hundred eighty (180) calendar days from the date of the proposal is due, unless extended by mutual written agreement between Muskegon Community College and the vendor.
11. **Review Final Contract Documents.** If MCC awards this project to a Bidder, this RFP and the selected Bidder's proposal, including all appendices or attachments, will become part of the final contract.
12. **Freedom of Information Act.** The content of all proposals, correspondence, addenda, memoranda, working papers and other medium which discloses any aspect of the RFP process shall be considered public information when the award decision is announced. This includes all proposals received in response to this RFP, both the selected proposal(s) and the proposal(s) not selected, and the information in those proposals that a Bidder may consider proprietary in nature. Therefore, MCC makes no representation it can or will maintain the confidentiality of such information. The act of submitting a proposal to MCC shall be construed as understanding and acceptance of this public information disclosure requirement.
13. **Anticipated Timeline.** Listed below are dates and times of actions related to this RFP:

Action	Date
RFP Issued	Friday, April 26, 2019 9am
Mandatory Pre-bid Walkthrough	Wednesday, May 1, 2019 10am
Proposal Due Date	Wednesday, May 8, 2019 2pm
Review RFP proposals	Friday, May 10, 2019
Selection of Vendor	Friday, May 17, 2019

PART II SCOPE OF SERVICES

A. REQUIRED SERVICES & EXPECTATIONS

- See general project deliverables and requirements page 15.
 - See Part IV equipment specifications, pages 16 & 17
 - Appendix – specifications pages 18 - 30
- I. Delivery and Installation.** Delivery and installation to begin June 17, 2019 for the Liebert CRV Precision Cooling - Thermal Management System scheduled for operation June 28, 2019 is described below:
- Assembly, delivery and installation shall be performed by the contracted party.
 - To ensure there is no conflict with the delivery of items the contractor shall coordinate the delivery date, delivery location, and installation schedule of items with the college's contract administrator prior to first delivery date.
 - All transportation, delivery, installation, and disposal arrangements shall be the responsibility of the contractor.
 - Items shall be delivered directly to the installation site.
 - Delivery shall be made from the curb. A walkway leads from the curb to the main entrance. The main entrance is double doors. Crane access is from the south adjacent sidewalk. Small platform crane can be used to reach 1 story lift requirements. RT Condensing unit can be moved across the roof by pneumatic tire cart.
 - The contractor shall have complete responsibility for supplies, items and equipment until they are unpacked, assembled and installed at rooftop and IT server room.
 - The college does not have storage facilities and shall not accept items prior to delivery.
 - The contractor shall be responsible for the daily removal of crating and packing materials from the college premises.
 - The contractor shall be solely responsible for correcting damages to the college premises resulting from the installation process.
 - Items shall be considered received when completely unpacked, assembled, installed in rooms and free of dirt, marks, dents, scratches, tape, packaging or other foreign substances.
 - The installation shall be inspected by representatives of the college and the contractor prior to final acceptance by the college.
 - Any special installation requirements shall be submitted with the quote to the college. Roof penetrations will be coordinated with Certified Building Solutions of Muskegon Michigan. Electrical work will be coordinated with Newkirk Electrical Associates.
 - The delivered product will be inspected by the college. In the event the delivered product fails to conform to award specifications, the contractor shall remove the delivered product and immediately replace it with an acceptable product conforming to the contract requirements at no additional cost the college.

B. FINAL CONTRACT

Following the award, MCC and the selected Provider will negotiate the terms of the definitive contract. In the event that an acceptable contract cannot be reached with the selected Provider, MCC may withdraw its award and negotiate with the next highest ranked Bidder, and so on, until an acceptable contract has been finalized. Alternatively, MCC may cancel the RFP, at its sole discretion.

The definitive contract shall at a minimum, contain the insurance provisions set forth in Section D below and the following terms:

