



ARCHITECTURE  
ENGINEERING

April 22, 2014

Re: **DELAWARE STATE POLICE – TROOP 3 – BID PACK II**  
Kent County, Delaware  
2011116.00

### **ADDENDUM THREE**

The addendum forms a part of the contract documents and modifies the original bidding documents dated April 7, 2014 as noted below.

### **GENERAL**

- 1) The Time at which sealed bids are to be received has been changed to **9:00 am local time.**
  - a. Sealed bids for OMB/DFM Contract No. MJ450600001 – Delaware State Police – New Troop 3 – Building Construction will be received by the State of Delaware, Office of Management and Budget, Division of Facilities Management in the reception area of the Facilities Management Office in the Thomas Collins Building, 504 S. DuPont Highway, Suite 1 (Third Floor), Dover, DE 19901 until **9:00 am** local time on Friday, May 2, 2014, at which time they will be publicly opened and read aloud in the conference room. Bidder bears the risk of late delivery. Any bids received after the stated time be returned unopened.
- 2) Bidding Schedule
  - b. **Last Day for Bidder Questions** – Friday April 25. Questions shall be received by 5:00 pm EST
  - c. **Last Addendum Issued** – Tuesday April 29.
  - d. **Bids Due / Bid Opening** – Friday May 2, at **9:00 am** local time
- 3) **Substitution Request Deadline Extension** – Substitution requests shall be received until 5:00 pm EST Friday April 25. Architect will review and approved substitutions, if any, will be identified in final addendum.

### **CLARIFICATIONS**

- 1) Question: List of DWG's in Spec. call for Electrical DWG "E103". There is no DWG "E103" on our disc, please advise.  
**RESPONSE: Drawing E103 – ELECTRICAL MEZZANINE PLANS LIGHTING & POWER is included per this addendum.**
- 2) Question: Fixtures in the center of Conference Room A143 are not typed, please advise.  
**RESPONSE: Fixtures are Type M.**
- 3) Question: No type "B4" is shown on fixtures schedules. These fixtures are shown in PT A145.  
**RESPONSE: Provide type G2 fixture shown on the fixture schedule E-128**
- 4) Question: Fixtures in Vestibule A126 not typed.  
**RESPONSE: Provide fixture type G**



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- 5) Question: Vehicle Processing A139 junction box for lighted cord reel. Who supplies the cord reel?  
**RESPONSE: The cord reel is furnished and installed by the electrical contractor. Cut sheet to be provided with future addendum.**
- 6) Question: Site lighting in front of the main lobby entrance not typed. Are they type "T" bollard lights?  
**RESPONSE: Yes**
- 7) We see no type "S5" site lights on E124, are there any on this project?  
**RESPONSE: No, they have been deleted from the schedule**
- 8) Question: Do all return grilles required lined sheet metal sound traps?  
**RESPONSE: Direction to be provided with future addendum.**
- 9) Question: The specifications call for manufactured casework and specifically lists several manufacturer's. Can casework be provided by a custom fabricator as long as it meets the specifications.  
**RESPONSE: We will consider specific fabricators during the bidding period as long as their qualification data is submitted no later than the last day for questions. Architect will review and approved fabricators, if any, will be identified in final addendum.**
- 10) Question: Are the following trades required to be pre-qualified, Painting, Drywall, Ceiling, and Millwork/Casework?  
**RESPONSE: No, refer to the Contractor/Subcontractor registry for list of required trade classifications issued as part of addendum 1. The above listed trades are required to be identified on the Bid Form's subcontractor list issued as part of addendum 1.**
- 11) Question: Is Merchant and Evan's EX-121 C and acceptable product for MWP 1 and MWP 1A?  
**RESPONSE: No, the proposed panel is 12" wide opposed the listed products which are 16" wide.**
- 12) Question: Is Merchant and Evan's Flush-Lock Series 311 and acceptable product for MWP 2?  
**RESPONSE: Yes, the Series 311-.75-0B (No Beads) is an acceptable product provided they meet the performance and detail requirements contained within the project documents and manufacturer's details / product data of the basis of design product.**
- 13) Question: Is RBI and acceptable manufacturer for the Boiler(s)?  
**RESPONSE: No**
- 14) Question: Is Patterson and acceptable manufacturer for the pump(s)?  
**RESPONSE: No**
- 15) Question: Is York and acceptable manufacturer for the chiller?  
**RESPONSE: No**
- 16) Question: Is Arctic Air and acceptable manufacturer for the chiller?  
**RESPONSE: The manufacturer / chiller product data is under review by design team / owner and clarification will be provided in future addendum.**
- 17) Question: Are the embeds for the door jambs and heads at the holding cells the responsibility of the structural steel contractor or the security contractor?  
**RESPONSE: Division of work scopes is the responsibility of bidders. Refer to 083463.1.4.A.**



