CAPITAL CONSTRUCTION

Invitation for Bid

CCK-2339-19

Proposal Due Date - 7-12-18

Magnetic Bearing Chiller – 1000 Ton
# GENERAL INDEX

**CCK-2339-19**  
**MAGNETIC BEARING CHILLER - 1000 TON**  

## PROCUREMENT PROCESS

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INVITATION FOR BID
ATTENTION: This is not an order. Read all instructions, terms and conditions carefully.

INVITATION NO.: CCK-2339-19
Issue Date: 6/25/2018
Title: Magnetic Bearing Chiller – 1000 Ton
Contracting Officer: Mike Mudd
Phone: 859-257-5409

RETURN ONE ORIGINAL COPY AND ONE CD OF BID TO:
UNIVERSITY OF KENTUCKY PURCHASING DIVISION BID DESK,
BID # CCK-2339-19, BID DATE 7/12/2018
322 PETERSON SERVICE BLDG.
411 South Limestone
LEXINGTON, KY 40506-0005

Issue Date: 6/25/2018
Title: Magnetic Bearing Chiller – 1000 Ton
Contracting Officer: Mike Mudd
Phone: 859-257-5409

IMPORTANT: BIDS MUST BE RECEIVED BY 07-12-2018 @ 3:00 P.M. LEXINGTON, KY TIME

The University’s General Terms and Conditions and Instructions to Bidders, viewable at www.uky.edu/Purchasing/terms.htm, apply to this Invitation for Bid. When the Invitation for Bid includes construction services, the University’s General Conditions for Construction and Instructions to Bidders, viewable at www.uky.edu/Purchasing/ccphome.htm, apply to the Invitation for Bid.

AUTHENTICATION OF BID AND STATEMENT OF NON-COLLUSION AND NON-CONFLICT OF INTEREST

I hereby swear (or affirm) under the penalty for false swearing as provided by Kentucky Revised Statutes (KRS) 523.040:
1. That I am the bidder (if the bidder is an individual), a partner, (if the bidder is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the bidder is a corporation);
2. That the attached bid has been arrived at by the bidder independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other vendor of materials, supplies, equipment or services described in the Invitation for Bids, designed to limit independent bidding or competition;
3. That the contents of the bid or bids have not been communicated by the bidder or its employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid or bids and will not be communicated to any such person prior to the official opening of the bid or bids:
4. That the bidder is legally entitled to enter into contracts with the University of Kentucky and is not in violation of any prohibited conflict of interest, including those prohibited by the provisions of KRS 164.390, 45A.330 to 45A.340.
5. That the Bidders, and its affiliates, are duly registered with the Kentucky Department of Revenue to collect and remit the sales and use tax imposed by Chapter 139 to the extent required by Kentucky law and will remain registered for the duration of any contract award.
6. That I have fully informed myself regarding the accuracy of the statement made above.

COLLUSION PROHIBITED
Any agreement or collusion among bidders or prospective bidders which restrains, tends to restrain, or is reasonably calculated to restrain competition by agreement to bid at a fixed price or to refrain from bidding, or otherwise, is prohibited, in accordance with KRS 45A.325.

SWORN STATEMENT OF COMPLIANCE WITH CAMPAIGN FINANCE LAWS
In accordance with KRS 45A.110(2), the undersigned hereby swears under penalty of perjury that he/she has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky and that the award of a contract to a bidder will not violate any provision of the campaign finance laws of the Commonwealth of Kentucky.

CONTRACTOR REPORT OF PRIOR VIOLATIONS OF KRS CHAPTERS 136, 139, 141, 337, 338, 341 & 342
The contractor, by signing and submitting a bid on this invitation, agrees as required by KRS 45A.485 to submit final determinations of any violations of the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 that have occurred in the previous five (5) years prior to the award of a contract and agrees to remain in continuous compliance with the provisions of these statutes during the duration of any contract that may be established. Final determinations of violations of these statutes must be provided to the University by the successful contractor prior to the award of a contract.

ALL BIDS ARE TO BE "F.O.B. DESTINATION – FREIGHT PREPAID AND ALLOWED"

THIS AREA MUST BE COMPLETED

DELIVERY AFTER RECEIPT OF ORDER: NAME OF COMPANY: PHONE:
FEDERAL EMPLOYER ID NO.: ADDRESS: E-MAIL:
PAYMENT TERMS: ADDRESS: WEB ADDRESS:
SHIPPING TERMS: F.O.B. DESTINATION – PREPAID AND ALLOWED CITY, STATE & ZIP CODE:
DUNS # SIGNATURE:

SIGNATURE REQUIRED: This bid cannot be considered valid unless signed and dated by an authorized agent of the bidder.

Type or print the information requested in the spaces provided.

Revised January 5, 2017
UNIVERSITY OF KENTUCKY
INSTRUCTIONS TO BIDDERS

All University of Kentucky bid solicitations are made upon and subject to the following conditions:

1 Preparation of Bids

1.1 All solicitations are subject to the provisions and requirements of any applicable Kentucky Revised Statutes, including the Kentucky Model Procurement Code, and the rules, regulations and policies of the University of Kentucky including the University of Kentucky’s General Terms and Conditions.

1.2 Bidders are expected to examine the complete bid and all attachments including drawings, specifications and instructions. Failure to do so is at bidder’s risk.

1.3 Bidders shall furnish information required by the solicitation in the form requested. The University reserves the right to reject bids with incomplete information or which are presented on a different form.

1.4 All bids must be legible. A legally authorized company representative shall sign all bids in the appropriate location. Erasures or other changes must be initialed by the person signing the bid. Signature on a bid certifies that the bidder has read and fully understands all bid specifications and bidder agrees to all terms and conditions stipulated in the Invitation For Bids (IFB).

1.5 Bid prices shall be entered in spaces provided on the bid form. All unit prices and mathematical extensions and totals shall be indicated where required. In cases of errors in extensions or totals the unit price will govern.

1.6 Should any potential bidder doubt the true meaning of any part of the solicitation, a written request for an interpretation may be submitted to the University. Requests for such interpretation shall be made in writing to the appropriate Contracting Officer identified in the solicitation. Every interpretation made shall be in the form of an “addendum” to the solicitation sent as promptly as is practicable to all prospective bidders to whom the solicitation has been issued. Failure by the University to send or any potential bidder to receive such interpretation(s) shall not relieve any bidder from any obligations under the bid solicitation or the bidder’s response. Any interpretations, corrections or changes to the solicitation made in any other manner, including oral explanations and instructions, are not binding upon the University.

1.7 Bidders or potential bidders are required to coordinate all discussions concerning solicitations through the appropriate Contracting Officer or other purchasing official within the University of Kentucky Purchasing Division. Bidders or potential bidders are not authorized to communicate with any University administrator, faculty, staff, or Board of Trustees member concerning this solicitation. Failure to comply with this requirement is grounds for the bidder’s disqualification.

1.8 Unless otherwise stipulated in a bidder’s response, the bidder’s offer is in strict accordance with the University’s specifications and terms and conditions of the Invitation For Bids. Any deviations must be fully itemized in detail. Any deviations from the requirements of this solicitation are at bidder’s risk and the University may determine the bid to be non-responsive.

2 Submission of Bids

2.1 Bids, and modifications thereof, shall be returned in a sealed envelope and submitted in such a manner as to ensure their arrival in the University of Kentucky Purchasing Division before the due date and time set forth in the solicitation. The time shown on the recording clock in the Purchasing Division is the official time. Unless otherwise indicated in the solicitation no oral, facsimile, e-mail or telephone bids will be accepted.