1. This is not an agreement of employment or partnership of the Provider or any of the Provider's employees by MCC. The Provider is an independent contractor for all purposes under this Agreement.
2. Provider shall perform its services in a professional manner and shall use only qualified and experienced personnel.
3. Provider agrees to maintain at all times, adequate staff of experienced and qualified employees for efficient performance under this Agreement.
4. Provider agrees that all personnel working for or on behalf of Provider, while on MCC's premises, shall obey the rules and regulations that are established by MCC, and shall comply with the reasonable directions of MCC's managerial staff.
5. Provider shall be responsible for all damages to persons or property caused by the Provider or any of its agents or employees while on MCC's premises. Provider shall promptly repair, to the specifications of MCC, any damage that it, or its employees or agents, may cause to MCC's premises or equipment. If the Provider fails to do so, MCC may repair such damage and the Provider shall reimburse MCC promptly for the cost of repair.
6. Provider agrees that, in the event of an accident of any kind, the Provider will immediately notify MCC's contact person and thereafter, if requested, furnish a full-written report of such accident.
7. MCC shall have no responsibility for the loss, theft, disappearance of, or damage to equipment, tools, materials, supplies, and other personal property of the Provider or its employees or subcontractors.
8. The contract may be terminated by mutual consent of both parties or by MCC at its discretion. This contract, if awarded, may be cancelled in whole or in part by MCC upon giving at least sixty (60) days written notice prior to cancellation; except that nonperformance on the part of the Provider will be grounds for termination. Termination will take place within fifteen (15) days of notification.
9. All prices for the Provider's services hereunder are firm for the term of this Agreement. MCC shall pay the Provider for satisfactory performance of the services specified in this Agreement, and any related addenda.
10. The Provider will abide by all State and Federal Regulations on wages and hours of any employee. The Provider shall be responsible for all of its employees, subcontractors and their actions during their term of the contract with MCC. The Provider shall keep current all licenses and permits.

C. EQUAL OPPORTUNITY NOTICE

Muskegon Community College continues to promote staff diversity, and is an equal opportunity employer. MCC does not discriminate on the basis of race, color, religion, sex, national origin, marital status, sexual orientation, gender identity, transgender status, political persuasion, disability, height, weight, veteran status, age or any other protected class in any of its educational programs, activities or employment. Minorities, women, veterans, and the physically challenged are encouraged to apply.

D. INSURANCE

1. **Coverage.** The selected Provider shall maintain insurance, having the coverage described below and approved by MCC, prior to the contract, and shall maintain such insurance until the contract is terminated according to the prescribed procedures.
2. **Evidence of Insurance.** The Provider shall furnish MCC with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements set forth above. All certificates shall provide for written notice to MCC prior to the cancellation of any insurance referred to therein. Failure to furnish the required certificate or failure to maintain the required insurance may result in termination of this Agreement at MCC's option. Any waiver of Provider's obligation to furnish such certificate or maintain such insurance must be in writing and signed by an authorized representative of MCC. Failure of MCC to demand such certificate or other evidence of full compliance with these insurance requirements or failure of MCC to identify a deficiency from evidence that is provided shall not be construed as a waiver of Provider's obligation to maintain such insurance, or as a waiver as to the enforcement of any of these provisions at a later date.
3. **Certified Copies of Policies.** Provider shall provide certified copies of all insurance policies required above within ten (10) days of MCC's written request for said copies.
4. **Commercial General and Umbrella Liability Insurance.** Provider shall maintain commercial general liability (CGL) and, if necessary, commercial umbrella insurance with a limit of not less than \$2,000,000 each occurrence. If such CGL insurance contains a general aggregate limit, it shall apply separately to this project or location. CGL insurance shall be written on an ISO occurrence form (or a substitute form providing equivalent coverage) and shall cover liability arising from premises, operations, products-completed operations, personal and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract). "MCC, its elected and appointed officials, employees, students, agents and volunteers" shall be included as an insured under the CGL and under the commercial umbrella, if any. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to College. There shall be no endorsement or modification of the CGL to make it excess over other available insurance; alternatively, if the CGL states that it is excess or pro rata, the policy shall be endorsed to be primary with respect to the additional insured. There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability assumed under a contract. Coverage shall be endorsed, if necessary to include lost key coverage.