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18) Question: The countertop support steel shown on the Architectural drawing (ref. 8/A401) refers us to the structural but no detail is found. Please advise of the size and material to be used.

**RESPONSE: Detail will be provided in next addendum**

19) Question: Who is providing the above ground fuel tank and dispensing equipment? If by GC please provide all necessary specifications.

**RESPONSE: The above ground fuel tank and dispensing equipment will be provided under separate contract with owner to be installed concurrent with Bid Pack II work. Refer to specification section 011000.1.6 Work Under Separate Contracts.**

20) Question: Who is providing the lifts in the Vehicle Maintenance Bay's

**RESPONSE: The lifts will be provided under separate contract with owner to be installed concurrent with Bid Pack II work. Refer to specification section 011000.1.6 Work Under Separate Contracts.**

21) Question: Is poplar an acceptable alternative to the species of wood specified in section 62023.2.2.B

**RESPONSE: Yes**

22) Question: Please verify that countertops not indicated as quartz or solid surface are to be plastic laminate

**RESPONSE: Confirmed, countertops are to be plastic laminate unless otherwise noted.**

23) Question: Can the following substitutions be made?

- a. Sanitary Sewer Piping Buried within 5 feet of Building – Request PVC Pipe and Fittings
- b. Sanitary Sewer Piping, Above Grade – Request PVC Pipe and Fittings
- c. Water Piping, Above Grade – Copper Tube Type L
- d. Storm Water Piping Buried within 5 feet of building – PVC Pipe and Fittings
- e. Storm Water Piping, Above Grade – PVC Pipe and Fittings
- f. Heating Water Piping Above Grade Steel Pipe – Steel Pipe grooved joint with mech. Couplings.

**RESPONSE: Requested substitutions are not approved.**

24) Question: Can the natural gas service enter the building at the Mechanical Room in 3", then run a ¾" line to the IR7 in the Sally-port?

**RESPONSE: Provide gas service per bid documents, requested change not approved.**

25) Question: Drawing A403 not included in set, please advise.

**RESPONSE: Drawing A403 will be issued in forthcoming addendum.**



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### **PROJECT MANUAL VOLUMES 1, 2 AND 3**

- 1) TABLE OF CONTENTS
  - a. REPLACE with attached TABLE OF CONTENTS
- 2) SECTION 004100 – BID FORM
  - a. REVISE Bid Time
- 3) SECTION 011000 - SUMMARY
  - a. ADD 1.6.C.3 – Ground Fuel Tank and Dispensing Equipment: Contract(s) to be awarded under the Delaware State Contract Procedures.
  - b. ADD 1.6.C.4 – Maintenance Vehicle Lifts: Equipment to be purchased under the Delaware State Contract Procedures.
- 4) SECTION 042000 – UNIT MASONRY
  - a. ADD Paragraph 2.3.A.1.c: SSB-3: 1-1/4” Radius Bullnose Rowlock (w x h x l: 3-5/8” x 2-1/4” x 7-5/8”)
  - b. ADD Paragraph 2.3.A.1.d: SSB-4: 1-1/2” Radius Cove Rowlock (w x h x l: 3-5/8” x 2-1/4” x 7-5/8”)
- 5) SECTION 236411 - CHILLERS
  - a. REPLACE section with attached section 236411 - CHILLERS

