

## SECTION 13 34 19

### MODULAR CENTRAL PLANT

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

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

B. Related Sections:

1. 07 52 16 Modified Bitumen Roofing
2. 07 56 10 Fluid Applied Flashing
3. 07 62 00 Sheet Metal Flashing & Trim
4. 07 92 00 Joint Sealants
5. 08 11 00 Steel Doors and Frames
6. 08 33 00 Coiling Doors and Grilles
7. 08 71 00 Finish Hardware
8. 09 90 00 Painting and Coating

##### 1.02 SUMMARY

A. Section includes design, performance criteria, equipment, refrigerants, controls, and installation requirements for modular central plant. The modular central plant will include chillers; chilled water connections; makeup water connections and specialties; variable volume pumps for chilled water systems; hydronic specialties; control panel including variable frequency drives; factory pre-wired single point 460-volt/3-phase/3-wire electrical connection by Division 16 Contractor; factory pre-wired for single point temperature control connection by controls contractor via BacNET interface.

##### 1.03 PACKAGED CENTRAL PLANT MAIN COMPONENTS

- A. Water cooled chillers
- B. Cooling Towers and accessories
- C. Cooling tower structural steel
- D. Pumps and pumping accessories
- E. Piping Systems (chilled water, condenser water, makeup water, etc.)
- F. Hydronic specialties (Air Separators, Expansion Tanks, suction guides, etc.)
- G. Valves, instrumentation
- H. Variable frequency drives
- I. Cabinet heating/cooling systems
- J. Centrifugal separator basin sweeper system
- K. Open loop chemical water treatment system
- L. Closed loop chemical treatment equipment

M. DDC controls system including flow meters, sensors, valves and switches etc.

#### 1.04 REFERENCES

- A. ARI 550/590: Water Chilling Packages using the Vapor Compressing Cycle
- B. ASHRAE 15 (American Society of Heating, Refrigerating and Air-Conditioning Engineers) - Safety Code for Mechanical Refrigeration.
- C. UL 1995 (Underwriters Laboratories, Inc.) – Heating and Cooling Equipment.
- D. ASTM A-525: Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- E. American Society for Testing and Materials (ASTM)
- F. Occupational Safety and Health Association (OSHA)
- G. Air Movement and Control Association, Inc. (AMCA)
- H. Cooling Technology Institute (CTI)
- I. Antifriction Bearing Manufacturing Association (AFBMA)
- J. American National Standards Institute (ANSI)
- K. National Electric Code (NEC)
- L. National Electrical Manufacturer Association (NEMA)
- M. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
- N. American Society of Mechanical Engineers (ASME)

#### 1.05 SUBMITTALS

- A. Submittals shall include the following as a minimum:
  - 1. General arrangement drawings including overall dimensions, modules weights, equipment clearances.
  - 2. Electrical single-line diagrams
  - 3. Piping and instrumentation diagrams
  - 4. Equipment performance data at the design operating points

#### 1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit start-up instructions, maintenance data, parts lists, controls, and accessories for all internal equipment. Include trouble-shooting guides.
- B. Provide detailed manufacturer's startup checklist for packaged plant along with individual internal component startup documentation.

#### 1.07 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in the design and manufacture of Packaged Central Plants.

- B. Each unit shall bear an ETL or UL label under UL Standard 1995 indicating the complete unit is listed as an assembly. ETL or UL listing of individual components, or control panels only, is not acceptable.
- C. Installer: Company specializing in performing work of this section with minimum five-year experience.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. The mechanical contractor shall be responsible for receiving the Packaged Central Plant on site in factory packaging along with any ship-loose materials. Contractor to inspect for damage and confirm receipt of all ship-loose materials. The manufacturer of the Modular Central Plant shall provide a factory trained and authorized representative to be on site when the equipment arrives.
- B. The Modular Central Plant shall be factory fabricated, tested, and delivered to the jobsite by the manufacturer as a complete unit (or in individual modules for field re-assembly) containing all major equipment and piping. Field fabrication of the Modular Central Plant is not acceptable.