2.2 Bids may be modified or withdrawn in writing or in person by an authorized representative if done so prior to the exact time and date for receipt of the bids. Telephone and facsimile modifications or withdrawals are not permitted. Withdrawn bids may be resubmitted, with or without modifications, up to the solicitation due date and time. No bids may be withdrawn after the due date and time without the express authorization of the University of Kentucky Purchasing Division.
2.3 Bids received after the designated time and date in the solicitation will not be considered. Bids will or will not be publicly opened and read in accordance with the Invitation For Bids.

2.4 Bidders shall show the bid due date and time, the solicitation number, and the name and address of the bidder on the face of the bid envelope.

2.5 All bids will be considered firm for a period of forty-five (45) calendar days from the bid opening date.

3 Specification Requirements

3.1 Unless otherwise specified in the solicitation, all items bid are to be new, unused, and not remanufactured in any way.

3.2 Whenever a trade name, brand name, or model and catalog numbers followed by the words “or equal” or “approved equal” are used in the bid invitation it is for the purpose of item identification and to establish standards of quality, style, and features. Bids on equivalent items, substantially the same, are invited. However, to receive consideration, sufficient descriptive literature and/or specifications to clearly identify the item and provide for competitive evaluation must accompany the bid. The University will be the sole judge of equality and suitability. If bidder does not identify exceptions to the specifications shown in the IFB, bidder will be required to furnish the brand name(s), models, numbers, etc. specified in the IFB.

3.3 Unless stated otherwise in the solicitation, alternate bids will be considered. Alternate bids may be made in addition to responding to the solicitation or as the only response to the solicitation. However, the University is under no obligation to consider or accept an alternate bid and it reserves the right to reject any and all such bids.

3.4 The University reserves the right to request samples of any or all items bid in order to determine compliance with the specifications. The bidder must provide the samples within ten (10) days of the request and at no charge to the University. Samples are non-returnable. Failure to comply may be cause for rejection of the bid.

3.5 Bidders shall clearly delineate any deviations or exceptions from the bid specifications.

3.6 Except as otherwise provided in the solicitation, all bid prices must be firm. Prices subject to qualifications, such as escalation or other variables, may be rejected as non-responsive.

3.7 Unless otherwise stipulated in the solicitation, all quantities are estimates and do not represent a minimum guarantee. The University is obligated to purchase only those quantities needed during the term of the contract and it reserves the right to purchase more or less than the estimated quantities. The University is obligated only for those quantities ordered.

3.8 Proposed delivery dates shall be stated in number of calendar days after receipt of order.

3.9 All offers shall be F.O.B. destination, freight prepaid and allowed.

4 Bid Evaluation and Award

4.1 Bids will be evaluated and the award made to the lowest responsive, responsible bidder who offers the best value to the University and meets the terms, conditions and specifications of the Invitation For Bids.

4.2 The term “Responsible Bidder” means a person, company, or corporation who has the capability in all respects to perform fully the contract requirements and the integrity and reliability that will assure good faith performance. In determining whether a Bidder is responsible, the University may evaluate various factors including (but not limited to) financial resources; experience; organization; technical qualifications; available resources; record of performance; integrity; judgment; ability to perform successfully under the terms and conditions of the contract; and adversarial relationship between the Bidder and the University that is so serious and compelling that it may negatively impact the work performed under this Invitation for Bid; or any other cause determined to be so serious and compelling as to affect the responsibility of the Bidder.

4.3 The University reserves the right to accept or reject any and all bids or part of a bid and waive informalities, technical defects and minor irregularities in the bids received. Further, the University reserves the right to
make a single award, split awards, make multiple awards or no award whichever is in the best interest of the University.

4.4 Unless stated otherwise in the solicitation, the University reserves the right to award the contract to the lowest aggregate bidder for all items, on an item by item basis, or a group of like items whichever is found to be in the best interest of the University. The University will consider bids submitted on an “all or nothing” basis if the bid is clearly designated as such.

4.5 In accordance with KRS 45A.494, a resident bidder of the Commonwealth of Kentucky shall be given a preference against a nonresident bidder. In evaluating proposals, the University will apply a reciprocal preference against a bidder submitting a proposal from a state that grants residency preference equal to the preference given by the state of the nonresident bidder. Resident bidder and nonresident bidder shall be defined in accordance with KRS 45A.494(2) and 45A.494(3), respectively. Any Respondent claiming Kentucky residency status shall submit with its proposal a notarized affidavit affirming that it meets the criteria as set for in the above referenced statute.

4.6 The University shall issue a price contract or purchase order as its notification of award to the successful bidder(s). Until such date a price contract or purchase order is issued, nothing shall be construed to constitute a binding agreement between the University and the bidder.

5 Payment and Taxes

5.1 The successful bidder shall be paid, at the prices stipulated, for items or services delivered and accepted, upon the submission of proper invoices to the billing address shown on the purchase order. The University’s standard payment terms are net 30 days after acceptance.

5.2 Bidders may offer prompt payment discounts. The University will not consider any prompt payment discounts in determining the bid award.

5.3 The University utilizes a procurement card program as the preferred method of payment. The University assumes that all successful bidders will accept the University’s procurement card as a method of payment unless a specific exception is stated in the bidder’s response to the IFB. No additional charges may be added for acceptance of the procurement card.

5.4 The University is tax exempt from the provisions of the Kentucky Sales and/or Use Tax (Tax Exemption # A00276) on materials and equipment under this solicitation. The University is also entitled to exemption from the Federal Excise Tax. All bidders shall take this into consideration when submitting their bid. Exemption certificates will be furnished upon request. Bidders are informed that material purchased by the contractor for the performance of this contract for the University are not exempt from the provisions of the Kentucky Sales and/or Use Tax. All adjustments and allowances for the current sales and/or use tax shall be included in the bid price.

6. Kentucky’s Personal Information Security and Breach Investigation Procedures and Practices Act

To the extent Company receives Personal Information as defined by and in accordance with Kentucky’s Personal Information Security and Breach Investigation Procedures and Practices Act, KRS 61.931, 61.932 and 61.933 (the “Act”), Company shall secure and protect the Personal Information by, without limitation: (i) complying with all requirements applicable to non-affiliated third parties set forth in the Act; (ii) utilizing security and breach investigation procedures that are appropriate to the nature of the Personal Information disclosed, at least as stringent as University’s and reasonably designed to protect the Personal Information from unauthorized access, use, modification, disclosure, manipulation, or destruction; (iii) notifying University of a security breach relating to Personal Information in the possession of Company or its agents or subcontractors within seventy-two (72) hours of discovery of an actual or suspected breach unless the exception set forth in KRS 61.932(2)(b)(2) applies and Company abides by the requirements set forth in that exception; (iv) cooperating with University in complying with the response, mitigation, correction, investigation, and notification requirements of the Act, (v) paying all costs of notification, investigation and mitigation in the event of a security breach of Personal Information suffered by Company; and (vi) at University’s discretion and direction, handling all administrative functions associated with notification, investigation and mitigation.
TERMS AND CONDITIONS

The University’s General Terms and Conditions and Instructions to Bidders, viewable at: http://www.uky.edu/Purchasing/docs/gencondpurch.pdf apply to this Invitation to Bid.

RESTRICTIONS ON COMMUNICATIONS WITH UNIVERSITY STAFF

From the issue date of this IFB until a Contractor is selected and a contract award is made, Bidders are not allowed to communicate about the subject of the IFB with any University administrator faculty, staff, or members of the Board of Trustees except:

- The Purchasing Office representative, any University Purchasing Official representing the University administration, or others authorized in writing by the Purchasing Office and
- University Representatives during Bidders presentations.

If violation of this provision occurs, the University reserves the right to reject the Bidder’s proposal.

INVITATION SUBMISSION AND DEADLINE

The University of Kentucky accepts deliveries of IFB’s Monday through Friday from 8:00 am – 5:00 pm Lexington Kentucky time. However, IFB’s must be received by 3:00 pm Lexington Kentucky time on the date specified on the IFB in order to be considered.