### **DRAWINGS VOLUMES I AND II**

- 1) DRAWING A202 – TYPICAL CLAY BRICK ELEVATIONS & PARTIAL ELEVATIONS
  - a. ADD Detail 5A – BRICK ARCH DETAIL
- 2) DRAWING A605 – COLOR SCHEDULE
  - a. ADD Drawing A605 – COLOR SCHEDULE
- 3) DRAWING FA103 – FIRE ALARM MAINTENANCE BUILDING
  - a. ADD / REVISE Devices, see revised drawing.
- 4) DRAWING E102 – ELECTRICAL FIRST FLOOR PLAN LIGHTING
  - a. ADD / REVISE fixtures, see revised drawing.
- 5) DRAWING E103 – ELECTRICAL MEZZANINE PLANS LIGHTING AND POWER
  - a. ADD Drawing E103 – ELECTRICAL MEZZANINE PLANS LIGHTING AND POWER
- 6) DRAWING E105 – ELECTRICAL FIRST FLOOR PLAN POWER
  - a. ADD/REVISE devices, see revised drawing
- 7) DRAWING E106 – ELECTRICAL MEZZANINE PLANS BOILER ROOM HVAC - POWER
  - a. ADD / REVISE devices, see revised drawing.
- 8) DRAWING E107 – ELECTRICAL MAINTENANCE BLDG. POWER
  - a. ADD / REVISE devices, see revised drawing
- 9) DRAWING E109 – ELECTRICAL ROOF PLAN POWER
  - a. ADD / REVISE devices, see revised drawing



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- 10) DRAWING E113 – ELECTRICAL MAIN DIST. PANEL MDP SINGLE LINE DIST. DIAGRAM
  - a. REVISE Main Distribution Panel MDP Single Line Diagram, see revised drawing
- 11) DRAWING E123 – ELECTRICAL PANEL SCHEDULES
  - a. REVISE Panels RP-C and UPS, see revised drawing
- 12) DRAWING E123A – MAINTENANCE BUILDING – PANEL SCHEDULES
  - a. REVISE Panel EP-C, see revised drawing
- 13) DRAWING E124 – ELECTRICAL SITE LIGHTING
  - a. ADD / REVISE devices, see revised drawing
- 14) DRAWING E128 – ELECTRICAL SITE FIXTURE SCHEDULE
  - a. REVISE Light Fixture Schedule, see revised drawing
- 15) DRAWING E130 – ELECTRICAL WIRING DIAGRAMS
  - a. REVISE EF-2, EF-4, & EF-15 Control Wiring Diagram, see revised drawing
- 16) DRAWING P000 – PLUMBING EQUIPMENT SCHEDULES & LEGENDS
  - a. REVISE Pump & Expansion Tank Schedules, see revised drawing
- 17) DRAWING P103 – PLUMBING MAINTENANCE BUILDING FLOOR PLAN
  - a. ADD / REVISE CW & HW lines and components, see revised drawing.

Attachments:

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SECTION 236411 - CHILLERS  
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DRAWING P000 – PLUMBING EQUIPMENT SCHEDULES & LEGENDS  
DRAWING P103 – PLUMBING MAINTENANCE BUILDING FLOOR PLAN

201111600\_BPII\_Addendum\_03.doc

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DELAWARE STATE POLICE NEW TROOP 3 – BID PACK II - BUILDINGS  
KENT COUNTY, DELAWARE  
CONTRACT # MJ4506000001

**BID FORM**

**For Bids Due:** Until 9:00 am (Local Time) **To:** State of Delaware, Office of Management and Budget  
May 2, 2014 Division of Facilities Management  
540 S. DuPont Highway, Suite 1  
Dover, Delaware 19901  
Attn: Rich Glazeski

**Name of Bidder:** \_\_\_\_\_

**Delaware Business License No.:** \_\_\_\_\_ **Taxpayer ID No.:** \_\_\_\_\_

**(Other License Nos.):** \_\_\_\_\_

**Phone No.:** ( ) \_\_\_\_\_ - \_\_\_\_\_ **Fax No.:** ( ) \_\_\_\_\_ - \_\_\_\_\_

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

\$ \_\_\_\_\_  
( \$ )

**ALTERNATES**

Alternate prices conform to applicable project specification section. Refer to specifications for a complete description of the following Alternates. An “ADD” or “DEDUCT” amount is indicated by the crossed out part that does not apply.

