METHOD STATEMENT
INSTALLATION AND TESTING AND COMMISSIONING
AIR COOLED PACKAGE CHILLERS

CLIENT

EMPLOYEER

CONSULTANT

CONTRACTOR
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1.0 PURPOSE:

This document deals with detail method of Installation and testing and commissioning of air cooled package chillers for Abu Dhabi future school Program Package 4 Package 2 Al Falah and Al Bahya followed by commissioning activity to be undertaken for the Mcquay Screw Chiller with Micro Tech II by the commissioning engineer on receipt of Pre-start check list.

2.0 SCOPE:

This method statement is applicable for the installation, startup, testing and commissioning of air cooled package chillers for Abu Dhabi future school Program Package 4 Package 2 Al Falah and Al Bahya.

3.0 REFERENCES:

1. Approved Shop Drawing.
2. Approved drawing for location and load calculations of the chillers.

4.0 CODES AND STANDARDS:

3. Cooler and Condenser Testing – ASME.

5.0 HEALTH /SAFETY AND ENVIRONMENT:

1. Work site shall be kept clean and tidy.

2. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3. Install anchor bolts to elevations required for proper attachment to supported equipment.

4. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions, drawings & specification.
6.0 STORAGE DELIVERY AND HANDLING:

1. Chillers will be delivered as a complete factory assembled unit with protective crating and covering.
2. Chillers will be transported in a fully charged condition.
3. Chillers will be stored and handled in accordance with manufacturer’s instructions.
4. Chillers will be shipped with all refrigerant piping and control wiring factory installed.
5. Chillers shall be shipped pre-charged with refrigerant as specified on the equipment schedule.
6. Unit shall be shipped with firmly attached metal name plates that indicate name of manufacturer. Chiller unit model number, compressor type and refrigerant used.

7.0 INSTALLATION PROCEDURE:

7.1 COORDINATION

1. Coordinate sizes and locations of concrete bases with actual equipment provided.

7.2 EXAMINATION

1. Before air cooled chiller installation, anchor-bolt sizes and locations, Piping, and electrical connections to verify actual locations, sizes, and other conditions affecting water chiller performance, maintenance, and operations. Water chiller locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
2. Proceed with installation only after unsatisfactory conditions have been corrected.
3. Comply with requirements for vibration isolation devices specified in technical specification section 21 07 00 "Vibration and Seismic Controls for HVAC Piping and Equipment."

7.3 INSTALLATION PROCEDURE

A. Installation of air cooled chiller shall be in line with manufacturer’s recommendation, technical specification and site conditions.

B. Equipment Mounting: Install chiller on concrete bases using spring isolators with 97% efficiency and as recommended by manufacturer. Vibration isolation springs provided by chillers manufacturers shall only be considered if they meet the above mentioned requirements.
C. The machine must be moved and lifted by using cables, spacing bars and scales of appropriate
dimensions to the machine weight as per manufacturer’s recommendation and also please refer to
attachments for lifting operation as per manufacturer’s recommendation.
D. Machine not to be pulled or pushed from any part other than the base frame.
E. Crane to be arranged with accessories and as per safety procedures.
F. Connect the cables hook to lifting points of chiller frame.
G. Ensure the chiller location is free of obstacles.
H. Machine to be installed on a perfectly levelled base foundation as mentioned in technical
specification.
I. Position the vibration isolators under the frame structure as per specified in technical
specification.
J. Land the chiller on its location smoothly on the place assigned for chiller Installation, drawing
also attached for the proposed location of the Chillers.
K. Disconnect lifting cables and proceed for connections.

7.4 CONNECTIONS

A. Arrangement of the pipes and fittings to be as per technical specification section – 21 10 50
   PIPES AND TUBES and Section- 23 18 00 AIR CONDITIONING PIPING.

B. All the refrigerant pipes connections to be as per Section- 23 18 00 AIR CONDITIONING
   PIPING, Drawings indicate general Arrangement of piping, fittings, and specialties.

C. Install piping adjacent to chiller to allow service and maintenance.

D. Evaporator Fluid Connections: As shown in detail drawings. Connect to evaporator inlet with
   shutoff valve, Strainer, flexible connector, thermometer, and plugged tee with pressure gage and
   drain connection with valve. Make connections to chiller with a union, and flanges.
E. Refrigerant Pressure Relief Valve Connections: For water chillers installed indoors, extend vent piping to the outside without valves or restrictions.

F. Connect each drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor Drain. Provide a shutoff valve at each connection if required.

8.0 PROCEDURE FOR TESTING OF AIR COOLED PACKAGED CHILLERS

All chillers dispatched from factory are run tested and. As precautionary measure every chiller should be subjected to pre-commissioning procedures to ensure trouble free operation and chillers might need fine tuning after commissioning.

