WEST VIRGINIA COMMUNITY & TECHNICAL COLLEGE SYSTEM

COMMUNITY & TECHNICAL COLLEGE SYSTEM OF WEST VIRGIIA

1018 Kanawha Boulevard, East, Suite 700
Charleston, WV 25301
681-313-2212

RFB No. 19122
Please show this number on all packages and documents related to this order.

GAE:

Page #:

Deliver Sealed Bid To:

Chief Procurement Officer
RFB 19122
WV Council for Community & Technical College Education
1018 Kanawha Boulevard, East, Suite 700
Charleston, WV 25301-2827

Bids will be received until:

Bid Opening Time: 3:00 PM, EDST
Bid Opening Date: April 16, 2019

RFB Date	Buyer	Ship Via	F. O. B.	Terms	Delivery Date Required
04/01/2019	RBD		Destination	Net 30	On or before July 1, 2019

Item	Quantity	U/M	Description	Unit Price	Extended Price
			REQUEST FOR BIDS (RFB) 19122		
1	1		Provide and deliver a 140 ton chiller pursuant to the requirements and specifications on the following pages to: New River Community and Technical College Greenbrier County Campus 653 Church Street Lewisburg, WV 24901 **Submit sealed bid on the attached Bid Form.** Modifications to the Bid Documents, if any, will be made by written Addenda prepared by ZMM Architects & Engineers and issued by the Community & Technical College System of WV ("CTCS"). Bidders shall not be entitled rely upon any other communication method. The State of West Virginia (CTCS) is exempt from Federal and State taxes. Ship F.O. B. Destination. Delivery must be scheduled at least one week in advance with the CTCS.		

VENDOR (BIDDER'S) NAME:	BID DATE:	
AUTHORIZED SIGNATURE:		
MAILING ADDRESS:		
TELEPHONE NUMBER:		
EMAIL ADDRESS:		

This order is tax exempt. Exemption #:550-517-092

Bids for furnishing the supplies, equipment, services or printing described and specified on the following pages will be received by the Chief Procurement Officer ("CPO") until the time and date for receipt of Bids. To receive consideration for award, the Bid should be submitted on this form, signed in full in ink and delivered to the CPO on or before the date and time shown for the Bid opening. Prices shall be based on the units specified. The Community and Technical College System of WV ("CTCS") reserves the right to accept or reject Bids on each item separately or in whole, to reject any or all Bids, to waive informalities or irregularities, and to contract as the best interests of the CTCS may require in the CTCS' sole opinion. Bids are subject to the Terms and Conditions, Instruction to Bidders and specifications and/or drawings in the following pages.

SEE TERMS AND CONDITIONS AND INSTRUCTIONS TO BIDDERS

TERMS AND CONDITIONS

1. ACCEPTANCE: Vendor shall be bound by this Order and its terms and conditions upon receipt of this Order. This Order expressly limits acceptance to the terms and conditions stated herein. Additional or different terms proposed by the Vendor are objected to and are hereby rejected, unless otherwise provided for in writing by the Institution and approved by the Attorney General.

2. APPLICABLE LAW: The laws of the State of West Virginia and the Procedural Rules of the Higher Education Policy Commission, Council for Community and Technical Education or Governing Board, whichever has jurisdiction pursuant to W. Va. Code, shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.

3. ASSIGNMENT: Neither this Order nor any monies due, or to become due hereunder, may be assigned by the Vendor without the Institution's consent.

4. INSTITUTION: For the purposes of these Terms and Conditions, the "Institution" means the institution purchasing goods and services for which a Purchase Order has been lawfully issued to the Vendor.

5. CANCELLATION: The Institution may cancel any Purchase Order/Contract upon 30 days written notice to the Vendor.

6. COMPLIANCE: Vendor shall comply with all federal, state and local laws, regulations and ordinances including, but not limited to, the prevailing wage rates of the W. Va. Division of Labor, if applicable.