**PROPOSAL FORM**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Catalog No. / Description</th>
<th>Qty.</th>
<th>Unit Price</th>
<th>Extended Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water Chiller Centrifugal machines – 1000 Nominal tons, Magnetic Bearing VFD, single compressor</td>
<td>1 ea</td>
<td>$_________</td>
<td>$_________</td>
</tr>
</tbody>
</table>

In addition, please complete the attached “Form of Proposal for Magnetic Bearing Chiller Pre-Purchase, University of Kentucky, Lexington, Kentucky, U. K. Project UK#18CHW2, PAGE FP-1, 2, 3 and 4.
FORM OF PROPOSAL FOR
MAGNETIC BEARING CHILLER PRE-PURCHASE

UNIVERSITY OF KENTUCKY
LEXINGTON, KENTUCKY
U.K. PROJECT UK#18CHW2

Chillers shall be offered as one (1) unit 1,000 tons each. The following
is for summarizing the proposed chillers:

LIST OF PERFORMANCE CRITERIA AND PHYSICAL DATA (PER CHILLER)

1. Compressor
   a. Type (single: open/closed) ________________________
   b. Motor _______volt__________rpm
   c. Motor Horsepower being supplied ________________________
   d. Maximum KW ________________________
   e. KW at design conditions ________________________
   f. Impeller rpm at design cond. ________________________

2. Evaporator
   a. Tons at design conditions ________________________
   b. GPM/ton _______min._________max.
   c. Water pressure drop ____________________max.
   d. Number of passes ________________________
   e. Water velocity _______min._________max.
   f. Suction temp. at design cond. ________________________

3. Condenser
   a. Entering water temp. at 3gpm/ton ____________________min.
   b. GPM/ton _______min._________max.
   c. Water pressure drop ____________________max.
   d. Number of passes ________________________
   e. Water velocity _______min._________max.
   j. Cond. temp. at design cond. ____________________max.

4. Certified Data to be Provided
   a. Certified motor curves ________________________
   b. Certified gear losses if gear drive machine ________________________

5. ECWT  CAPACITY  LCHWT  KW/TON
   85 deg.F.  100%  40  ____________________max.
   75 deg.F.  100%  40  ____________________max.
   65 deg.F.  100%  40  ____________________max.
   55 deg.F.  100%  40  ____________________max.
   40 deg.F.  100%  40  ____________________max.

6. NPLV ________________________
MODIFIED LIFE CYCLE COST CALCULATION

- NOTE: Modified Life Cycle Cost Calculations and all blank spaces must be filled out in their entirety by the Offerer or the Offer will be considered non-responsive and rejected.

- Centrifugal Refrigeration Machine (CRM)
- CRM Model __________________
- Refrigerant ________________
- Drive __________Open ____________Hermetic
- Speed __________Constant

NOTES:
- This modified life cycle calculation considers the first cost (which is the offered price) and the electric utility costs to operate the machine for 20 years. Maintenance costs will not be considered.

$ for consumption costs are calculated as:

$ = Tons x Hours x $/KWH x KW/Ton

- The Present Worth Value factor is based on a 20-year life and an interest rate of 6%. Thus P_{W} = [(1.06)^{20}-1]/0.06(1.06)^{20} = 11.470

- The KW/Ton values for each bin must be filled in by the vendor. Values to three decimal places will be allowed (example 0.591). The value indicates a limit that will be used in factory testing.

- Design Conditions: Condenser water flow is 3 GPM/TON, entering condenser water temperature is 85 F; Evaporator water flow of 1.6 GPM/TON, entering temperature of 40 F. The chiller shall also operate surge free at each of the following conditions:

   Evaporator flows from 1.6-2 gpm/ton with 40 F leaving water temperature; condenser entering water temperatures from 55-85°F at 2 or 3 gpm/ton with the above mentioned evaporator conditions; condenser entering temperature 90 F at 3 gpm/ton at the above mentioned evaporator conditions; 1.6-2 gpm/ton with 40 F leaving water temperature, 65°F condenser entering water temperature, 25% of full load capacity.

- If there is a math error in the extension, it will be corrected but revised KW/Ton values may not be entered.
**CALCULATION OF ANNUAL CONSUMPTION COST**

**HERMETIC CHILLER(S)**

Complete the following chart

*Do not change indicated values*

Based on 1.6 GPM/ton evaporator and 3 GPM/ton condenser water flow.

<table>
<thead>
<tr>
<th>GPM</th>
<th>ECWT</th>
<th>LCHWT</th>
<th>OUTPUT TONS</th>
<th>HOURS/YR.</th>
<th>$/KW HR.</th>
<th>KW/TON *</th>
<th>$ COST/YR 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>85</td>
<td>40</td>
<td>6</td>
<td>1179</td>
<td>0.05</td>
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<tr>
<td>100%</td>
<td>75</td>
<td>40</td>
<td>6</td>
<td>1778</td>
<td>0.05</td>
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<tr>
<td>100%</td>
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<td>40</td>
<td>6</td>
<td>2540</td>
<td>0.05</td>
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<td>100%</td>
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<td>6</td>
<td>1505</td>
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<td>100%</td>
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<td>40</td>
<td>6</td>
<td>1758</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTALS**

8760

TOTAL ANNUAL CONSUMPTION COST (EACH CHILLER) $-------------------

**CALCULATION OF MODIFIED LIFE CYCLE COST**

A. **Offered Price (Initial Cost) for one (1) Chiller**

$___________________________

Inclusive of materials, supplies, labor, delivery and services required to complete this procurement in accordance with the specifications and contract documents and any duly issued addenda for a Lump Sum Amount.

B. **20-Year Present Worth of Annual Electrical Costs**

Total Annual Consumption x 11.470= $___________________________

C. **Total Modified Life Cycle Cost (A + B)/Opr. Tons = C** $_____________________ $/Ton

See General Notes.
NOTES:
1. LCHWT - Leaving chill water temperature.
2. ECWT - Entering condenser water temperature.
3. Fouling factor shall be 0.00025 for condenser and 0.0001 for evaporator.
4. Base electrical energy cost of $.05 per KW-Hr.
5. Based on Cost: $ = (KW) (gross tons) (hours) ($/KW-HR).
   Ton
6. Chiller tons are to be the actual tonnage at the specified operating point. Tonnage
   shall be for one (1) chiller.

* KW/ton will be factory tested at four different points of entering condenser water
  temperature. One (1) point at 100% load and 85 deg.F. ECWT and the remaining five (5)
  points will be selected at owner’s option. Additional point will be tested for stable
  operation and any combination of flows and temperatures listed. These points will not
  to be considered in the modified life cycle cost analysis.
SECTION 236420 - PRE-PURCHASED WATER CHILLER

PART 1 - GENERAL

RELATED DOCUMENTS

General provisions of Contract and Division-1 Specifications apply to work of this section.

DESCRIPTION OF WORK:

Extent of water chiller work is indicated by requirements of this section. Manufacturer shall visit and survey proposed chiller installation site.

Types of water chiller specified in this section include the following:

- Centrifugal machines – 1,000 Nominal tons, Magnetic Bearing VFD, single compressor.

QUALITY ASSURANCE:

Regulatory Requirements

- International Mechanical Code as adopted by Kentucky Building Code.

ARI Compliance: Provide certified capacity ratings for water chiller in accordance with Air-Conditioning and Refrigeration Institute (ARI) Standard 550-98. NOTE: Also, exceptions to ARI 550-98 values in selection and testing requirements.

ASHRAE Compliance: Construct refrigerating system of water chiller in accordance with American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard ANSI/ASHRAE 15 "Safety Code for Mechanical Refrigeration". Include on the chiller and piping all proposed safety features and/or devices required by ASHRAE for refrigerants declared to be toxic.