5. **Automobile and Umbrella Liability Insurance.** Provider shall maintain automobile liability and, if necessary, commercial umbrella liability insurance with a limit of not less than \$2,000,000 each accident. Such insurance shall cover liability arising out of any auto (including owned, hired, and non-owned autos). Umbrella Coverage \$3,000,000.
6. **Workers Compensation Insurance.** Provider shall maintain workers compensation and employers liability insurance. The commercial umbrella and/or employers liability limits shall not be less than \$1,000,000 each accident for bodily injury by accident or \$1,000,000 each employee for bodily injury by disease.
7. **Commercial Property Insurance.** Provider may, at its option, purchase business income, extra expense or similar coverage, and in no event shall MCC be liable for any business interruption or other consequential loss sustained by Provider, whether or not it is insured, even if such loss is caused by the negligence of MCC, its elected and appointed officials, employees, students, agents or volunteer. Provider may, at its option, purchase insurance to cover its personal property. In no event shall MCC be liable for any damage to or loss of personal property sustained by Provider, whether or not it is insured, even if such loss is caused by the negligence of MCC, its elected and appointed officials, employees, students, agents and volunteers.
8. **Professional Liability Insurance.** Provider shall maintain in force for the duration of this contract errors and omissions liability insurance appropriate to the Provider's profession. Coverage as required in this paragraph shall apply to liability for a professional error, act, or omission arising out of the scope of the Provider's services as defined in this Agreement. Coverage shall be written subject to limits of not less than \$1,000,000 per loss. If coverage is written on a claims-made basis, the Provider warrants that any retroactive date applicable to coverage under the policy precedes the effective date of this Agreement; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years beginning from the time that work under the contract is completed.
9. **Acceptability of Insurers.** All required insurance shall be purchased from insurers acceptable to MCC. MCC shall have the right to reject insurance from an insurer that it deems unacceptable due to poor financial condition or because it is not operating legally.
10. **No Representation of Coverage Adequacy.** By requiring insurance herein, MCC does not represent that coverage and limits will necessarily be adequate to protect Provider, and such coverage and limits shall not be deemed as a limitation on Provider's liability under the indemnities granted to MCC in this contract.
11. **Indemnification.** Provider agrees to defend, indemnify and hold MCC, its elected and appointed officials, employees, students, agents and volunteers harmless from any claim, including, but not limited to death, bodily injury, personal injury or property damage, together with reasonable attorneys' fees and court costs, arising from Provider's performance under this Agreement, except, however, Provider will not be required to indemnify MCC for claims that arise out of the sole negligence or acts of MCC.
12. **Subcontractor Requirements.** Provider agrees to contractually obligate its subcontractors to indemnify MCC in precise conformance to the terms of Provider's obligation to indemnify MCC pursuant to this Agreement. The Provider further agrees to contractually obligate its subcontractors to provide insurance with the insurance coverages and limits of liability required to be provided by the Provider pursuant to the terms and conditions of this Agreement.

13. **Cancellation or Reduction in Coverage.** In the event of a lapse or reduction in the required coverages, the Provider shall cease operations and shall not resume operations until new insurance is in force.

E. PROPOSAL FORMAT

In order to insure a uniform review process and obtain the maximum degree of compatibility, it is required that proposals be organized in the manner specified below:

1. **Title Page.** The Provider should identify the RFP subject, the name of the Company, local and corporate address, telephone number, name and title of contact person and date of submission. See Proposer's Certification Form in PART III PROPOSAL FORMS.
2. **Executive Summary.** The executive summary shall discuss the highlights, key features and distinguishing points of the proposal. A separate sheet shall include a list of individuals and contacts for this proposal and how to communicate with them. Limit the Proposal Summary to three (3) pages including the separate sheet.
3. **Company Profile.** The company profile shall include a brief description of the Bidder's company size as well as the proposed local organization structure. Include a discussion of the Bidder's financial stability, capacity and resources. If other companies are participating in the proposal, include similar information about those companies.
4. **Company Qualifications.** This section shall include a brief description of the Bidder's qualifications and previous experience on similar or related projects. Bidder must provide detailed information regarding the expertise and experience supporting the critical components of the project.
5. **Work Plan or Proposal.** This section shall present a well-conceived plan for the services at MCC. Include a full description of major tasks and subtasks. This section of the proposal shall establish that the Provider understands MCC's objectives and work requirements, and the Provider's ability to satisfy those objectives and requirements. Succinctly describe the proposed approach for addressing the required services and the Provider's ability to meet MCC's schedule, outlining the approach that would be undertaken in providing the requested services described in this RFP.
6. **Proposal Exceptions.** If the Provider finds it impossible or impractical to adhere to any portion of the RFP specifications and all attachments, it shall be so stated in its proposal, with all deviations grouped together in a separate section entitled, "Exceptions/Deviations from Proposal Requirements." This section will be all-inclusive and will contain a definition statement of each and every objection or deviation with adherence to specific RFP sections. Objections or deviations expressed only in other parts of the proposal, either directly or by implication, will not be accepted as deviations, and the Provider in submitting a proposal, will accept this stipulation without recourse. Items not excepted, will not be open to later negotiation.
7. **Proposal Cost Sheet.** This section shall include the individual furniture costs, and all charges for transportation, packaging, crates, containers, insurance, etc. necessary to complete delivery.

PART III PROPOSAL FORMS

- A. Schedule A -- Proposer's Certification
- B. Schedule B -- List of References Form

Schedule A

MUSKEGON COMMUNITY COLLEGE REQUEST FOR PROPOSAL Liebert CRV Precision Cooling - Thermal Management System – Main Campus IT Server Room

PROPOSER'S CERTIFICATION

IMPORTANT: This form must be returned with the bid proposal form

The undersigned certifies that he/she has carefully examined the Request for Proposal, Instructions, Terms and Conditions, Scope of Services, Bid forms and all other documents accompanying this proposal.

The undersigned offers and agrees to furnish the services specified in the Request for Proposal at the prices or rates quoted in the proposal. The undersigned agrees that the proposal will remain firm for a period of sixty (180) days in order to allow Muskegon Community College adequate time to evaluate the proposals.