#### 1.09 MANUFACTURER FIELD SERVICES

- A. Provide assistance on startup and checkout of all internal equipment and systems provided with the modular central plant including, pumps, controls, water treatment equipment, VFD's etc. including all travel and living expenses.
- B. Provide onsite assistance on installation and of modular chiller plant.

#### 1.10 WARRANTY

- A. The complete unit shall be covered by a parts warranty during the first year of operation. This warranty period shall start on the date of start-up or six months after the date of shipment, whichever is sooner.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURER

- A. Basis of Design Product: Subject to compliance with the requirements described in this specification, the Basis of Design shall be Flex Air, a division of Miller Industries, LLC.
- B. Deviation from basis of design is at the sole risk of the contractor. All costs associated with, but not limited to additional drawing reviews, modifications to systems, etc, shall be the responsibility of the contractor.

#### 2.02 GENERAL

- A. MCP shall be completely factory assembled and tested. The equipment's capacity and performance shall meet or exceed the values on the schedule. Tags and decals to aid in service or indicate caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access doors. Operation and maintenance manuals shall be furnished with each unit both electronically and in hard copy.
- B. Modular Central Plant shall meet the dimensions shown on plans, and it shall be no smaller than required to provide adequate space for maintenance. Maintenance for the

MCP shall be done from the inside of the MCP where it's possible. Adequate space shall be provided inside the MCP for access to all internal components.

- C. Packaged Central Plant will be equipped with a refrigerant monitor, exhaust fan, ventilation dampers, and audible. The exhaust fan will purge the Packaged Central Plant of refrigerant when a refrigerant leak is detected. All associated controls and wiring shall be factory installed. Provide emergency chiller shutdown switches, emergency ventilation switches and emergency shutdown switches at exterior package plant access doors. Refer to MEP Construction Documents for additional information.
- D. Label all electrical, controls and equipment components with permanently mechanically fastened blue phenolic coated nameplates.
- E. Provide primary water piping and pumping system. Refer to MEP Construction Documents for additional information.
- F. Cooling tower support platform to be engineered and provided by MCP manufacturer.
- G. MCP shall be provided with fan coil units to maintain the interior of the MCP so that controls and variable frequency drives operate without temperature faults, and to cool any electrical equipment within the plant. Fan coil AC units shall be completely piped/installed and wired with all necessary controls from the factory when freight limitation permit it. The fan coil drain pan shall be factory piped to a floor drain. Fan CoilAC units shall be provided with digital thermostats or space sensors located across the space. Refer to MEP Construction Documents for additional information.
- H. The internal MCP components must be arranged in a serviceable manner, with adequate internal service clearances provided from within the MCP. Multiple components such as chillers, or pumps must all be accessible from within the plant through common walkways and vestibules without having to leave the plant. A common walkway servicing all chillers must be provided that is clear of any service impediments such as piping, pumps or accessories.
- I. All pumping systems must be provided with common headers to allow for any single pump to be operated with any of the major system components. For example, pumps must be piped such that any one of the pumps can operate with any one of the chillers. Refer to MEP Construction Documents for additional information.

## 2.03 PACKAGED CENTRAL PLANT CONSTRUCTION

- A. The modular central plant shall be factory assembled and shipped in one piece except where (a) otherwise specified and (b) where trailer and/or airport entry gates physical limitations prevent such shipment. If this occurs, the enclosure shall be shipped in sections for field re-assembly by others. The design shall be such that all equipment, piping and related components required for system operation shall be contained within and air conditioned (40°F minimum to 95°F maximum inside design temperature) weatherproof enclosure as detailed in this specification section. All roof, walls, and panels shall meet the specified R values. Cabinets shall be constructed in a watertight manner.