7. DELIVERY: For exceptions to the delivery date as specified in the Order, the Vendor shall give prior notification and obtain the approval of the Institution. Time is of the essence of this Order and it is subject to termination by the Institution for failure to deliver on time.

8. DISPUTES: Disputes arising out of the agreement shall be submitted to the West Virginia Court of Claims.

9. HOLD HARMLESS: The Institution will not agree to hold the Vendor or any other party harmless because such agreement is not consistent with state law.

10. MODIFICATIONS: This writing is the parties' final expression of intent. No modification of this Order shall be binding unless agreed to in writing by the Institution.

11. NON-FUNDING: All services performed or goods delivered under this Purchase Order/Contract are to be continued for the term of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.

12. ORDER NUMBERS: Contract Order numbers or Purchase Order numbers shall be clearly shown on all acknowledgments, shipping labels, packing slips, invoices and correspondence.

13. PAYMENTS AND INTEREST ON LATE PAYMENTS: Payments may only be made after the delivery of goods or services. Interest may be paid on late payments in accordance with the West Virginia Code.

14. RENEWAL: The Contract may be renewed only upon mutual written agreement of the parties.

15. REJECTION: All goods or materials purchased herein are subject to approval of the Institution. Rejection of goods or materials due to nonconformity with the terms, conditions or specifications of this Order, whether held by the Institution or returned to the Vendor, will be at the Vendor's risk and expense.

16. VENDOR: For the purposes of these Terms and Conditions, the "Vendor" means the vendor whose quotation, bid, proposal or expression of interest has been accepted and has received a lawfully issued Purchase Order from the Institution.

17. SHIPPING, PACKING, and BILLING & PRICING: Unless otherwise stated, all goods are to be shipped prepaid, FOB destination. No charges will be allowed for special handling, packing, wrapping, bags, containers, etc., unless otherwise specified. All goods or services shall be shipped on or before the date specified in this Order. Prices are those that are stated in this Order. No price increase will be accepted without written authority from the Institution.

18. TAXES: The State of West Virginia (the Institution) is exempt from Federal and State taxes and will not pay or reimburse such taxes.

19. TERMINATION: In the event of a breach by the Vendor of any of the provisions of this contract, the Institution reserves the right to cancel and terminate this contract forthwith upon giving written notice to the Vendor. The Vendor shall be liable for damages suffered by the Institution resulting from the Vendor's breach of contract.

20. WARRANTY: The Vendor expressly warrants that the goods and/or services covered by this Order will: (a) conform to the specifications, drawings, samples or other description furnished or specified by the Institution; (b) be merchantable and fit for the purpose intended; (c) be free and clear of all liens, claims and encumbrances of any kind; and/or (d) be free from defect in material and workmanship.

INSTRUCTIONS TO BIDDERS

(Purchases greater than $25,000)

West Virginia Higher Education Policy Commission ('Commission")
West Virginia Council for Community and Technical College Education ("Council")

1. BIDDER'S REPRESENTATIONS: The bidder, by making a bid, represents that: (a) the bidder has read and understands the bidding documents, terms and conditions, and the bid is made in accordance therewith; and (b) the bid is based upon the materials, equipment, systems, printing and/or services specified.

2. QUALITY STANDARDS: Brand names, when identified, include the standard of quality, performance or use desired. Unless otherwise noted, bids by bidders on equivalents may be considered, provided the bidder furnishes descriptive literature and other proof required by the Institution. Samples, when required, must be furnished free of charge, including freight. In the event the Institution elects to contract for a brand purported to be an equivalent by the bidder, the acceptance of the item will be conditioned on the Institution's inspection and testing after receipt. If, in the sole judgment of the Institution, the item is determined not to be equivalent, the item will be returned at the Seller's expense and the contract terminated.

3. SUBMISSION OF BIDS: The bid, the bid security, if any, and other documents required to be submitted with the bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the bids and shall be identified as a "Sealed Bid," and shall include the bid number, the bid opening time, and the bid opening date. Bids shall be delivered and deposited at the designated location prior to the time and date for receipt of bids. Bids received after the time and date for the bid opening will be returned unopened. The bidder shall assume full responsibility for timely delivery at the location designated for receipt of bids. Oral, telephonic, facsimile or telegraphic bids are invalid and will not receive consideration.