The undersigned certifies that this bid/proposal is made without prior understanding, agreement, connection, discussion or collusion with any other person, firm or corporation submitting a bid/proposal for the same commodity or service; no officer, employee or agent of Muskegon Community College or of any other bidder/proposer interested in bid/proposal; and the undersigned executed this bidders/proposers certification with full knowledge and understanding of the matters contained and was duly authorized to do so.

The undersigned certifies that all information contained in this Request for Proposal is truthful to the best of his/her knowledge and belief. The undersigned further certifies that he/she is duly authorized to submit this proposal on behalf of the Provider/contractor and that the Provider/contractor is ready, willing and able to perform if awarded this bid/proposal.

Name of Business

Date

Address

Authorized Signature

City and State

Zip Code

Name (Typed or Printed)

Phone Number

Undersigned Title

E-Mail Address

Company URL

NOTE: Changes to this RFP may be issued in the form of an addendum at any time prior to the due date and time for submitting proposals. The RFP Coordinator maintains a mailing list of all vendors that were provided copies of this solicitation (via vendor pickup, mail, fax or email). The RFP Coordinator will send the addendum to any vendor who directly received a copy of the RFP from the RFP Coordinator. Any vendor who did not directly receive a copy of the RFP from MCC is encouraged to visit MCC's web site regularly to learn of any changes to the solicitation (<http://www.muskegoncc.edu/pages/2933.asp>) and contact the RFP Coordinator to have their name added to the mailing list.

Schedule B

**MUSKEGON COMMUNITY COLLEGE
REQUEST FOR PROPOSAL**

**Liebert CRV Precision Cooling - Thermal Management System –
Main Campus IT Server Room**

LIST OF REFERENCES

IMPORTANT: This form must be returned with the bid proposal form.

The Provider must furnish at least three (3) references from persons who can attest to the quality of similar prior work performed.

1. **Company Name:** _____
 Street Address: _____
 City/State/Zip Code: _____
 Contact Person: _____
 Telephone No.: _____
 E-Mail Address: _____

2. **Company Name:** _____
 Street Address: _____
 City/State/Zip Code: _____
 Contact Person: _____
 Telephone No.: _____
 E-Mail Address: _____

3. **Company Name:** _____
 Street Address: _____
 City/State/Zip Code: _____
 Contact Person: _____
 Telephone No.: _____
 E-Mail Address: _____

GENERAL PROJECT DELIVERABLES AND REQUIREMENTS

- Coordinate with MCC Physical Plant and Office of Information Technology delivery, demolition, installation and startup
- Current Liebert Unit must remain in service during the new Liebert Installation
- Provide rooftop mounting structure for new condensing unit
- Coordinate membrane installation and modifications with roofer – Certified Building Products
- Remove existing air handling unit above IT server hardware in conditioned space
- Reclaim refrigerant from air handling unit above ceiling
- Dispose / recycle removed units
- Condensate drain ran to condensate pump terminating into sanitary sewer
- Remove existing chilled water lines and remove from immediately above the IT server system
- Return current suspended ceiling pads, grid and lighting after completion
- Protect server equipment and maintain current cooling for campus operation
- Provide new power source to new air handling unit
- Provide new power source to new condensing unit
- Provide power feed to equipment from electrical closet #14 480 /3 phase
- Coordinate electrical installation and modifications with electrician – Newkirk Electric Associates
- Five-year compressor warranty – manufacturer's
- Factory / manufacturer's equipment startup
- All Hot Work will be coordinated with Muskegon Community College Physical Plant and Muskegon Community College Security Office
- All planned installation – delivery, demolition, installation services and startup will be performed under normal campus working hours. Monday – Friday 7am – 5pm. Saturdays 7am until 3pm. No holiday access.
- Liebert Equipment & Installation Specifications attached

PART IV - EQUIPMENT SPECIFICATIONS

Proposed Unit

Liebert CRV Precision Cooling:



Date:

4/29/2019

Quantity (1) Liebert CRV Air-cooled Precision Cooling System

- Configuration Number: CR020RA1A7SH1811PDU0PW903
- Model Number: CR020RA1A7W903
- Nominal 20 kW, 70 kBtuh at approximately 90F, 27% RH
- 460 Voltage, 3 Phase, 60 Hz
- Condensate Pump 65k SCCR

The Liebert CRV is a precision cooling unit located within a row of heat generating IT equipment racks. It is capable of performing all the necessary functions of a precision air conditioner including cooling, humidification, dehumidification, air filtration, and condensate management. Air enters the unit from the hot aisle, is filtered, cooled and conditioned, then expelled into the cold aisle through a supply air baffle.