The base shall be built of Type ASTM A36 welded structural steel c-channel, 6-inch min height, sized by structural design calculations and reinforced to meet or exceed specified loads. All critical load bearing points shall be engineered for structural integrity to meet both stationery and shipping thrust inertia. The entire enclosure shall

be designed to meet or exceed the loading (wind, snow/sand, live and dead loading, lifting) as required for the site-specific criteria outlined in the relevant parts of this specification. The steel base shall include lifting lugs as required for rigging of entire shipping modules, lifting lugs to be certified and spammed by a PE. Structural steel members shall be located to facilitate the mounting of all major equipment. Mounting of this equipment to unsupported deck plate is not permitted. The deck shall be a minimum of 1/4" HRS steel, welded to the structural base steel and finished as described above. The floor must be covered by high build or Factory applied powder coat (3 to 5 mils) marine grade epoxy paint Coating shall pass ASTM B-117 1,000-hour salt spray test. Color shall be manufacturer's standard or as specified by Architect. The design of the base shall include the installation of drain receptacles at strategic locations as required for water drainage that may occur during routine maintenance functions on equipment and/or pipe systems or to accommodate any spills or leaks that may occur.

The base shall be insulated with a closed cell, polyurethane foam system designed for spray applications. The insulation thickness shall be 2 inches. Foam shall be a two-component, medium density one to one by volume spray applied polyurethane foam system. UPC 2.0 system consists of an "A" component (ISO) and a blended "B" component (RESIN) in separate drums. UPC 2.0 system utilizes HFC-245fa blowing agents.

1. Compressive Strength: 35 psi
2. Core Density: 2.0 pcf.
3. R-Value @ 1": 6.6

B. The wall and roof frame shall be constructed of prefabricated insulated panel mechanically fastened with a system designed by a structural engineer, structural calculations and reinforced to meet or exceed specified loads. Wall and roof systems shall be 1-hour rated. Roof design shall incorporate roof panels as detailed below. The roof assembly shall be covered with a Modified Bitumen Membrane roofing system meeting MDAD Criteria and utilize a sloped (1/4" per foot minimum) to allow for proper drainage, for MCPs with multiple modules the joints on the roof of these modules will be finished/sealed in the field by the manufacturer for a single source result, Flex Air will provide the roofing material. Assembly shall include all stainless-steel flashing, counter flashing and gutters as required to properly weatherproof the enclosure. Wall panels are to be a 2" thick comprised of an interior and exterior liner of 22 gage g90 galvanized steel, insulation with a minimum R value of 7.2 per inch as per ASTM C518@75°F, and 8.25 @ 35°F. Ceiling panels are to be 2" thick comprised of an interior and exterior liner of 20 gage g90 galvanized steel, with same insulation and R values as the walls.

C. All the exterior paint finish characteristics listed below shall be meet:

1. Gloss: 15 +/- 5 measured at 60° angle tested in accordance with ASTM D523.
2. Pencil Hardness: HB-H minimum tested in accordance with ASTM D3363.
3. Flexibility, T-Bend: 1-2T bend with no adhesion loss when tested in accordance with ASTM D4145.
4. Flexibility, Mandrel: No cracking when bent 180° around a 1/8 mandrel as tested in accordance with ASTM D522.
5. Adhesion: No adhesion loss tested in accordance with ASTM D3359.