4. MODIFICATION OR WITHDRAWAL OF BIDS: Prior to the time and date designated for receipt of bids, a bid submitted may be modified or withdrawn by notice to the party receiving bids at the place designated for receipt of bids. Such notice shall be in writing over the signature of the bidder and shall be received prior to the designated time and date for receipt of bids. A modification shall be worded so as not to reveal the amount of the original bid. A withdrawal may be made by facsimile or electronic transmission. A modification may also be made by facsimile or electronic transmission if the final bid result is not revealed prior to the bid opening.

5. OPENING OF BIDS: Bids shall be publicly opened and read aloud at the designated location for receipt of bids shortly after the time and date bids are due.

6. REJECTION OF BIDS: The Institution shall have the right to reject any and all bids, in whole or part; to reject a bid not accompanied by a required bid security or other data required by the bidding documents; or reject a bid which is in any way incomplete or irregular.

7. ACCEPTANCE OF BID (AWARD): It is the intent of the Institution to award a contract to the lowest responsible and responsive bidder provided the bid does not exceed the funds available. The Institution shall have the right to waive informalities or irregularities in a bid received and to accept the bid, which in the Institution's judgment, is in the Institution's own best interests. All bids are governed by the West Virginia Code and the Procedural Rules of the Commission.

8. VENDOR REGISTRATION: Prior to any award for purchases exceeding $15,000, the apparent successful bidder must be properly registered with the W. Va. Department of Administration, Purchasing Division, and have paid the required vendor registration fee.

9. NON-FUNDING: All services performed or goods delivered under State Purchase Orders/Contracts are to be continued for the term of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.

10. PAYMENTS AND INTEREST ON LATE PAYMENTS: Payment may only be made after the delivery and acceptance of goods or services. Interest may be paid for late payment in accordance with the West Virginia Code.

11. RESIDENT VENDOR PREFERENCE: A resident vendor preference will be granted upon written request in accordance with the West Virginia Code.

12 TAX EXEMPTION: The State of West Virginia, the Commission and Council, and the Governing Board and its institution are exempt from federal and state taxes and will not pay or reimburse such taxes.

Submitted by: _____
(Firm Name)

BID FORM

RFB 19122

Dated: _____
(Bidder to insert date bid submitted)

SUBMITTED BY:

_____ *(hereinafter called "Bidder")*

SUBMIT BID TO:

Chief Procurement Officer
RFB 19122
Community & Technical College System of West Virginia
1018 Kanawha Boulevard, East, Suite 700
Charleston, WV 25301 *(hereinafter called "Owner")*

The Bidder, being familiar with local conditions affecting the cost of the Work and the Contract Documents, including Instructions to Bidders, Bid Form, General Conditions, Drawings, Specifications, and any Addenda or Clarifications issued, hereby propose to furnish all material, taxes, transportation and expendable equipment necessary for the satisfactory and delivery of

CHILLER REPLACEMENT
NEW RIVER COMMUNITY & TECHNICAL COLLEGE
GREENBRIER HALL
LEWISBURG, WEST VIRGINIA

in every detail and ready for operation, all in full accordance with, and in conformity to, the Contract Documents, for the stipulated sums as follows:

The Undersigned Bidder Agrees:

1. To accept the provisions of all sections of the documents listed above.
2. That the amounts stated in this Form of Proposal represents the entire cost of the chiller. The amount bid includes allowances for delivery of the chiller to the project site and startup / demonstration.
3. To certify that this bid is genuine and not sham or collusive or made in the interest or in behalf of any person not herein named, and that the undersigned has not directly or indirectly induced or solicited any other bidder to put in a sham bid, or any other person, firm or corporation to refrain from bidding and that the undersigned bidder has not in any manner sought by collusion to secure for himself an advantage over any other bidder.