The supply air baffle allows the air leaving the cooling unit to be directed to the racks the Liebert CRV is conditioning; maximizing its effectiveness, reducing the chance for hot spots, and improving the overall system efficiency.

System Details:

- Liebert iCOM control system with 9" Color Touch Display
- 2T temperature sensors to measure air temperature entering server racks - quantity 3
- Adjustable supply air baffle system
- Variable speed EC plug fans
- Digital scroll, variable capacity compressor utilizing R-410A
- Crankcase compressor heater
- Low Sound Package (Compressor sound jacket and additional panel insulation)
- Evaporator Type: slab, copper tubes - aluminum fins with hydrophilic coating
- Electric Reheat
- Steam Generating Humidifier
- Compliance with ASME A112.1.2 section 2.4.2 (backsiphonage testing)

- Filter Rating: MERV 8 per ASHRAE 52.2 (30% efficient by ASHRAE 52.1)
- Locking Disconnect Switch
- Top and Bottom electrical and piping connections
- One remote shutdown terminal
- One alarm contact
- The Liebert IntelliSlot Unity Card (IS-UNITY-DP) provides ground fault isolated RS-485 Modbus, BACnet IP & 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. This card can support dual IP and 485 protocols simultaneous. IS-UNITY-DP card is factory-installed in an IntelliSlot.
- Hot air rear return with front cold air discharge
- Front and rear service and maintenance access only
- Installation casters with leveling feet
- Powder coated panels
- Enclosure: Standard Unit, Standard Color: ZP-7021 – Black Gray Matte
- Server rack style rear door
- Superior Service Access Panel

Quantity(1) Liebert MC Air-Cooled Microchannel Condenser(s), Model MCS028E1ADN251, using input supply voltage of 460 Volt, 3 Phase, 60 Hz

The Liebert MC is an air-cooled condenser featuring an all-aluminum microchannel coil and a variable speed fan motors on every fan. Constructed with an aluminum cabinet, the Liebert MC is a low-profile, direct-drive propeller fan-type air-cooled unit suitable for mounting outdoors. It provides for the heat rejection of either one or two separate refrigeration circuits, matching heat rejection capacity varying with the outdoor ambient temperatures, compressor or pump (if applicable) system mode and with each corresponding compressor/pumps heat rejection requirements. The unit is quiet and corrosion resistant. All electrical connections and controls are enclosed in a factory mounted NEMA 3R electrical panel. Copper pipe connections are provided for brazing of field piping and connections are located next to the electrical panel.

Liebert MC Condenser Details:

- Microchannel aluminum coil
- Variable Speed EC Fans
- Premium electronic control board providing communication with iCOM using CANbus
- Aluminum exterior panels and 18" aluminum legs
- Single refrigerant circuit condenser
- R-410A factory set points
- Domestic packaging
- Short Circuit Current Rating of 65,000 Amps, rms

Services Include:

- Warranty Inspection Included (Includes Liebert Heat Rejection)
- 2nd Thru 5th Year Compressor Extended Warranty

Additional Options Include:

- High temp thermostat for existing Liebert Challenger to be installed and wired by Hedrick Associates
- **5 Racks of EZI blanking panels**

Hedrick Associates
2360 Oak Industrial Drive NE

Grand Rapids, Michigan 49505

Thank you for the opportunity to assist with this project

Joe Hancock/Greg Bassham

Hedrick Associates

APPENDIX – SPECIFICATIONS

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 and humidity conditions in rooms containing electronic equipment, with good insulation and vapor barrier. The manufacturer shall design and furnish all equipment to be fully compatible with the 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.

The system shall be AHRI Certified™, the trusted mark of performance assurance for heating, ventilation, air conditioning and commercial refrigeration equipment, using AHRI Standard 1360.

1.3 SUBMITTALS

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

2.0 PRODUCT

2.1 COOLING SYSTEM

2.1.1 Air-Cooled Refrigeration System

2.1.1.1 Refrigeration System

Single refrigeration circuit shall include a liquid line filter drier, a refrigerant sight glass with moisture indicator, an adjustable externally equalized expansion valve and a liquid line solenoid valve. The indoor evaporator refrigerant piping shall be spun shut with a nitrogen holding charge. Field relief of the Schrader valve shall indicate a leak-free system.

2.1.1.2 Hydrophilic-Coated Evaporator Coil

The direct expansion tilted-slab cooling coil shall have 7.25 ft² (0.674 m²) face area, four or five rows deep. It shall be constructed of copper tubes and hydrophilic-coated aluminum fins. The hydrophilic coating shall significantly improve the speed of condensate drainage from the fins and shall provide superior water carryover resistance. Two stainless steel condensate drain pans shall be provided.