ASME Compliance: Construct and test water chiller in accordance with American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII. Chiller must carry the ASME stamp.

Years in Service: The style of chiller being offered shall have been manufactured and in service for a minimum of 4 years.

SUBMITTALS:

Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), furnished specialties and accessories; and installation and start-up instructions.

Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.
Pre-Purchase Water Chiller

University of Kentucky
UK#18CHW2

Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of water chiller and controls. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed. Chiller Manufacturer is responsible for coordination of this work with the contractor on site and the engineer.

Maintenance Data: Manufacturer shall submit maintenance/operational manuals, and parts list for each water chiller, control, and accessory; including "trouble-shooting" maintenance guide. Manufacturer shall include current service, and repair and overhaul manuals and include owner on mailing list to receive any published related materials.

PRODUCT DELIVERY, STORAGE AND HANDLING

Handle water chiller and components carefully to prevent damage, breaking, denting and scoring. Do not ship damaged water chiller or components; replace with new.

PART 2 - PRODUCTS

WATER CHILLER -- GENERAL

This specification is for one (1) electric driven hermetic, with single compressor, as specified hereafter. Chiller shall be provided with all parts as necessary for automatic operation. See specification section 01050 for quantity of chillers.

Acceptable Refrigerants:

Centrifugal --- R-134a.

Chiller shall be sized, rated and tested in accordance with ARI Standard 550-98 for water chiller and shall have the following minimum capacities:

(Note also, special exceptions to ARI 550-98 values in selection and testing requirements for this project.)

Chiller Size:

See attached drawing for maximum footprint.

Cooling capacity: 1,000 full load output tons (nominal).

Design Conditions:
Evaporator

Chilled water flow: 1.6 GPM/Ton
Pressure drop (maximum): 30.0 Ft.
Entering water temperature: 55.0 deg. F.
Leaving water temperature: 40.0 deg. F.
Maximum tube velocity: 10.0 FPS
Water side working pressure: 250 PSIG

Condenser

Condenser water flow: 3 GPM/Ton
Pressure drop (maximum): 30.0 Ft.
Entering water temperature: 85.0 deg. F.
Leaving water temperature: 95.0 deg. F.
Maximum tube velocity: 10.0 FPS
Water side working pressure: 150 PSIG

The chiller shall also operate surge free at each of the following conditions (and any condition in between):

- Evaporator flows from 1.6-2 gpm/ton with 40 F leaving water temperature; condenser entering water temperatures from 40-85°F at 2 or 3 gpm/ton with the above mentioned evaporator conditions.
- Condenser entering temperature 90 F at 3 gpm/ton at the design evaporator conditions.
- 1.6-2 gpm/ton with 40 F leaving water temperature, 40°F condenser entering water temperature, 10% of full load capacity.

General

Fouling factors: chilled water - .0001; condenser water - .00025

Electrical characteristics:

All compressors sizes: 3-ph., 60 cy., 480v.

Chiller shall be a complete package, factory assembled and wired. If manufacturer does not provide a unit as a complete factory package, then furnish the necessary labor and material to complete the assembly and erection and insulation of the machine in the field.

Chiller may have hermetic drive.

Chiller shall conform to 2010 ASHRAE 90.1 Energy Code and meet requirements of Kentucky Building Code. Chiller shall provide surge-free operation at 100% to 15% capacity at maximum operating conditions specified including, but not limited to, 40 deg. F. leaving chilled water temperature and 85 deg. F. entering condenser water temperature with specified water flows.

Furnish and install the initial charge of refrigerant. Chiller and accessories shall be installed, tested, dehydrated and charged under the direct supervision of a factory trained service engineer.
factory engineer shall be present at all progress meetings and be present during all erections, calibrations, dehydrations and the initial running of each water chiller.

After chiller has been thoroughly tested and is running, the factory engineer will provide 24 hours operation based on three 8-hour days for each chiller. The factory service engineer shall log all operating conditions each hour during the 24 hours of operation and submit the logs to the Engineer for his review and approval. The 24 hours will include instructing the Owner’s representative and familiarizing the Owner in the correct means of logging all pressures and temperatures in connection with the chiller. The manufacturer’s service engineer shall visit the job three (3) times per year during the Warranty period: summer, spring, or fall and winter after acceptance for any adjustments necessary for proper operation. One of the three visits shall be at the start of each cooling season. The manufacturer's representative will have a service engineer close enough to service any breakdown in 24 hours after notification and the number of trips will not be limited during the warranty. Training sessions shall be “video taped” by a professional company on DVD and turned over to owner with Operation and Maintenance Manuals.

VIBRATION CONTROL

Concrete base and the following vibration isolators:

Vibration Isolators: Rubber pads (as recommended by the manufacturer).

DEMONSTRATION

Startup Services: Provide two separate sessions with factory-authorized service representative to start chiller and to demonstrate and train Owner’s maintenance personnel, engineers and supervisors as specified below:

Test and adjust chiller controls and safeties. Lubricate rotating parts. Verify that motor amperage conforms to manufacturer's data.

Start chiller and verify performance. Demonstrate operation to Owner.

Train Owner’s personnel on procedures and schedules for startup, shutdown, troubleshooting, servicing, and preventive maintenance.

Review data in operating and maintenance manuals.

Schedule training with the Owner through the Engineer with at least 14 days’ notice.

SOUND

The centrifugal chiller sound pressure level (SPL), in decibels (dB), with a reference pressure of 20 micropascals, shall not exceed the values listed below. All ratings shall be in accordance with ARI Standard 575-87, "Method of Measuring Machinery Sound Within Equipment Rooms".
No reduction of entering condenser water or raising of leaving chilled water temperatures will be allowed in the SPL’s. Making such a temperature adjustment does not represent the loudest operating condition the chiller will experience while on the job, and could mask sound problems that would otherwise occur. A minimum of 75% of the sound data points along the length of the machine shall be taken, and established as the minimum percentage of total possible points used to determine sound levels.

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</thead>
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<tr>
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</table>

Sound Pressure Test -- Each chiller shall have a sound test conducted at the factory prior to shipment to confirm the Sound Pressure Levels as listed above. All data must be measured and presented in strict accordance with ARI Standard 575-87.

The sound data points shall be measured simultaneously during the factory verification of capacity and efficiency.

In the event that a chiller does not meet the submitted dBA sound pressure level, the manufacturer must, at his expense, provide sufficient attenuation to the machine to meet the submitted value. This attenuation shall be applied in such a manner that it does not hinder the operation or routine maintenance procedures of the chiller.

If the unit cannot be modified to meet the submitted SPL levels, unit will be rejected.

The project engineer or his representative must be present to witness the test. The manufacturer will assume all expenses for two people.

The project engineer or his representative must witness the test after attenuation to confirm that the submitted values are met. The manufacturer will assume all expenses incurred by the project engineer or his representative to witness the retest.

CENTRIFUGAL WATER CHILLER:

Water chiller shall be complete with compressor and motor, evaporator, condenser, lubrication system, capacity control and controller, motor starter, instrument and control panel mounted and factory wired on the machine, purge system, mounting isolation and other items as herein specified.

The machines shall be shipped completely factory assembled with all refrigerant piping and control wiring factory installed. Ship the entire refrigerant charge in separate containers.

Centrifugal Compressor:

Single stage or multi stage
Fully accessible housing with vertical circular joints.
Direct driven
Magnetic bearings
Levitated shaft position shall be actively controlled and monitored by an X-, Y-, and Z-axis digital position sensor.

The compressor shall be capable of coming to a controlled, safe stop in the event of a power failure by diverting stored power from the DC bus to the magnetic bearing control system.

Mechanical linkage system that continuously monitors compressor-discharge gas characteristics and optimizes diffuser spacing to minimize impeller gas-flow disruptions.