Submitted by: _____
(Firm Name)

BASE BID:

For the sum of: _____

_____ ($_____).

CHILLER MANUFACTUER:

Manufacturer of Chiller: _____

If awarded contract on Base Bid, I (we) agree to deliver the chiller on or before July 1, 2019.

The Bidder certifies that this bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this bid with any other bidder or with any competitor.
The Bidder agrees that the Owner reserves the right to reject any or all bids, and to waive any formalities in the bidding. The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 60 days.

The Bidder acknowledges receipt of the following Addenda: (Please list by number and date.)

_____ _____ _____

_____ _____ _____

_____ _____ _____

SIGNATURE OF BIDDER:

Firm: _____ By: _____

Address: _____ Title: _____

Address: _____ Phone: _____

Address: _____ Fax: _____

Tax Cert. #: _____

END OF BID FORM

SECTION 010000 - PROJECT REQUIREMENTS

PART 1 - GENERAL

1.1 BIDDING DOCUMENTS

A. Bid Form.

B. Specification Section 010000 “Project Requirements”

C. Specification Section 236423.21 “Air-Cooled Scroll Water Chillers”

D. Drawing SK001 – Chiller Schedule

1.2 SUMMARY

A. This bid package is for the procurement and delivery of the specified chiller.

B. Bidder shall be responsible furnish product submittal with their bid proposal.

C. Bidder shall be responsible to deliver the chiller to the Owner’s project site at New River Community and Technical Center, Greenbrier Hall at the Lewisburg Campus.

1. 653 Church Street, Lewisburg, West Virginia 24901

1.3 SUBMITTALS

A. Bidder shall provide product submittal that shall include at a minimum the following:

1. Product data
2. Owner’s Operation Manual
3. Installation Manual / Instructions
4. Warranty Manual

1.4 PROJECT SCHEDULE

A. Bidder shall deliver the chiller unit to the College by no later than July 1, 2019.

1.5 SUBSTITUTIONS

A. Product or Manufacturer substitutions are not permitted.

1.6 DELIVERY REQUIREMENTS

A. Bidder shall deliver the chiller to the College. The College's HVAC contractor shall receive and unload the chiller.

1. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

1.7 STARTUP AND DEMONSTRATION

A. Bidder shall coordinate with the Owner the startup and demonstration for the chiller. Startup and demonstration services shall be provided by the Chiller manufacturer per specifications.

END OF SECTION

SECTION 236423.21 - AIR-COOLED, SCROLL WATER CHILLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged, air-cooled, electric-motor-driven, scroll water chillers.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.

C. DDC: Direct digital control.

D. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in Btu/h to the total power input given in watts at any given set of rating conditions.

E. GFI: Ground fault interrupt.

F. IPLV: Integrated part-load value. A single-number part-load efficiency figure of merit for a single chiller calculated per the method defined by AHRI 550/590 and referenced to AHRI standard rating conditions.

G. I/O: Input/output.

H. kW/Ton: The ratio of total power input of the chiller in kilowatts to the net refrigerating capacity in tons at any given set of rating conditions.

I. NPLV: Nonstandard part-load value. A single number part-load efficiency figure of merit for a single chiller calculated per the method defined by AHRI 550/590 and intended for operating conditions other than the AHRI standard rating conditions.

J. SCCR: Short-circuit current rating.

K. TEAO: Totally enclosed air over.

L. TENV: Totally enclosed nonventilating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include refrigerant, rated capacities, operating characteristics, and furnished specialties and accessories.
2. Performance at AHRI standard conditions and at conditions indicated.
3. Performance at AHRI standard unloading conditions.
4. Minimum evaporator flow rate.
5. Refrigerant capacity of water chiller.
6. Oil capacity of water chiller.
7. Fluid capacity of evaporator.
8. Characteristics of safety relief valves.
9. Force and moment capacity of each piping connection.