2.1.1.3 Compressor

The compressor shall be scroll-type with variable capacity operation from 20-100%, commonly known as a *digital scroll*. The Compressor solenoid valve shall unload the compressor to provide variable capacity operation. The compressor shall have a suction gas-cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch, rotalock service valves, low-pressure and high-pressure transducer, crankcase heater, internal centrifugal oil pump and an operating speed of 3500 RPM at 60Hz(2900rpm @ 50Hz). The compressor shall be located outside the airstream and shall be removable and serviceable from the rear of the unit.

2.1.1.4 R410A Refrigerant

The system shall be designed for use with R410A refrigerant, which meets the U.S. Clean Air Act for phaseout of HCFC refrigerants.

2.1.1.5 Low Noise Package The Low Noise Package shall reduce the level of sound emitted from the compressor. The package shall consist of a 3/8 inch closed cell polymeric 4.5 - 8.5 lb/ft³ density compressor sound jacket that encloses the compressor. Additional half-inch, closed cell polymeric 3 - 8 lb/ft³ density sound deadening material shall be affixed to the underside of the Superior Service Access Panel located above the compressor and attached to the inner side of the compressor compartment panels that face the hot and cold aisles. All sound deadening material shall be non-shedding and located outside the air stream.

2.2 FAN SECTION

The unit shall be equipped with two plug fans: direct driven centrifugal fans with backward curved blades and electronically commutated DC motors; commonly referred to as EC plug fans. The fan speed shall be variable and automatically regulated by the Liebert iCOM[®] control through all modes of operation. Each fan shall have a dedicated motor, fault monitoring circuitry and speed controller which provides a level of redundancy. The impellers shall be made of steel and balanced. The EC plug fans shall be mounted on the rear fan door. The entire fan assembly shall be capable of swinging out of the unit for accessibility. The fans shall be located to blow air through the filters and tilted-slab cooling coil to ensure even air distribution and maximum coil performance.

2.3 ADVANCED AIRFLOW MANAGEMENT

2.3.1 Supply Air Baffle System

A field-adjustable, modular supply air baffle system shall be located in the discharge air stream on the front of the cabinet to direct air toward the equipment racks and balance airflow requirements within the row. The six modular baffle segments shall be easily reconfigurable to redirect airflow as cooling requirements change. Controlling the airflow prevents hot spots and maintains high return air temperatures by not blowing cold air over racks or out the ends of aisles. By focusing the cold air where it is needed and meeting the servers' requirements, the need for excessive airflow and energy consumption is eliminated.

2.4 CABINET CONSTRUCTION AND ACCESSIBILITY

2.4.1 Cabinet Construction

The exterior panels shall be 20 gauge steel and powder-coated with charcoal color paint to protect against corrosion. The double-wall side panels separate the half-inch, 2.0 lb./ft³ insulation from the air stream and increase unit rigidity. The unit shall be mounted on casters for quick installation and provided with leveling feet. The perforated inlet and outlet panels shall have 81% open area. The rear door shall utilize a Knurr® rack style handle and hinges to mirror the appearance of neighboring server racks.

2.4.2 Serviceability

The cabinet shall be designed so all components are easily accessible for service and maintenance through either the front or rear of the unit. Units that are not fully accessible from front and rear or not serviceable in place are unacceptable.

The Superior Service Access Panel shall provide additional access to the top of the system components. Side access is not required.

The variable speed EC plug fans shall be mounted on the rear fan door to provide access to all sides when swung out of the unit. Units with a compressor, dual-float condensate pump and canister humidifier shall be conveniently mounted near the edge of the unit.

2.4.3 Supply Air Baffle System

A field-adjustable, modular supply air baffle system shall be located in the discharge airstream on the front of the cabinet to direct air toward the server racks and balance airflow requirements within the row. The six modular baffle segments shall be easily reconfigurable to redirect airflow as cooling requirements change. Controlling the airflow prevents hot spots and maintains high return air temperatures by not blowing cold air over racks or out the ends of aisles. By focusing the cold air where it is needed and meeting the servers' requirements, the need for excessive airflow and energy consumption is eliminated.

2.5 LOCKING DISCONNECT SWITCH

A manual disconnect switch shall be mounted in the electrical panel and be capable of disrupting the flow of power to the unit. The electric panel compartment shall be accessible only with the switch in the Off position. It shall be conveniently located behind the Liebert iCOM® display door for quick access.

2.6 SHORT CIRCUIT CURRENT RATING (SCCR)

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

2.7 FILTRATION

MERV 8

The filter channel shall be an integral part of the system, located within the cabinet and serviceable from the rear. The two filters shall be deep-pleated, 4 inches thick with an ASHRAE 52.2 MERV8 rating (30% ASHRAE 52.1). A filter clog alarm shall be included. Mesh type, cleanable filters are unacceptable.