The driveline (compressor and motor) and chiller starter shall be individual unit assemblies allowing for independent inspection, service, and repair/replace. If an integrated driveline and starter package is utilized which is not fully field repairable, the supplier must provide one spare package with the unit.

The chiller shall utilize a single compressor that delivers the specified performance at all load and lift conditions.

Motors shall be the single speed, non-reversing squirrel-cage induction type, and shall be suitable for voltage indicated herein. Motor stator shall be arranged for service or removal without complete compressor disassembly or breaking of main refrigerant piping connections. Full load operation of the motor shall not exceed nameplate rating. Motor shall be built for connection to selected starter.

Evaporator and condenser shall be fabricated with high performance integrally-finned copper tubing rolled into the tube sheets in both the evaporator and condenser as well as expanded into the tube support sheets in the evaporator. Tubing shall be finned except in the area adjacent to and in contact with the tube and tube support sheets. Tube support sheet shall be spaced at intervals to maintain proper tube spacing and to minimize tube vibration and wear. If “skip fin” tubes described above are not used, provide tube support sheets at minimum 2′ centers.

Minimum tube wall thickness shall be 0.028” in the evaporator and 0.035” in the condenser.


The evaporator and condenser shall comply with rules of Section VIII of the ASME Boiler and Pressure Vessel Code and shall carry ASME label if required by B.O.C.A. Mechanical Code Article 13.

Provide marine water boxes on both ends of condenser and evaporator-take apart design. Provide all water boxes with hinges or gantries.

Water Boxes: Marine type, removable, carbon steel, with vent and drain connection. Rated for 250 psig on evaporator and 150 psig on condenser.

Regardless of refrigerant type units shall be equipped with a factory mounted spring loaded reseating relief valves designed for exterior venting.

Provide factory applied epoxy paint to the outside of the tube sheet and interior of the water box on the condenser.
Provide pump out or purge system factory or field installed, and piped; system shall be self-contained. Provide any necessary devices for separating and returning refrigerant to the system.

Units operating with refrigerants having positive pressure at 75 Deg. F. Shall have isolation valves so that chiller has the capability of storing the entire refrigerant charge in the condenser. Provide the isolating valves at the chiller compressor discharge and the refrigerant liquid line, so that the refrigerant charge can be isolated in the condenser. If condenser does not have the capacity to store the entire refrigerant charge, then provide a separate storage receiver.

Demand limiter -- Demand limiter device shall be provided within the standard control panel so that maximum current may be manually set to any fraction between 10% and 100% of full load amperes.

Unit Controller:

The unit shall be equipped with a complete microprocessor control system. At a minimum, this system shall consist of control transformer, temperature and pressure (thermistor and transducer) sensors, Input/Output (I/O) board, power supply board, main processor board and interface board with display and keypad. All devices and sensors shall be factory mounted and wired. These devices shall be capable of self diagnostics. All sensors shall be hard-wired with quick-disconnect devices for easy removal.

The interface device shall be equipped with individual touch-sensitive membrane key switches.

CHILLER/DDC "INTEGRATOR": The chiller manufacturer shall provide all hardware, software, control wiring, co-ordination and programming required to interface the chiller on board digital controller to the campus Johnson Controls system. The following shall be reported as a minimum:

System operating information, including the following as a minimum:

1. Return and leaving chilled water and condenser water temperatures and water flows.
2. Evaporator and condenser refrigerant saturation temperatures
3. Sub-cooling refrigerant temperature
4. Evaporator and condenser pressure
5. Evaporator tube and condenser tube small temperature difference
6. Compressor discharge temperature
7. Oil sump temperature (if applicable)
8. Oil pump pressure differential (if applicable)
9. Percent of motor full load current
10. Input power
11. Kilowatt hours
12. Operating hours
13. Prerotation vane position (if applicable)
1. Refrigerant level position (condenser)
2. Motor winding temperature (each phase)
3. Average motor winding temperature
4. VSD – Output frequency
5. VSD – Output voltage (each phase)
6. VSD – Current (each phase)
7. VSD – Input current limit setpoint
8. VSD – Total supply KVA
9. VSD – Total power factor
10. VSD - Voltage total harmonic distortion (each phase)
11. VSD – Current total demand distortion (each phase)
12. VSD – DC bus voltage
13. VSD – DC bus current
14. VSD – Input and output Peak and RMS voltages and currents (each phase)
15. VSD – Internal ambient temperature
16. UPS Battery voltage
17. VGD Position
18. Discharge Pressure
19. Motor Housing and Winding Temperatures
20. MBC – Positions
21. MBC – Currents
22. MBC – Temperatures
23. MBC – Rotor Elongation
24. MBC – Motor Speed

The chiller shall have the necessary controls to allow the chiller to start with 35°F condenser water temperature and 60°F return chilled water temperature. Piping system does have internal sump and bypass.

Starters for motors shall be furnished for all auxiliary motors, such as purge and transfer unit.

All wiring shall meet or exceed the current National Electrical Code and shall be in metal conduit.
All low temperature surfaces on chiller shall be factory insulated with 1.5" inch fire retardant flexible closed cell plastic type painted insulation (thermal conductivity = 0.28 Btu/hr-ft^2). Items to be insulated shall include, but not be limited to: evaporator, waterboxes, and suction elbow. The economizer and motor cooling lines shall be insulated with 1/2 inch insulation. If chiller is not furnished insulated by the manufacturer, then the manufacturer shall provide the necessary labor and material to insulate each chiller at the project.

Provide vibration isolation pads for each chiller according to isolator manufacturer’s recommendations.

**COMPRESSOR MOTOR STARTER: VARIABLE SPEED DRIVE**

**General:** Variable Speed Drive (VSD) compressor motor starter to start motor and control motor speed by controlling the frequency and voltage of the electrical power supplied to the motor.

**Drive type:** Pulse width modulated (PWM) utilizing insulated gate bipolar transistors (IGBTs).

**Control Logic:** Independently control motor speed and pre rotation vane (PRV) position for optimum efficiency and operational stability. Base motor speed and PRV position on a minimum of 4 inputs: leaving chilled water temperature, return chilled water temperature, evaporator refrigerant pressure, condenser refrigerant pressure; Verify motor speed and PRV position and also use as inputs to the control logic.

**Power Factor:** At all loads and speeds, provide a minimum of a .97 power factor.

Capacitors shall not require scheduled replacement. If capacitors do not meet this requirement, the chiller manufacturer shall provide three spare sets of capacitors per compressor for the building owner’s stock.

**Enclosure:** NEMA-1 type with hinged access door with door interlock, lock and keys, and padlockable

**Packaging:** Factory mounted on chiller, piped to cooling circuit; wired to control panel and compressor motor; entire package (including active harmonic filter) shall be UL listed.

**Cooling:** Cool drive pole assembly components and internal ambient air via fluid-cooled, closed loop; all starter components accessible for service and replacement without opening the chiller’s main refrigerant circuit.

**Factory run test:** Perform an electrical and mechanical run test of VSD starter prior to shipment to verify proper wiring and phasing.

**Factory settings:** Set starting design current and current overload settings prior to shipment.

**Harmonic Distortion:** Provide a drive and chiller system with an integrated active harmonic filter mounted inside the starter cabinet. System must generate harmonic distortion levels less than the following, measured at the input side of the drive:

- **Current:** 5% maximum current total demand distortion
- **Inrush amperage:** Limited to the design full load amperage of the chiller.

**Protective devices:** provide the following, as a minimum:
Electronic current-sensing overloads (1 per phase) – with indicating message on the control panel and reset button; shut down chiller upon detection of operating current exceeding 105% full load amperage.

High instantaneous current overload – with indicating message on the control panel and reset button; shut down chiller upon detection of starting current exceeding 115% of design inrush starting current for 1 second.

Phase rotation insensitivity

Single phase failure protection circuit with indicating light – shut unit down if power loss occurs in any phase at startup.