B. Shop Drawings: Complete set of manufacturer's prints of water chiller assemblies, control panels, sections and elevations, and unit isolation. Include the following:

1. Assembled unit dimensions.
2. Weight and load distribution.
3. Required clearances for maintenance and operation.
4. Size and location of piping and wiring connections.
5. Diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

a. Structural supports.
b. Piping roughing-in requirements.
c. Wiring roughing-in requirements, including spaces reserved for electrical equipment.
d. Access requirements, including working clearances for mechanical controls and electrical equipment, and tube pull and service clearances.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each water chiller to include in emergency, operation, and maintenance manuals.

B. Spare Parts List: Recommended spare parts list with quantity for each.

C. Touchup Paint Description: Detailed description of paint used in application of finish coat to allow for procurement of a matching paint.

D. Instructional Videos: Including those that are prerecorded and those that are recorded during training.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Tool kit to include the following:

1. A tool kit specially designed by chiller manufacturer for use in servicing chiller(s) furnished.
2. Special tools required to service chiller components not readily available to Owner service personnel in performing routine maintenance.
3. Lockable case with hinged cover, marked with large and permanent text to indicate the special purpose of tool kit, such as "Chiller Tool Kit." Text size shall be at least 1 high.
4. A list of each tool furnished. Permanently attach the list to underside of case cover. Text size shall be at least 1/2 inch high.

B. Touchup Paint: 32 oz. container of paint used for finish coat. Label outside of container with detailed description of paint to allow for procurement of a matching paint in the future.

1.8 QUALITY ASSURANCE

A. AHRI Certification: Certify chiller according to AHRI 590 certification program.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Ship water chillers from the factory fully charged with refrigerant and filled with oil.ze

1.10 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of water chillers that fail in materials or workmanship (parts & labor) within one year of Substantial Completion.

B. Special Warranty:

1. Compressor Warranty Period: Five years from date of Substantial Completion (parts only).

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

1. Component Importance Factor: 1.5.

B. Site Altitude: Chiller shall be suitable for altitude (2100 feet) at which installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.

C. AHRI Rating: Rate water chiller performance according to requirements in AHRI 550/590.

D. ASHRAE Compliance: ASHRAE 15 for safety code for mechanical refrigeration.

E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. ASME Compliance: Fabricate and stamp water chiller heat exchangers to comply with ASME Boiler and Pressure Vessel Code.

G. Comply with NFPA 70.

H. Comply with requirements of UL 1995, "Heating and Cooling Equipment," and include label by a qualified testing agency showing compliance.

I. Operation Following Loss of Normal Power:

1. Equipment, associated factory- and field-installed controls, and associated electrical equipment and power supply connected to backup power system shall automatically return equipment and associated controls to the operating state occurring immediately before loss of normal power without need for manual intervention by an operator when power is restored either through a backup power source, or through normal power if restored before backup power is brought on-line.
2. Provide means and methods required to satisfy requirement even if not explicitly indicated.

J. Outdoor Installations:

1. Chiller shall be suitable for outdoor installation indicated. Provide adequate weather protection to ensure reliable service life over a 25-year period with minimal degradation due to exposure to outdoor ambient conditions.
2. Chillers equipped to provide safe and stable operation while achieving performance indicated when operating at extreme outdoor temperatures encountered by the installation. Review historical weather database and provide equipment that can operate at extreme outdoor temperatures recorded over past 30-year period.

2.2 MANUFACTURERS

A. Trane
B. York
C. Carrier

2.3 MANUFACTURED UNITS

A. Description: Factory-assembled and run-tested water chiller complete with compressor(s), compressor motors and motor controllers, evaporator, condenser with fans, electrical power, controls, and indicated accessories.

B. Sound-reduction package shall have the following:

1. Acoustic enclosure around compressors.
2. Reduced-speed fans with acoustic treatment.

3. Designed to reduce sound level without affecting performance.

C. Security Package: Security grilles with fasteners for additional protection of compressors, evaporator, and condenser coils. Grilles shall be coated for corrosion resistance and shall be removable for service access.