ALTERNATE No. 1: Construction of Maintenance Building and associated construction. Refer to drawings and specifications for scope.

Add/Deduct: \_\_\_\_\_  
( \$ )

ALTERNATE No. 2: Provide Asphalt Shingle Roof and Modified Bitumen Roofing in Lieu of Standing Seam Metal Roofing. Refer to drawings and specifications for scope.

Add/Deduct: \_\_\_\_\_  
( \$ )

ALTERNATE No. 3: Provide Rubber Base and VCT Flooring in Lieu of Wood Base and Resinous Flooring at Corridors. Refer to drawings and specifications for scope.

Add/Deduct: \_\_\_\_\_  
(\$ \_\_\_\_\_ )

ALTERNATE No. 4: Provide insulated metal panel in lieu of standard metal panel at Maintenance Building. Refer to drawings and specifications for scope.

Add/Deduct: \_\_\_\_\_  
(\$ \_\_\_\_\_ )

ALTERNATE No. 5: Provide Alternate Bricks in Lieu of Base Bid Bricks. Refer to drawings and specifications for scope.

Add/Deduct: \_\_\_\_\_  
(\$ \_\_\_\_\_ )

DELAWARE STATE POLICE NEW TROOP 3  
KENT COUNTY, DELAWARE  
CONTRACT # MJ4506000001

**BID FORM**

**UNIT PRICES**

Unit prices conform to applicable project specification section. Refer to the specifications for a complete description of the following Unit Prices:

	<b><u>ADD</u></b>	<b><u>DEDUCT</u></b>
UNIT PRICE No. 1: _____ (BRIEF DESCRIPTION) _____	\$ _____	\$ _____

DELAWARE STATE POLICE NEW TROOP 3  
KENT COUNTY, DELAWARE  
CONTRACT # MJ4506000001

**BID FORM**

I/We acknowledge Addendums numbered \_\_\_\_\_ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for sixty (60) days from the date of opening of bids, and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within \_\_\_\_\_ calendar days of the Notice to Proceed.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am / We are an Individual / a Partnership / a Corporation

By \_\_\_\_\_ Trading as \_\_\_\_\_  
(Individual's / General Partner's / Corporate Name)  
\_\_\_\_\_  
(State of Corporation)

Business Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Witness:** \_\_\_\_\_ **By:** \_\_\_\_\_  
(SEAL) ( Authorized Signature )  
\_\_\_\_\_  
( Title )  
**Date:** \_\_\_\_\_

**ATTACHMENTS**

Sub-Contractor List  
Non-Collusion Statement  
Bid Security  
(Others as Required by Project Manuals)

DELAWARE STATE POLICE NEW TROOP 3  
KENT COUNTY, DELAWARE  
CONTRACT # MJ4506000001

**BID FORM**

**SUBCONTRACTOR LIST**

In accordance with Title 29, Chapter 6962 (d)(10)b Delaware Code, the following sub-contractor listing must accompany the bid submittal. The name and address of the sub-contractor **must be listed for each category** where the bidder intends to use a sub-contractor to perform that category of work. In order to provide full disclosure and acceptance of the bid by the *Owner*, **it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work.**