High temperature safety protection system on IGBTs with indicating light and reset button; via thermistors embedded on IGBT heat sinks – shut unit down if IGBT temperature exceeds acceptable limits.

Power fault protection for momentary power interruptions – interrupt power to the compressor motor within 4 line cycles upon detection of power interruptions longer than ¾ of a line cycle.

High and low line voltage protection.

Features: Factory mount and wire the following as a minimum:

Control transformer: 115volt and sized to power control panel and all unit controls.

Electrical lugs: Sized to accept the copper power lines required by the chiller.

Single point power: From electrical lugs at starter, power all powered devices on the chiller including control panel, control devices, oil pump (if applicable) and refrigerant purge.

Circuit-breaker disconnect: Door interlocked; ground fault protection; minimum 65,000A short circuit withstand capacity per UL 508.

Control panel readouts: Display on the control panel and provide to BAS via communication port the following as a minimum:

Output frequency

Output voltage

Output current (each phase)

Input power (kW)

Energy consumption (kWh)

Elapsed running time

Three phase voltage total harmonic distortion (THD)

Three phase current total demand distortion (TDD)

Total unit power factor

Total supply KVA
WARRANTY

The manufacturer shall provide a five year parts and labor warranty for the entire compressor assembly. Include coverage for compressor casting, compressor motor, impellers, speed increasing gears, inlet guide vanes, bearings, shafts, motor alignment, gaskets and O-rings, lubrication system, refrigerant containment system, suction elbow and discharge volute. The compressor shaft seal shall be tested for refrigerant leaks in the presence of the Owner two times per year at the expense of the manufacturer during the five year compressor warranty period. Any refrigerant leaks at the shaft seal shall be repaired at no cost to the Owner. The warranty shall commence upon substantial completion for each chiller.

The manufacturer shall provide a one year parts and labor warranty for the complete chiller assembly including structural frame, lubrication system, refrigerant containment system, compressor motor starter, compressor, compressor motor, speed increasing gears, purge (low pressure chiller), pumpout system, condenser and evaporator tube bundles and tubes, control panel, chiller controls and safeties, microprocessor boards, gauges, water boxes, refrigerant relief valves and rupture disks (low pressure chiller). The warranty shall commence upon substantial completion for each chiller.

Manufacturer shall stock complete refrigerant charge at factory for 5 years, marked for this chiller. If, at any point during the 5 year period refrigerant is needed for this unit, the refrigerant shall be restocked for the remainder of the 5 year period (no re-stock limit). At the end of 5 years, the refrigerant shall be turned over to the university. Refrigerant loss due to negligence of the owner will not be a part of this warranty.

Five Year Maintenance Agreement

The chiller manufacturer shall include a five year maintenance agreement for chiller(s). The maintenance agreement shall include a minimum of three, eight (8) hour inspections each year of operation for the chiller(s), by factory maintenance engineer. One of three inspections shall be at the start of each cooling season. Additional the cost for all materials, parts, refrigerant, gaskets, shaft seals, O-rings, couplings, etc., for each year maintenance agreement shall be borne by the chiller manufacturer. Each inspection shall include a standardized service and maintenance written report indicating all items checked and serviced. Signed reports shall be submitted to the Owner for review and approval at the end of each inspection. Reports shall note any irregularities in operation of each system and tracked over time in an attempt to predict component replacement and/or downtime.

Each Year Maintenance Agreement shall include the following:

- Electrical System Check - Operational verification of relays, overload dashpot fluid level, starter contacts, tightening of power wiring, and megohmeter test of compressor motor(s), and overload calibration.


- Purge Service - Pressurize the purge tank, test the solenoid valves to insure proper sealing, check purge tank sight glass and remove any water if present, lift the purge tank body from the base plate to visually inspect the purge tank coil and all internal parts and clean where necessary, inspect the tank drain valve and line to insure it is free of any debris, replace the tank gasket, and install new filter drier cores, put tank back in place, pressurize, and check for leaks.
Speed Increasing Gear Set Service - The speed increasing gear set shall be checked at each of the specified inspections.

Refrigerant Charge Service - The chiller shall be checked for proper refrigerant charge at each of the specified inspections. Refrigerant shall be added as required at no charge to the Owner.

Condenser Tube Service - The condenser heads shall be removed at both ends of the chiller. The tubes and tube sheets shall be inspected for fouling.

Provide follow-up personnel training during service period.

Operator’s Log - A review of the operator’s logs and the operator’s experience with recent operation shall be done at each of the specified inspections to address any concerns.

Unit Log - A log of all temperatures, pressures, amperage, and voltage shall be done at each of the specified inspections.

The following items shall be done at each of the specified inspections while the chiller is operational:

- Adjust operating and safety controls as required and record settings.
- Complete operating log of temperatures, pressures, voltages, and amperages to determine unit operating efficiency.
- Check operation of purge system.
- Check operation of control circuit.
- Check operation of motor and motor starter.
- Check customer’s log with operator and discuss operation of the chiller(s) in general.
- Provide chilled water and condenser water analysis and make recommendations on chemical treatment modifications.
- An ASHRAE Guideline 3 Report shall be reviewed with the Owner at each of the specified inspections by the manufacturer’s field supervisor. The report shall be signed by the chiller manufacturer’s field supervisor and given to the Owner for his records.

Refrigerant Analysis Service - An analysis of the refrigerant shall be performed annually measuring acid, moisture content, and check for system contamination. The manufacturer’s field supervisor shall make a review of the laboratory results and a written report shall be submitted.

**CHILLER COLOR**

The entire surface of the chiller shall be painted to match the existing chillers in the plants (“UK Blue”).

**PART 3 - EXECUTION (BEFORE DELIVERY)**
VERIFICATION OF CAPACITY AND EFFICIENCY

The chiller shall be run-tested under full load conditions to check performance (tons and KW), vibration, operating controls and safety cutouts. The manufacturer shall provide to the Consulting Engineer and the Owner's representative a factory certified test report to confirm that the proposed chiller perform as specified. The performance test will be conducted in the manufacturer's factory or laboratory. The Engineer and Owner's Representative shall be notified to review the installation and witness the factory test. The factory shall pay for all expenses for the engineer and owner's representative (3 people) to witness the test.

The manufacturer shall submit for approval before scheduling the testing procedures including the following:

* Data sheets showing the acceptable maximum/minimum points as well as the anticipated values.
* The test load points with guaranteed KW/ton.
* Test equipment.
* Overall schedule
* Test stand layout.
* Activity schedule
* Other, etc.

In order to expedite the time for testing, the manufacturer will be required to test each chiller unit in, at most, one (1) chiller/day. The chiller shall be tested. The Owner will witness testing only during normal working hours.

The performance test shall be run in accordance with ARI 550/590, except where otherwise specified, and performed on an ARI approved test stand. The Owner will accept the equipment if the test procedures and results are in conformance with the following specified requirements stated below. If the equipment fails to perform within allowable specified tolerances, the manufacturer will be allowed to make necessary revisions to his equipment and retest as required. The manufacturer shall assume all expenses incurred by the Owner and his representatives to witness the retest (2 people). The Owner will not accept the chiller or allow the chiller to be shipped from the factory until all requirements are met.

Full Load Capacity Test: The chiller shall meet 100% of the specified minimum cooling tons required. No ARI tolerances will be acceptable for the specified minimum cooling tons.

Full Load KW Per Ton: The chiller shall meet 100% of the maximum KW per ton value that manufacturer submitted on the life cycle cost offer form. No ARI tolerances will be acceptable for the full load KW per ton value.

The procedures and instrumentation listed below conform with ARI 550-98. These guides must be followed to insure the accuracy of this performance test.

Two venturi flow metering devices sized for the specified evaporator and condenser GPM shall be used. The accuracy of this venturi shall be +1%.