2.8 ELECTRIC REHEAT

The low-watt density, 304/304, stainless steel, finned-tubular electric reheat coils shall be capable of maintaining room dry bulb conditions when the system is calling for dehumidification. The reheat section shall

include UL/CSA recognized safety switches to protect the system from overheating. The capacity of the reheat coils shall be controlled in one stage. The reheat elements shall be accessible from the front of the cabinet.

2.9 STEAM GENERATING CANISTER HUMIDIFIER

A canister-type steam generating humidifier shall be factory-installed in the cooling unit and operated by the Liebert iCOM®. It shall be complete with disposable cylinder, all supply and drain valves, steam distributor and electronic controls. The need to change the canister is indicated on the Liebert iCOM. The humidifier shall be designed to operate with water conductivity from 330 to 670 (60Hz) microS/cm. The system shall automatically fill and drain as well as maintain the required water level based on conductivity. An air-gap within the humidifier assembly shall prevent back-flow of the humidifier supply water. The humidifier canister shall be removable from the rear of the cabinet.

2.10 CONDENSATE PUMP—MODELS

The dual-float condensate pump shall have a minimum capacity of 6 GPM (22.7 l/min) at 30 ft. (9 m) head. The pump shall be complete with integral primary and secondary float switches, pump, motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition.

3.0 Control

3.1 Liebert iCOM® MICROPROCESSOR CONTROL WITH 9-INCH COLOR TOUCHSCREEN

The Liebert iCOM shall be microprocessor-based with a 9" 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 shall allow 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 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.
- **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 be able to configure the display 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 display shall enable the user to configure custom widgets on the main screen. Widget options will 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 LED's**- The Liebert iCOM shall show the unit's operating status using an integral 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 be able to store the local service or sales contact information.
- **Upgradeable** - Liebert iCOM upgrades shall be performed through a USB connection.
- **Timers/Sleep Mode** – The menus shall allow various customer settings for turning the unit On or Off.
- **Menu Layout** - The menus shall be divided into two main menus: 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 shall provide 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-supplied 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 control 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.

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 customers Building Management System/Building Automation System. The Liebert iCOM shall activate an audible and visual alarm in event of any of the following conditions:

- High Temperature
- Low Temperature
- High Humidity
- Low Temperature
- EC Fan Fault
- Change Filters
- Loss of Air Flow
- Loss of Power
- Humidifier Problem
- High Head Pressure
- 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 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 time delay of 0 to 255 seconds.

3.3 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.

3.4 CONTROLLING SENSOR OPTIONS

Liebert iCOM shall be flexible in the sense that it shall allow for 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 diagnostic or to receive a signal from the BMS through the Liebert remote monitoring devices or analog input)

3.4.1 Temperature Compensation

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

3.4.2 Humidity Control

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

3.5 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 cooling units equipped with Liebert

iCOM using the U2U (Unit-to-Unit) network. There shall be three modes of teamwork operation:

- **Teamwork Mode 1:** 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.
- **Teamwork Mode 2:** The 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 unit's controlling sensors.
- **Teamwork Mode 3:** Optimized Aisle: May be employed 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) is controlled through unit supply air conditions. 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.

3.6 STANDBY LEAD-LAG

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

3.7 STANDBY UNIT CASCADING

The Liebert iCOM cascade option shall allow the units to turn On and Off based on heat load when utilizing Optimized Aisle, Teamwork Mode 3 and remote temperature sensors. Cascade mode dynamically coordinates the fan speed to save energy and to meet the 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 additional 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 into standby.

3.8 WIRED SUPPLY SENSOR

Each Liebert 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.

3.9 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 shall automatically assign a virtual master. The virtual master shall assume the same responsibilities as the master until communication is restored.

3.10 COMPRESSOR SHORT CYCLE CONTROL

To help maximize the life of the compressor there shall be start-to-next start delay for the compressor. The control shall monitor the number of compressor starts in an hour. If the compressor starts more than 10 times in 60 minutes, the local display and remote monitoring shall notify the user through a Compressor 1 Short Cycle event.

3.11 LIEBERT MC™

Units may be matched to a premium efficiency condenser control with enhanced monitoring, alarming and diagnostics. The condenser control shall have an automated, low-noise mode and fan reversal for cleaning mode.

3.12 SYSTEM AUTO RESTART

The auto restart feature shall automatically restart the system after a power failure. Time delay shall be programmable.