8.1 CHECKS ON MICRO TECH PANEL

Visual check of the unit controller shall be carried out to ensure all components such as Transformers, relays, contactor, controllers are in good condition. All pressure sensors, temperature sensors, etc. shall be checked for proper connections.

8.2 STARTER PANEL

Confirm the Megger test, Perform the control logic test as per the drawing of the starter panel before proceeding to commissioning work. Check the wiring connections, phase sequence, supply voltage.

Check phase sequence of the main power in coming with help of phase sequence meter.

8.3 MEGGER TEST OF THE MOTORS

Phase to Earth’ and ‘Phase to Phase’ megger value shall not be less than 20 mega-ohms (this test should be conducted after keeping the heaters on for at least 24 hours). A suitable megger of 500V shall be used to carry out the test.

8.3.1 PHASE TO EARTH:

Connect one terminal of megger terminal probe(red color) to one end of motor terminal T1 and other end of megger terminal probe (black color) shall be connected to motor earth terminal. Rotate the handle of megger at constant speed OR press the button provided on megger and note the reading shown in display. Keep the black colored megger terminal probe at motor earth terminal and change the red color megger terminal to the remaining motor terminals viz. T2, T3, and take readings. In all above three tests megger shall show not less than 20 mega-ohms.
After performing the tests specified in step 3.a, discharge the residual voltage stored in the winding by earthing all the six motor terminals momentarily using an electric wire.

**8.3.2 PHASE TO PHASE:**

Connect one terminal of megger terminal probe (red color) to one end of motor terminal T1 and other end of megger terminal probe (black color) shall be connected to other motor terminal T2. Rotate the handle of megger at constant speed OR press the button provided on megger and note the reading shown in display. Repeat this procedure for the terminals T1 & T3 and T2 & T3. In all above three tests megger shall show not less than 20 mega-ohms.

After performing the tests specified in step 8.3.1 discharge the residual voltage stored in the winding by earthing all the three motor terminals momentarily using an electric wire.

The motor insulation is healthy if all the readings taken during the above procedure are above 20 mega-ohms.

**9.0 STARTUP OF THE CHILLERS**

1. With main disconnect open, check all electrical connections in control panel and starter to be sure they are tight and they provide good electrical contact. Although all the connections are tightened at the factory, they might have loosened enough in shipment, which may cause system malfunction.

2. Check the actual line voltage to the unit to make sure it is the same as specified in the compressor nameplate within $\pm 10\%$ and that phase voltage unbalance does not exceed 2%. Verify that adequate power supply and capacity is available to meet the required load.

3. Make sure all interlock wiring is completed as per Mcquay wiring diagram.

4. Turn the main power switch ON; this will energize the crankcase heaters of the compressor. Please note the crankcase heaters should be kept on at least 24 hours prior to start up, crankcase should be warm.

5. The unit might have been shipped from factory with the valves in position, ensure that all the valves are open.

6. Check and inspect evaporator water piping. Make sure that the flow direction is correct and piping is made to correct water nozzle connections on the respective heat exchangers and open the isolation
valves of secondary side. Check the proper connections and settings of differential water pressure switch/Flow switch.

7. Start manually evaporator water pumps. Check all piping for leaks. Vent the air from the evaporator water headers/ from the entire secondary system. The secondary circuit in the evaporator side should contain clean, non-corrosive liquid.

8. Set the required water flow valve with the help of pressure drop and ensure that adequate load is available for initial start-up.

9. Once again check all the set points fed in the controller.

10. Check and inspect evaporator water piping. Make sure that the flow direction is correct and piping is made to correct water nozzle connections on the respective heat exchangers and open the isolation valves of secondary side. Check the proper Connections and settings of differential water pressure switch/Flow switch.

11. Start manually evaporator water pumps. Check all piping for leaks. Vent the air from the evaporator water headers/ from the entire secondary system. The secondary circuit in the evaporator side should contain clean, non-corrosive liquid.

12. Set the required water flow valve with the help of pressure drop and ensure that adequate load is available for initial start-up.

13. Once again check all the set points fed in the controller.

14. By keeping the main power wire of compressor disconnected, give start command from control Panel and observe the starting sequence and check the compressor input/output and unit input/output. If the sequence and other input and output signals are healthy, make the electrical connections and now it is safe to start the Chiller.

15. After taking the control test as specified in the last point of above procedure make the power and control connections and power supply to the unit is to be established.

16. Check the physical rotation of the compressor. Observe the chiller parameters during start up.

17. After initial pull down, at stable operating conditions; the startup data shall be filled in the Mcquay startup Form for individual chiller