Two thermometers in 50% immersion wells shall be installed at each temperature sensing location. The accuracy of these thermometers must be +0.15 deg. F. and should be readable to ±0.1 deg. F. Each thermometer shall be calibrated and traceable to the National Bureau of Standards. The calibration curves shall be attached to the performance test.
The readings of both thermometers shall be averaged together to minimize the effect of temperature gradients.

Two 80" water-over-mercury manometers capable of ±0.1" readings (each to Meriam Model 30EB25) for measuring the pressure change across the orifices. Alternate = Rosemont pressure transducers with digital voltmeter (±1/2%), calibrated and traceable to the National Bureau of Standards.

The polyphase wattmeter shall have a digital readout and be capable of ±1% accuracy. The wattmeter shall be calibrated prior to the test. The KW measurement shall be taken upstream of the starter/VFD.

A factory certified test report of all data shall be forwarded to the Engineer/Owner for approval prior to equipment acceptance. All calibration curves and information sheets for all of the above instrumentation shall be provided upon request.

Machine shall be tested at full load to verify the tonnage produced and the KW/Ton consumed. Machine shall be tested additionally at five (5) points selected by the owner/engineer that are within the specified parameters. Maintain constant 40°F. leaving chilled water temperature.

Provide test stand vibration mapping of each unit. Mapping will be compared to field mapping after chiller has been installed.

EXAMINATION

Examine areas to receive chiller for compliance with requirements for installation tolerances and other conditions affecting chiller performance. Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION OF WATER CHILLER

Manufacturer shall supervise installation of chiller and verify that the chiller is installed according to manufacturer’s recommendations.

Maintain manufacturer’s recommended clearances for service and maintenance, with the exception of tube bundle pull space. Space normally required to pull tube bundle will not be required for this installation. See drawing for additional information.

Electrical: Furnish electrical field-wiring diagrams to Design Engineer, in AutoCAD format, for power wiring to water chiller, purge/pump out system, (and any other field wired components) and control wiring for field-mounted controls. Wiring work is not a part of this section. Any items not turned over or coordinated with the engineer shall be field wired at the manufactures cost.

REQUIRED SUBMITTALS:

The following chart is supplied for the benefit of the Owner, Architect, Engineer and Contractor to assure a complete submission of required information. It is a reference listing of documents required by the Specifications under this Section. Refer to Specifications Section - General Provisions for the general requirements of submittals.
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* Provide wiring diagrams.

END OF SECTION 2364020
# Pavilion Chiller

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## Connectivity Points

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<tr>
<td>Evap. Leaving Wtr Temp.</td>
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<td>Evap. Enter. Wtr Temp.</td>
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<td>Cond. Leaving Wtr Temp.</td>
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<tr>
<td>Cond. Enter. Wtr Temp.</td>
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<tr>
<td>Evap. Refrigeration Pressure</td>
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<td>Cond. Refrigeration Pressure</td>
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<td>CHW Flow Status</td>
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<tr>
<td>Cond. Wtr Flow Status</td>
<td>X X</td>
</tr>
<tr>
<td>Run Amps</td>
<td>X X</td>
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<tr>
<td>Head Temp</td>
<td>X X</td>
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<tr>
<td>Evap. Temp</td>
<td>X X</td>
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<tr>
<td>Total Tons (calculated)</td>
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<tr>
<td>Power Meter (KWH)</td>
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<td>Leaving CHW Setpoint</td>
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<td>% Run Load Amps</td>
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<td>Mode Of Operation</td>
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<td>Manual Reset Alrm. Status</td>
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<td>Auto Reset Alrm. Status</td>
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<td>Demand Limit Setpoint</td>
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<td>Chiller Enable</td>
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<tr>
<td>Cond. Wtr Flow</td>
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</table>
DIVISION 1 - GENERAL REQUIREMENTS

SECTION 001050 - SPECIAL CONDITIONS

SCOPE

The specifications describe the work to be done and the material to be provided for furnishing pre-
purchased water chiller for the University of Kentucky, Central Plant #2. This procurement action is initiated
to effect timely delivery of the equipment and to select the chiller to be purchased on the chiller evaluation
form subject to available funds.

The equipment to be purchased is as follows:

Provide unit pricing for the purchase of one (1) chiller.

The University of Kentucky will place the orders for the purchase and shipment of the equipment. Chiller
shall be offered as “delivered to site”. The installing contractor for the project will be responsible for receiving
the equipment and material upon arrival at the designated delivery point and making an inspection for
damage in transit and unloading.

The delivery point of the pre-purchased equipment and materials shall be F.O.B. truck bed at Lexington,
Kentucky CP2 site. The Chiller Manufacturer shall coordinate the deliver date with the General Contractor’s
schedule and shall provide at least (3) weeks advance notice of the shipping date, weight, rigging
requirements, etc., to the Engineer and the installing contractor.

Coordinate delivery and installation with the General Contractor on this project. The delivery shall be
between the dates of May 15, 2018 and October 31, 2018. The General Contractor shall select the final
date (between the dates listed above) and the manufacturer will be required to deliver on this date.

Provide detailed shop drawings of the field wiring required and the sizes of the chiller and equipment within
4 weeks of contract award. This shall include AutoCAD drawings (plan and elevations) for all equipment.

On account of the various manufacturers, it is impossible to specify all details of construction; however, all
materials and labor shall be furnished which are necessary to construct the listed equipment in accordance
with the best accepted practice. Each Manufacturer shall visit the project before submitting an offer to verify
that the proposed chiller can be installed and service maintained in the available space. If chiller require
disassembly and reassembly for installation and/or building walls (piping, etc.) require removal and repair,
the Manufacturer shall make the owner aware of this in their proposal. If the manufacturer fails to notify the
owner of any of the above-mentioned conflicts, they will be responsible for additional cost associated with
the chiller installation.

These Special Conditions shall apply to all Divisions of the Specifications.

CONFLICTS

If there is any conflict in the "Instructions to Offerers" and the "General Conditions" with these "Special
Conditions," the "Special Conditions" shall govern.
DEFINITIONS

The term "Owner" as used throughout the Specifications and Contract Documents means the University of Kentucky.

The term of "Engineer" as used throughout the Specifications and Contract Documents means the firm of Staggs & Fisher Consulting Engineers, Inc., 3264 Lochness Drive, Lexington, Kentucky 40517.

The term "provided" as used throughout these Specifications shall mean furnish and deliver to the Owner’s property.

The term "contractor" applies to the general/mechanical contractor awarded the CP2 renovation contract.

LIQUIDATED DAMAGES

If the chiller manufacturer fails to meet the chiller delivery date, then the owner will assess liquidated damages at fifteen hundred dollars ($1,500.00) per day for each consecutive day missed.

OFFER AND PERFORMANCE AND PAYMENT BOND

Offers shall be accompanied by an offer guarantee of not less than five Percent (5%) of the amount of the Base Offer executed by a Surety Company authorized to do business in the State of Kentucky.

The Manufacturer shall furnish a surety bond (form to be furnished) in an amount equal to one hundred percent (100%) of the Contract Price as security for the faithful performance of this contract and for the payment of all persons performing labor including payment of all unemployment contributions which become due and payable under Kentucky Unemployment Insurance Law, and furnishing materials, equipment, supplies, taxes, and other proper charges and expenses incurred or to be incurred in the performance of the contract. All bonds shall be executed by a surety company authorized to do business in the Commonwealth of Kentucky and the contract instrument or bond must be countersigned by a duly licensed Kentucky resident agency representing the company. Bonds shall be good for two (2) years after the final payment has been on the contract. If the furnishing of such bonds is stipulated in the offering documents, the Offerer shall pay the premiums. If the furnishings of such documents if not provided for in offer documents, but required by the Purchasing Officer subsequent to the award of contract, the successful Offerer shall then procure such bond and shall be reimbursed for the premium cost.