2.4 CABINET

A. Base: Galvanized-steel base extending the perimeter of water chiller. Secure frame, compressors, and evaporator to base to provide a single-piece unit.

B. Frame: Rigid galvanized-steel frame secured to base and designed to support cabinet, condenser, control panel, and other chiller components not directly supported from base.

C. Casing: Galvanized steel.

2.5 COMPRESSOR-DRIVE ASSEMBLIES

A. Compressors:

1. Description: Positive-displacement direct drive with hermetically sealed casing.
2. Each compressor provided with suction and discharge service valves, crankcase oil heater, and suction strainer.

    a. For multiple compressor assemblies, it is acceptable to isolate each compressor assembly in lieu of each compressor.

3. Operating Speed: Nominal 3600 rpm for 60-Hz applications.
4. Capacity Control: On-off compressor cycling.

5. Oil Lubrication System: Automatic pump with strainer, sight glass, filling connection, filter with magnetic plug or removable magnet in sump, and initial oil charge.

    a. Manufacturer's other standard methods of providing positive lubrication are acceptable in lieu of an automatic pump.

6. Vibration Isolation: Mount individual compressors on vibration isolators.

    a. For multiple compressor assemblies, it is acceptable to isolate each compressor assembly in lieu of each compressor.

B. Compressor Motors:

1. Hermetically sealed and cooled by refrigerant suction gas.
2. High-torque, two-pole induction type with inherent thermal-overload protection on each phase.

C. Compressor Motor Controllers:

1. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing.

2.6 REFRIGERATION

A. Refrigerant: R-410A. Classified as Safety Group A1 according to ASHRAE 34.

B. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.

C. Refrigerant Circuit: Each circuit shall include an electronic or a thermal-expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.

D. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line and the refrigerant liquid-line to allow the isolation and storage of the refrigerant charge in the chiller condenser.

1. For multiple compressor assemblies, it is acceptable to isolate each compressor assembly in each circuit in lieu of each compressor.

E. Pressure Relief Device:

1. Comply with requirements in ASHRAE 15, ASHRAE 147, and applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Select and configure pressure relief devices to protect against corrosion and inadvertent release of refrigerant.
3. ASME-rated, spring-loaded, pressure relief valve; single- or multiple-reseating type. Pressure relief valve(s) shall be provided for each heat exchanger.

2.7 EVAPORATOR

A. Brazed-plate or shell-and-tube design, as indicated.

B. Shell and Tube:

1. Description: Direct-expansion, shell-and-tube design with fluid flowing through the shell and refrigerant flowing through the tubes within the shell.
2. Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
3. Shell Material: Carbon steel.
4. Shell Heads: Removable carbon-steel heads with multipass baffles designed to ensure positive oil return and located at each end of the tube bundle.
5. Shell Nozzles: Fluid nozzles located along the side of the shell and terminated with mechanical-coupling end connections for connection to field piping.
6. Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.

C. Brazed Plate:

1. Direct-expansion, single-pass, brazed-plate design.
2. Type 304 or 316 stainless-steel construction.

3. Code Compliance: Tested according to ASME Boiler and Pressure Vessel Code.
4. Fluid Nozzles: Terminate with mechanical-coupling end connections for connection to field piping.

D. Flow Switch: Factory-furnished, thermal-type flow switch wired to chiller operating controls.

E. Heater: Factory-installed and -wired electric heater with integral controls designed to protect the evaporator to minus 20 deg .

2.8 AIR-COOLED CONDENSER

A. Coil(s) with integral subcooling on each circuit.

B. Copper Tube with Plate Fin Coils:

1. Construct coils of copper tubes mechanically bonded to aluminum fins.

C. Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.

D. Fans: Direct-drive variable speed propeller type with statically and dynamically balanced fan blades, arranged for vertical air discharge. Provide low noise fan package.

E. Fan Motors: TENV or TEAO enclosure, with sealed and permanently lubricated bearings, and having built-in overcurrent- and thermal-overload protection.