<u>Subcontractor Category</u>	<u>Subcontractor</u>	<u>Address (City &amp; State)</u>	<u>Subcontractors tax payer ID # or Delaware Business license #</u>
1. <u>Concrete</u>	_____	_____	_____
2. <u>Masonry</u>	_____	_____	_____
3. <u>Electrical</u>	_____	_____	_____
4. <u>Mechanical</u>	_____	_____	_____
5. <u>Plumbing</u>	_____	_____	_____
6. <u>Roofing</u>	_____	_____	_____
7. <u>Steel Erection</u>	_____	_____	_____
8. <u>Painting</u>	_____	_____	_____

9.	<u>Drywall</u>			
10.	<u>Resinous Floor Systems</u>			
11.	<u>Resilient Floor Systems</u>			
12.	<u>Carpet Floor Systems</u>			
13.	<u>Ceilings</u>			
14.	<u>Millwork / Casework</u>			
15.	<u>Storefront / Curtainwall</u>			
16.	<u>Pre-Eng. Metal Building</u>			
17.	<u>Fire Alarm</u>			
18.	<u>Fire Sprinkler</u>			
19.	<u>Ballistic Materials</u>			
20.	<u>Insulating Air Barrier</u>			



DELAWARE STATE POLICE NEW TROOP 3  
KENT COUNTY, DELAWARE  
CONTRACT # MJ4506000001

**BID FORM**  
**NON-COLLUSION STATEMENT**

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date (*to the Office of Management and Budget, Division of Facilities Management*).

All the terms and conditions of (*Project or Contract Number*) have been thoroughly examined and are understood.

**NAME OF BIDDER:** \_\_\_\_\_

**AUTHORIZED REPRESENTATIVE  
(TYPED):** \_\_\_\_\_

**AUTHORIZED REPRESENTATIVE  
(SIGNATURE):** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**ADDRESS OF BIDDER:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**E-MAIL:** \_\_\_\_\_

**PHONE NUMBER:** \_\_\_\_\_

Sworn to and Subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_.

My Commission expires \_\_\_\_\_. NOTARY PUBLIC \_\_\_\_\_.

**THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.**

**SECTION 236411****CHILLERS****PART 1- GENERAL****1.01 SUMMARY**

- A. Section includes design, performance criteria, refrigerants, controls, and installation requirements for Multistack air cooled centrifugal chillers.

**1.02 REFERENCES**

- A. Comply with the following codes and standards: (as adopted by each individual State)
- B. ARI 550/590
- C. ANSI/ASHRAE 15
- D. ASME Section VIII
- E. NEC
- F. ETL
- G. CE
- H. CSA
- I. OSHA

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Submittals shall include the following:
- C. Chiller dimensional drawings with elevation overview. Drawings to include required service clearances, location of all field installed piping and electrical connections.
- D. A summary of all auxiliary utility requirements for normal system operation required. Auxiliary utility requirements include: electrical, water, and air. Summary of auxiliary equipment shall include quantity and quality of each specific auxiliary utility required.
- E. Chiller Control documentation to include: Chiller control hardware layout, wiring diagrams depicting factory installed wiring, field installed wiring with points of connection, and points of connection for BAS control/interface points.
- F. Sequence of operation depicting overview of control logic used.
- G. Installation and Operating Manuals.
- H. Manufacturer certified performance data at full load in addition to either IPLV or NPLV.

**1.04 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with the codes and standards as defined in Section 1.02 titled REFERENCES
- B. Chiller is required to be run tested at manufacturer's facility to job specific requirements, prior to shipment. Report available upon request.

**1.05 DELIVERY AND HANDLING**

- A. Chiller(s) shall be delivered to the job site completely assembled and charged with complete refrigerant charge.
- B. Installing contractor to comply with the manufacturer's instructions for transporting, rigging, and assembly of chiller.

**1.06 WARRANTY AND START-UP**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer shall provide full parts-only warranty coverage for entire chiller for a period of two years. All parts shall be warranted against defects in material and workmanship. Similar parts-only coverage shall be provided for the chillers compressors for a period of five years.

The warranty period shall commence either on the equipment start-up date or six months after shipment, whichever is earlier.