PAYMENT TO MANUFACTURER

After delivery and acceptance of the chiller, the Manufacturer may apply for payment in an amount equal to eighty (80%) percent of the total purchase contract price. The remaining twenty (20%) percent shall be retained until all the equipment has been installed, started up, tested and accepted.

CONDITIONS OF THE CONTRACT

No offerer shall insert any conditions in the Form of Proposal.

ORDINANCES AND CODES
All work as specified shall be executed in strict compliance with all state regulations and codes and shall be in compliance with all National Codes when same have jurisdiction.

All offerers must be qualified and experienced and meet all requirements provided and/or required under any state statute, code, ordinance, or rule governing the performance of this type of work for which he submits offers, and be able to submit proof thereof on request.

PERMITS

All permits, inspections and certificates necessary shall be obtained by the Manufacturer from the authorities governing such work. The Manufacturer shall pay the cost of all permits, inspections and certificates.

ADDENDA

Offerers shall take prompt action and allow sufficient time for making interpretations.

Prompt action and allowing sufficient time shall be interpreted as meaning that offerers shall make any requests for explanations or interpretations by such method of communication as will place the request in the hands of the Engineer no less than ten (10) calendar days prior to the date set for the opening of offers. No addendum will be issued later than seven (7) days prior to the date set to the opening of offers, such period being adjudged necessary for distribution of an addendum to all offerers. The failure of offerers to request explanations and interpretations as set forth above, and the submission of an offerer so doing shall be construed as evidence that no explanations or interpretations were required. Claims made subsequent to submission of a offer for labor, materials, tools, discrepancies, or omissions, which were not questioned as set forth above or for difficulties encountered thereby will not be eligible for consideration. The Engineer’s decisions in such cases shall be final. Questions concerning the technical specifications may be directed by mail to Staggs & Fisher Consulting Engineers, Inc., 3264 Lochness Drive, Lexington, Kentucky 40517.

SPECIFICATIONS

It shall be the responsibility of the Manufacturer to carefully examine the Specifications and Contract Documents pertaining to all phases of the Contract in order that the Manufacturer may foresee all requirements for the coordination of his work. The Special Conditions and all other Contract Documents apply to all branches of the work. The submission of an offer shall be construed as evidence that such examination has been made. Claims made subsequent to submission of a offer for labor, materials, tools, equipment, transportation, etc., required on account of not having made an examination as set forth above will not be eligible for consideration. The Engineer’s decisions in such case shall be final.

CATALOG/DRAWINGS, PERFORMANCE CRITERIA AND PHYSICAL DATA

Provide six (6) sets of complete catalog/drawings and electrical drawings describing proposed chiller and Equipment Performance Criteria and Physical Data. This material is to be turned over the Owner at offer opening. This material is to be used during the evaluation process and development of drawings for the installing contractor. In addition complete the “LIST OF PERFORMANCE CRITERIA AND PHYSICAL DATA” sheet and include with the submittals.
CHILLER OPERATION AND MAINTENANCE MANUALS

Provide five (5) bound final installation, training, operation, maintenance and repair manuals to be turned over to the Owner's Representative and approved for content by the Engineer prior to acceptance of substantial completion.

Manuals provided must be of sufficient detail to enable customer to install, calibrate, train, operate, maintain, service and repair every system, subsystem, and/or piece of equipment installed on or as part of this contract. Manual must contain:

- Project Title, Project number, Location, dates of submittals, names of Engineer, Engineer, Contractor, and Contractor's Subs. Provide phone numbers and addresses for Contractor and Subs..

- An Equipment Index that includes manufacturers name, address, and telephone number for all equipment purchased on the project.

- Emergency instructions with phone numbers and names of contact persons on warranty items.

- All manuals in binders shall be original copies provided by the manufacturer. At minimum these binders must include:

  - Installation manuals, Calibration manuals
  - Training manuals, Operation manuals
  - Service Manual, Repair manuals
  - Parts list, Wire list
  - Control and control interface manuals
  - Copies of all software programming and programs
  - Reviewed submittals.
  - Certification that owner is to receive all published service, repair and overhaul manuals by being placed on the current mailing list.
  - Copies of all inspection and guarantee certificates. Copies of all manufacturers' warranties as filed with the State of Kentucky listed as the owner for all equipment provided and/or installed.

All manuals shall be as follows: Bound in hard cover three (3) ring (D-type) binder, 1", 1.5" or 2" maximum, indexed and in CSI format, tabbed (4,5,8 or 16th cut), no more than 80% binder fill, white vinyl, presentation type with clear vinyl view cover on front, back and spine and with pockets on front and back. Maximum drawing size in binder shall be folded 11”x17” and shall be hole punched and reinforcements added. Do not put drawings in pockets. Top of all drawings shall be at top or spine side of the manual. Complete drawings must be viewed without opening rings. Provide binders as manufactured by Universal Office Products, Des Plaines, IL. 1”(S# B2-20740), 1.5”(B2-20744), or 2”(B2-20746) or equal.

If the binder includes manuals from any one manufacturer covering several different model numbers, the model used on the project must be highlighted.

NEW MATERIALS

All materials furnished under the contract shall be new and of first quality.

Material shall bear Underwriters' label or other acceptable independent laboratory, where such standard has been established and listed by Underwriters' Laboratories, Inc.
Materials, equipment and appliances shall conform to latest standards of:

- Kentucky Building Code
- International Mechanical Code
- Air Conditioning and Refrigerating Engineers Institute
- American National Standards Institute
- American Society of Mechanical Engineers
- American Society of Testing Materials
- National Electrical Manufacturer's Association
- National Electrical Code
- American Society of Heating, Refrigerating and Air Conditioning Engineers

Use extreme care in selection and installation of equipment to insure that noise and vibration are held to absolute minimum. Correct objectionable noise and vibration.

SUBMITTALS

Submittals, brochures of equipment, material, literature, etc., shall be submitted as directed to the Engineer for approval in the required number of copies. The approval of these drawings will not release the Manufacturer of the responsibility for details and dimensions and compliance with the Specifications.

The Manufacturer’s attention is directed to the fact that he is requested to check and approve all submittals, brochures, literature, etc., prior to submission to the Engineer for review.

Submittals shall include the manufacturer’s recommendations as to size, arrangement, and construction of auxiliary equipment.

All submittals shall be submitted as soon as possible after an award.

INSURANCE (This section shall apply only to those Manufacturers who are required to perform work with their own forces at the job site.)

The Manufacturer shall provide and include in his Offer Price the cost of the following insurance:

- Workmen’s Compensation – Kentucky Statutes
- Public Liability - $1,000,000 combined single limit
- Property Damage - $1,000,000 combined single limit (To include all vehicles and equipment owned or non-owned for use on the project.)

Generally

The Manufacturer shall not commence work under this contract until he has obtained all insurance required under the conditions of the contract, nor shall the manufacturer allow any subcontractor until all similar insurance required of the subcontractor has been obtained. The Manufacturer shall furnish the owner with satisfactory evidence that he has secured and is maintaining the required insurance coverage.

There shall be endorsement in each of the above policies reading as follows:

“It is hereby agreed that in event of a claim arising under this Policy, the company will not deny liability by reason of the insured being a state, county, municipal corporation or government agency.”
All insurance certificates shall be submitted in duplicate to the Owner and carry the provision that a 30 –
day written notice shall be given prior to cancellation by the company.

FACTORY CERTIFICATION TEST AND DAMAGES FOR FAILURE TO MEET CAPACITY AND POWER
REQUIREMENTS

These documents require that a factory certification test be performed on the water chiller to certify capacity
and power requirements. (See Technical Specifications.) Any chiller not meeting the test requirements of
specifications will not be shipped.

END OF SECTION 01050