3.13 SEQUENTIAL LOAD ACTIVATION

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

3.14 LOW-PRESSURE MONITORING

Units shall ship standard with low-pressure transducers for monitoring compressor suction pressure. If the pressure falls due to loss of charge or other mechanical cause, the corresponding circuit shall shut down to prevent equipment damage. The user shall be notified of the low-pressure condition through the local display and remote monitoring

3.15 WINTER START TIME DELAY—AIR-COOLED MODELS

An adjustable software timer shall be provided to assist with compressor starting during cold weather. When the compressor starts, the low-pressure input shall be ignored for the period set in the user-adjustable timer. Once the time period has elapsed after the compressor start, the low-pressure input should remain in the normal state. If the low-pressure input does not remain in the normal state when the time delay has elapsed, the circuit shall lock out on low pressure. The low-pressure alarm shall be announced on the local display and communicated to remote monitoring systems.

3.16 ADVANCED FREEZE PROTECTION

Units shall ship standard with advanced freeze protection enabled. The advanced freeze protection shall monitor the pressure of the circuit using a transducer. The control shall interact with the fan and compressor to prevent the unit coil from freezing if circuit suction pressure drops. If a freeze condition is detected, the user shall be notified through the local display and remote monitoring systems

3.18 REFRIGERANT PRESSURE TRANSDUCER FAILURE

The control shall monitor the high-side and low-side refrigerant pressure transducers. If the control senses the transducer has failed, has been disconnected, has shorted or the reading has gone out of range, the user shall be notified through an event on the local display and remote monitoring. The corresponding circuit that the failure

has occurred on shall be disabled to prevent unit damage.

3.19 OIL RETURN PROTECTION

The control shall monitor compressor operation and staging to ensure that liquid and hot gas velocity are maintained for proper oil return to the compressor.

3.20 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 monitoring. After the initial lockout, the control shall continue to monitor compressor temperature during the off-cycle and re enable the circuit once a safe operating temperature is reached. The control shall store the number of high temperature trips. The number of trips shall be accessible through the local display.

3.21 DIGITAL SCROLL SENSOR FAILURE

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

3.22 COMPRESSOR HIGH- AND LOW-TEMPERATURE LIMIT PROTECTION

The control shall monitor the return air to ensure that the compressor(s) are operated within the manufacturer's defined window of operation. If the return air temperature deviates from the manufacturer's window of operation, the Liebert iCOM shall automatically adjust to prevent damage to the cooling unit or reduction in its reliability.

3.23 COMPRESSOR RUN TIME MONITORING

The control shall log these compressor statistics:

- Number of compressor starts
- Run hours
- Average run time
- Starts per day
- Starts per day worst
- Number of high-pressure alarms
- Operating phase in which the high-pressure alarm occurred
- Number of low-pressure alarms
- Operating phase in which the low-pressure alarm occurred

- Number of compressor overloads
- Number of high-temperature alarms

The user shall have the ability to monitor compressor operating temperature and pressure from the local display to be used as a diagnostic tool

3.24 RACK TEMPERATURE SENSORS

The Liebert® CRV™ shall be provided with three 2T rack temperature sensors, which consist of a vented case with two temperature probes. The sensors shall provide real-time, direct feedback to the cooling unit to optimize the amount of cooling and airflow provided. The sensor data shall be available to remote BMS and monitoring systems. The sensor network shall consist of one CAN wire leaving the cooling unit and connecting to a 2T sensor. Each remaining 2T sensor is connected to the previous sensor.

3.27 COMMUNICATION INTERFACES

3.27.1 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.

3.27.2 Common Alarm Contact

The common alarm contact shall provide the customer with a set of normally open contacts for remote indication of unit alarms.

3.27.5 Liebert IntelliSlot® Unity-DP™ Card

The Liebert IntelliSlot Unity Card (IS-UNITY-DP) shall provide ground fault isolated RS-485 Modbus, BACnet IP and Modbus IP network connectivity to Building Management Systems for unit monitoring and management. Also, it shall provide 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 e-mail and SMS for mobile messaging. The card shall support IP and 485 protocols simultaneous.

4.0 HEAT REJECTION

4.1 AIR-COOLED MICROCHANNEL CONDENSER

4.1.1 Standard Features

The 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 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 shall 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.

4.1.2 Condenser Coil

4.1.2.1 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.

4.1.3 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.

4.1.3.1 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

4.1.4 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.

4.1.4.1 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 control board shall receive an indoor unit run signal via field-supplied low voltage interlock wires to the compressor side switch, via field-supplied CANbus communication wires from the indoor unit's Liebert iCOM control or via both. 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.

4.1.5 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.

4.1.6 Mounting Legs

4.1.6.1 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).

5.1 INSTALLATION OF THERMAL MANAGEMENT UNITS

5.1.1 General

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

5.1.2 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.

5.1.3 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.

5.1.4 Refrigerant Charging

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

5.1.5 Field Quality Control

Start up 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.