1. Overcurrent- and thermal-overload protection not integral to motor is acceptable if provided with chiller electrical power package.

F. Fan Guards: Removable steel safety guards with corrosion-resistant PVC coating.

2.9 INSULATION

A. Closed-cell, flexible, elastomeric thermal insulation complying with ASTM C 534/C 534M, Type I for tubular materials and Type II for sheet materials.

1. Thickness: 1-1/2 inches.

B. Adhesive: As recommended by insulation manufacturer.

C. Factory-applied insulation over all cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator, evaporator water boxes including nozzles, refrigerant suction pipe from evaporator to compressor, cold surfaces of compressor, refrigerant-cooled motor, and auxiliary piping.

1. Apply adhesive to 100 percent of insulation contact surface.
2. Before insulating steel surfaces, prepare surfaces for paint, and prime and paint as indicated for other painted components. Do not insulate unpainted steel surfaces.
3. Seal seams and joints to provide a vapor barrier.

4. After adhesive has fully cured, paint exposed surfaces of insulation to match other painted parts.
5. Manufacturer has option to factory or field insulate chiller components to reduce potential for damage during installation.
6. Field-Applied Insulation:

    a. Components that are not factory insulated shall be field insulated to comply with requirements indicated.
    b. Manufacturer shall be responsible for chiller insulation whether factory or field installed to ensure that manufacturer is the single point of responsibility for chillers.
    c. Manufacturer's factory-authorized service representative shall instruct and supervise installation of field-applied insulation.
    d. After field-applied insulation is complete, paint insulation to match factory-applied finish.

2.10 ELECTRICAL

A. Factory installed and wired, and functionally tested at factory before shipment.

B. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to water chiller.

C. House in a unit-mounted, NEMA 250, Type 3R enclosure with hinged access door with lock and key or padlock and key.

D. Wiring shall be numbered and color-coded to match wiring diagram.

E. Field power interface shall be to NEMA KS 1, heavy-duty, nonfused disconnect switch. Minimum SCCR according to UL 508 shall be as required by electrical power distribution system, matching available fault current.

F. Each motor shall have overcurrent protection.

G. Overload relay sized according to UL 1995, or an integral component of water chiller control microprocessor.

H. Phase-Failure and Undervoltage: Solid-state sensing with adjustable settings.

I. Controls Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.

J. Control Relays: Auxiliary and adjustable time-delay relays, or an integral to water chiller microprocessor.

K. Indicate the following for water chiller electrical power supply:

1. Current, phase to phase, for all three phases.
2. Voltage, phase to phase and phase to neutral for all three phases.
3. Three-phase real power (kilowatts).
4. Three-phase reactive power (kilovolt amperes reactive).

5. Power factor.
6. Running log of total power versus time (kilowatt hours).
7. Fault log, with time and date of each.

2.11 CONTROLS

A. Factory installed and wired, and functionally tested at factory before shipment.

B. Standalone, microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.

C. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.

D. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, digital display. Display the following:

1. Date and time.
2. Operating or alarm status.
3. Operating hours.
4. Outside-air temperature if required for chilled-water reset.
5. Temperature and pressure of operating set points.
6. Chilled-water entering and leaving temperatures.
7. Refrigerant pressures in evaporator and condenser.
8. Saturation temperature in evaporator and condenser.
9. No cooling load condition.
10. Elapsed time meter (compressor run status).
11. Pump status.
12. Antirecycling timer status.
13. Percent of maximum motor amperage.
14. Current-limit set point.
15. Number of compressor starts.
16. Alarm history with retention of operational data before unit shutdown.
17. Superheat.

E. Control Functions:

1. Manual or automatic startup and shutdown time schedule.
2. Capacity control based on evaporator leaving-fluid temperature.
3. Capacity control compensated by rate of change of evaporator entering-fluid temperature.
4. Chilled-water entering and leaving temperatures, control set points, and motor load limit. Chilled-water leaving temperature shall be reset based on return-water temperature.
5. Current limit and demand limit.
6. Condenser-water temperature.
7. External water chiller emergency stop.
8. Antirecycling timer.
9. Automatic lead-lag switching.
10. Ice-building mode.