- C. Manufacturer shall provide the services of a Factory Authorized Service Engineer to provide complete start-up supervision. After start-up a Manufacturer's Representative shall provide a minimum of 8-hours of operator training to the owner's designated representative(s).

#### **1.07 MAINTENANCE**

- A. Maintenance of the chiller shall be the sole responsibility of the owner.

### **PART 2 - PRODUCTS**

#### **2.01 ACCEPTABLE MANUFACTURERS**

- A. A. Multistack LLC
- B. B. (Approved Equal)

#### **2.02 PRODUCT DESCRIPTION**

- A. Provide and install as shown on the plans a factory assembled, charged, and run tested, air-cooled packaged chiller.
- B. Each unit shall include: One or two MagLev®, oil-free, magnetic bearing, variable speed two stage centrifugal compressor equipped with inlet guide vanes and load balance valve. Compressors to utilize its integrated variable speed drive in conjunction with the compressors inlet guide vanes and load balancing valve, to optimize the chillers part load efficiency.
- C. The chiller evaporator, condenser, and electronic expansion valves shall be common to the compressor. The chiller shall operate with (1) one refrigerant circuit.
- D. Chiller shall utilize R-134A refrigerant only.

#### **2.03 DESIGN REQUIREMENTS**

- A. Provide a complete factory assembled air-cooled, oil free centrifugal chiller equipped with a MagLev® compressor(s) as specified herein. Chiller to be built in accordance to the standards defined in Section 1.02 of this specification.
- B. Chiller to utilize one of the following compressor arrangements for the specified nominal tonnages:
  - 1. 1. 60 thru 120 tons- One MagLev compressor
  - 2. 2. 125 thru 250 tons- Two MagLev compressors
- C. Each chiller shall be equipped with the following: One (1) flooded evaporator heat exchanger, one (1) air cooled condenser equipped with high efficiency ECM condenser fan motors, one (1) or more MagLev® Compressors (refer to section 2.03 B) with integrated variable speed drive, soft start, magnetic bearings, and inlet guide vanes, one (1) or more electronic expansion valves, one (1) liquid level refrigerant sensor, one (1) load balance valve per compressor, one (1) master chiller control with necessary operating controls and system safeties, with all mechanical pressure safeties to be located at each individual compressor.
- D. Chiller Performance: Refer to performance schedule on the job specific drawings.
- E. Acoustics: Sound data shall be measured in accordance with AHRI 370 Standard. Unit sound performance data shall be measured at the highest level recorded at all load points. Unit sound performance shall not exceed a level of 100 dBA (total).
- F. Electrical: Chiller shall feature single-point power connection not utilizing adjoining power cabinets as pull boxes.
- G. Minimum Operating Conditions: Lowest evaporator saturated suction temperature shall not be below 34F. Lowest leaving chilled water temperature shall not be below 38F. Lowest standard ambient temperature shall not drop below 40F without the use of optional low ambient kit.
- H. Maximum Operating Conditions: The highest leaving chilled water temperature shall not be above 60F. Chiller shall be capable of operating at up to 110F ambient temperature.

**2.04 CHILLER COMPONENTS****A. Compressor:**

1. Chiller to have one or more MagLev®, magnetic bearing, oil-free, two-stage, hermetical centrifugal compressor. Compressor to contain integrated variable speed drive with soft start and movable inlet guide vane assembly.
2. Compressor to be microprocessor controlled. Compressor to be networked to master controller via Etherbus connection with a refresh rate of 50 microseconds and the micro processor of the compressor to control the variable speed drive and inlet guide vanes on the compressor to maximize unit efficiency.
3. The compressor shall be capable of coming to a controlled safe stop in the event of a power outage. Unit shall be capable of auto restart in the event of a power outage, once power has been restored.
4. The compressor is required to be mechanically and electrically isolated to facilitate proper maintenance, service, and or removal.