6. Reverse Impact: No cracking or adhesion loss when impacted 3000 x inches of metal thickness (lb-in), tested in accordance with ASTM D2794.
  7. Abrasion Resistance: Nominal 65 liters of falling sand to expose 5/32 inch.
  8. Graffiti Resistance: Minimal effect.
  9. Acid Pollutant Resistance: No effect when subjected to 30% sulfuric acid for 18 hours, or 10% muriatic acid for 15 minutes when tested in accordance with ASTM D1308.
  10. Salt Fog Resistance: Passes 1000 hours, when tested in accordance with ASTM B117 (5% salt fog @ 95° F).
  11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours when tested in accordance with ASTM D5894.
  12. Humidity Resistance: Passes 1500 hours at 100% relative humidity and 95°F, with a test rating of 10 when tested in accordance with ASTM D2247 and D714.
  13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154.
  14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A.
  15. Color Tolerances: Maximum of 5ΔE Hunter units on panels when tested in accordance with ASTM D2244.
- D. Stainless steel floor sinks and drains with walk-on safety fibergrate grating at all pumps, Chillers, makeup water stations, and in any other area where spills may occur. Route all air vent and pressure relief valve bleed connections to floor drains.
- E. Durable insulated access doors shall be provided for easy access to all components. The access doors shall be fabricated with a galvanized or coated steel skin and shall be insulated with foamed polyurethane insulation with an R-13.1 value. The doors shall have 3 butt hinges and a lockable handle. All handles must be operable from both inside and outside of the unit. Access doors shall be 36-inch-wide x 80-inch-high. Garage style rollup doors are not acceptable for unit access but can be used for equipment servicing or replacement where necessary. When required, provide interior panic hardware on all doors to allow for personnel working inside of the packaged plant to exit through doors that may be locked from the outside.
- F. Cooling tower structure to be designed and stamped by a PE licensed in the state of jobsite, according to the site conditions and loads imposed by cooling tower and condenser water piping when supported from this structure. Shall be furnished with stairs and/or access ladder when height of platform is more than 6'. Shall be furnished with Railing around perimeter of platform, steel bar grating walking surface on walkways. Galvanized finished. Knock down construction, to be shipped loose and installed by others on the field.

## 2.04 PACKAGED CENTRAL PLANT EQUIPMENT

- A. Water Cooled Centrifugal Chillers – Refer to MEP Construction Documents for Chiller Requirements.
- B. Water Pumps – Refer to MEP Construction Documents for Hydronic Pumps Requirements
- C. Water Treatment Equipment and Accessories – Refer to MEP Construction Documents for Chemical Water Treatment Requirements.

## 2.05 PIPING & PIPING SPECIALTIES

Refer to MEP Construction Documents for Piping and Piping Requirements.

#### 2.06 ELECTRICAL POWER

Refer to MEP Construction Documents for Electrical Power Requirements.

#### 2.07 CONTROLS

Refer to MEP Construction Documents for Automatic Control Requirements.

#### 2.08 FACTORY TESTING

- A. Manufacturer to conduct comprehensive quality control checkout and testing prior to shipment of the packaged central plant including but not limited to, point to point conductivity electrical testing, controls functionality testing, and pneumatic pressure testing for leak detection of all factory installed piping systems.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Provide for connection to electrical service. Refer to Division 16. Provide multiple electrical connections indicated in the drawing.
- B. The assembly of multiple sections for Packaged Central Plants that come in more than one piece shall be performed by the manufacturer to provide a single sourced product. Assemble and complete cabinet installation and weatherproofing by the manufacturer.
- C. Coordinate and install packaged central plant sections on concrete housekeeping pad.
- D. Anchorage of MCP should be determined by the engineer of record according to local codes and site conditions.
- E. Connect and install all ship-loose components per manufacturer's instructions including but not limited to, piping spool pieces, electrical splices and connections, external condensate drain lines, external controls components (sensors, etc.), electrical components etc.
- F. Contractor to provide and coordinate closed loop CHW chemical water treatment with the main building loop flush, cleaning and permanent treatment procedures.

### PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

#### 4.01 METHOD OF MEASUREMENT

- A. Measurement of New Modular Chiller Plant Building shall be the full assembly completed as indicated on Plans, fully functional, tested, commissioned, and accepted in accordance with the contract documents and as directed by the Engineer. The work includes complete furnishing of all new Modular Chiller Plant Building with all necessary transportation to the Airport through existing security gates, erecting and assembly, doors, roll up coil doors, metal panels, coating, equipment, appurtenances,

spare parts, employee training, and other work associated with the building and as shown on the Plans and in other sections of the Specifications.

4.02 BASIS OF PAYMENT

- A. Payment for the quantities measured as described above shall be made at Lump Sum of which price and payment shall be full compensation for furnishing all labor, materials and incidentals necessary to complete the work under this section.
- B. Payment shall be made under the following Pay Item Numbers:

13 34 19-1	Modular Chiller Plant Building	Lump Sum
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END OF SECTION