F. Manual-Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:

1. Low evaporator pressure or high condenser pressure.
2. Low chilled-water temperature.
3. Refrigerant high pressure.
4. High or low oil pressure.
5. High oil temperature.
6. Loss of chilled-water flow.
7. Loss of condenser-water flow.
8. Control device failure.

G. BAS System Interface: Factory-install hardware and software to enable system to monitor, control, and display chiller status and alarms.

1. Communication Interface: ASHRAE 135 (BACnet) communication interface shall enable control system operator to remotely control and monitor the water chiller from an operator workstation. Control features and monitoring points displayed locally at water chiller control panel shall be available through DDC system for HVAC.

H. Factory-installed wiring outside of enclosures shall be in NFPA 70-complaint raceway. Make terminal connections with liquidtight or flexible metallic conduit.

2.12 ACCESSORIES

A. Factory-furnished neoprene isolators for field installation.

2.13 SOURCE QUALITY CONTROL

A. Perform functional test of water chillers before shipping.

B. Factory performance test water chillers, before shipping, according to AHRI 550/590.

1. Test the following conditions:

a. Design conditions indicated.
b. AHRI 550/590 part-load points.

C. Factory test and inspect evaporator according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Stamp with ASME label.

D. For water chillers located outdoors, rate sound power level according to AHRI 370 procedure.

PART 3 - EXECUTION

3.1 STARTUP SERVICE

A. Perform startup service.

B. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.

C. Complete installation and startup checks according to manufacturer's written instructions and perform the following:

1. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
2. Verify that pumps are installed and functional.
3. Verify that thermometers and gages are installed.
4. Operate water chiller for run-in period.
5. Check bearing lubrication and oil levels.
6. Verify that refrigerant pressure relief device for chillers installed indoors is vented outside.
7. Verify proper motor rotation.
8. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
9. Verify and record performance of chilled water flow and low-temperature interlocks.
10. Verify and record performance of water chiller protection devices.
11. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

D. Visually inspect chiller for damage before starting. Repair or replace damaged components, including insulation. Do not start chiller until damage that is detrimental to operation has been corrected.

E. Prepare a written startup report that records results of tests and inspections.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water chillers. Video record the training sessions and provide electronic copy to Owner.

1. Instructor shall be factory trained and certified.
2. Provide not less than eight hours of training.
3. Train personnel in operation and maintenance and to obtain maximum efficiency in plant operation.
4. Provide instructional videos showing general operation and maintenance that are coordinated with operation and maintenance manuals.
5. Obtain Owner sign-off that training is complete.
6. Owner training shall be held at Project site.

END OF SECTION 236423.21

AIR COOLED CHILLER SCHEDULE

MARK	MFR	MODEL	WEIGHT (LBS)	MINIMUM DERATED TONNAGE	EFFICIENCY NPLV (EER)	EVAPORATOR				REFRIGERANT DATA		ELECTRICAL DATA				REMARKS
						EWT	LWT	GPM DESIGN	DP (FEET OF HEAD)	TYPE	# CIRCUITS	VOLTAGE	PHASE	MCA	MOCP	
CH-1	TRANE	ACSA140	8000	123.18	14.9	54	44	330	13.6	410A	3	460	3	285	350	-

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NO.	DESCRIPTION	DATE

ATTACHMENT TO:
- ☐ ADDENDUM NO.
- ☐ CHANGE ORDER NO.
- ☐ C.C.D. NO.

SUPPLEMENTAL DRAWING
- ☐ NEW DRAWING or DETAIL
- ☐☐ REVISION OF DRAWING or DETAIL ON SHEET
- ☐☐ CLARIFICATION OF DRAWING or DETAIL ON SHEET

DRAWN: JWL
DATE: 03/18/19
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