**B. Refrigerant, Evaporator and Condenser:**

1. All heat exchangers to be built in accordance to Section VIII of the ASME code and carry a manufacturer's name plate certifying ASME compliance.
2. The evaporator is to be of shell and tube construction. Evaporator to be constructed of a single shell. Evaporator to be of flooded type with refrigerant surrounding the tubes and water passing through the tubes. Tubes to be enhanced and rifled. Internal intermediate tube supports, liquid eliminator baffle plate, pressure relief vent, water drains and vents required. Pressure relief to be spring loaded self seating type in accordance to ASHRAE 15 standard. Evaporator to be pressure tested at a test pressure of 1.1 times the operating pressure however no less than 100 PSIG. Evaporator, water boxes, suction piping, and any other component subject to condensate shall be insulated with a UL recognized ¾ inch or 1 ½" closed cell insulation. All joints and seems to be sealed so a vapor barrier is created. Factory mounted differential pressure transmitters required for flow safety. Paddle flow switches are not acceptable. Heat Exchangers to feature enhanced and rifled individual tubes. Tubes shall be individually replaceable. Tubes shall be mechanically rolled into steel tube sheets and sealed with Loctite® or equivalent sealant. Waterside to be designed to a minimum of 150 psig or 300 psig, whichever is specified. Piping connections to be either mechanical grooved connection or flange, whichever is specified. Evaporator tubes shall be serviceable without removing water connections when an even number of passes is specified.
3. The condenser shall be of aluminum fin with copper tubes. Condenser to be constructed in a "V" configuration. Condensers to be equipped with no fewer than six (6) and no greater than sixteen (16) ECM type condenser fan motor assemblies. Motors shall incorporate integrated active temperature management to ensure motor protection. Blades shall be of aluminum construction. Fans must be designed to ensure proper acoustical and energy performance.
4. Refrigerant Control: Chiller to feature one (1) electronic expansion valve. Fixed orifice and float controls are not acceptable. The electronic expansion valve shall operate from minimum chiller capacity to the full load of the chiller's capacity. A low side refrigerant level sensor, constructed out of stainless steel, with a stainless steel canister with sight glass is to be used to provide feedback to the expansion valves for proper control. This ensures that a proper liquid seal is always present on the compressors power electronics. A refrigerant sight glass is required on the main liquid line feeding the electronic expansion valves. Isolation valves before and after the EXV required for proper service without removing the entire refrigerant charge.

**C. Compressor:**

1. The prime mover shall be of sufficient size to effectively meet the compressor horsepower requirements. Prime mover shall be one liquid refrigerant cooled, hermetically sealed, permanent magnet synchronous motor. Motor shall be controlled by variable speed drive. Motor shall utilize soft start capabilities with an inrush current no greater than two (2)

amps. Motor shall have internal thermal overload protection devices embedded in the winding of each phase of the motor.

D. Variable Speed Drive:

1. The chiller shall be equipped with a variable speed drive. Please refer to section 2.03 B for compressor requirements. The variable speed drive to utilize Insulated Gate Bi-Polar Transistors. Variable speed drive to create it's own simulated AC voltage for the motor connected to it. Acceptable applied voltages are: 400 Volt 50 hertz, 460 Volt 60 hertz.
2. Variable Speed drive in conjunction with the compressors inlet guide vanes will be controlled via compressor microprocessor to optimally match the lift and load requirements.
3. The compressor circuit is required to have a line reactor and circuit breaker.

E. Chiller Controls

1. The unit shall feature an industrial grade CPU with an Intel-based processor. Processor must compute at a processing speed of 1 Ghz or faster with a minimum of 1 GB of Ram, 2 GB solid state drive capacity with internal battery backup/UPS. All chiller and compressor I/O to be controlled via Etherbus with an update rate of 50 microseconds. Controller to have a minimum of 5.7 inch touch screen interface that can be disconnected and chillers still runs properly. Controller to use proprietary control logic to optimize loading, unloading, and control of multiple MagLev compressors. User shall operate chiller via HMI located on touch screen or remote web connection. All system parameters, compressor status, alarms, and faults, trend graphing, fault logging, BAS communication window, manuals, wiring diagrams, log book, and control set points shall be viewable. Shall be able to fully commission and adjust all components on the chiller, including the compressors without an auxiliary computer or software.
2. Software
  - a. Controller shall control one (1) refrigerant circuit.
  - b. HMI interface is only control system on the market with a user definable points list, tag names, and functions without special software. With this feature, end user can scale on all inputs and outputs, change what controls it, change the functionality, the name of it etc.
  - c. Control system can be field reconfigured through HMI to remap I/O to change functionality on the fly. This allows for customized integration into the end users system.
  - d. Control System features easy to use web interface. This allows the user to do anything remotely that could be done on site.
  - e. Most advanced trend graphing available on the market. Over 100 data points are recorded in five (5) second intervals. Data can be analyzed with zoom feature. Trend graph images can be exported. Trend graphs can be exported to csv files as well.
  - f. Advanced Fault Logging featuring calendar capability for ease of use. Data can be sorted by alarm type, time stamp, or compressor.
  - g. Color coded data. Green data means good, yellow means alarm, red means fault or off.
  - h. Controller logs when user makes any type of change.
  - i. Controller is loaded with all manuals, wiring diagrams, and supporting data which can be recalled via touch screen.
  - j. Controller has onboard maintenance log to store system information.
  - k. Controller offers real time capacity and efficiency data.
3. Optional BAS Interfaces included with controller are (PROVIDE THESE OPTIONS):
  - a. BAC Net IP
  - b. BACNET MSTP
  - c. BAS interface dashboard shown on HMI. This allows the user to view what data is being written to the BAS system. Also shows if there is an error, last com, and how many times the data was sent or received.
  - d. Control system uses proprietary optimization logic to perform accurate energy balance on all systems for maximum system performance.

- e. Control System features an optimum start function to ensure initial lift is always made. This prevents nuisance check valve flutter and compressor faults.
- F. Chiller Power
  - 1. Chiller shall have a unit mounted through the door disconnect. Chiller shall also include a master breaker.
  - 2. Unit shall also have through the door disconnects for the compressor and for the fans. This will allow power to be separately shut off to either or both components without the need to open the access door.
  - 3. All enclosures shall be built to NEMA 3R specifications, ETL listed, fully vented, louvered and feature cooling fans controlled by FlexSys Lite for maximum energy efficiency.

## **2.05 OPTIONS (TO BE PROVIDED WITH THIS CHILLER)**

- A. Heat Exchangers-
  - 1. Epoxy Coating
    - a. Tube Sheets
    - b. Heads
  - 2. Insulation
    - a. 1 ½ Closed Cell Foam
    - b. Metal Jacketed Insulation
  - 3. Multiple pass configurations to meet water side design criteria
- B. Electrical-
  - 1. EMI noise filtration to meet IEE 519 standards
- C. Other-
  - 1. Lifting Frame
  - 2. Vibration Isolation
  - 3. Seismic Isolation

## **PART 3- EXECUTION**

### **3.01 INSTALLATION**

- A. Chiller must be installed per all of the manufacturer's documentation. This includes: IOM Manual, Submittal documentation, CAD Drawings, other.
- B. All local structural codes must be observed. Chiller to be mounted and aligned on chiller pad or mounting rails as specified on CAD drawings.
- C. All local plumbing codes must be observed. Piping must be run in such a way that the proper required clearances for head removal for tube cleaning are observed.
- D. All National and Local Electrical codes must be observed. Installation of the electrical on the chiller must follow the associated documentation from the chiller manufacturer. Electrical installation shall be coordinated with electrical contractor.
- E. All National and Local Electrical codes must be observed. Controls installation shall be coordinated with the controls contractor.
- F. Provide all material required for a fully operational and functional chiller.

### **3.02 START-UP**

- A. Units shall be factory charged with R-134A refrigerant.
- B. Factory Start-Up Services: An authorized factory start-up agent is required.
- C. During the start up period, the factory authorized agent will instruct the owner's representative on proper care and operation of the chiller.

**END OF SECTION**

**DRAWINGS REDACTED**