

# Guide Specifications

## VARIABLE SPEED WATER COOLED MODULAR CHILLER “SuperMod”

### PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. **Work Included:**  
The water-cooled modular chiller system shall consist of individual chiller modules that are assembled on site. Each chiller module shall be completely factory wired and tested prior to shipment. Each module shall include a compressor, evaporator, water-cooled condenser, and controls. Controls shall be designed to allow the master controller to operate remaining slave modules in the event of a malfunction of any slave controller. The controls shall also be designed to operate on a distributed master control system which allows each individual slave microprocessor to operate on its own temperature sensor if there is a failure of the master microprocessor.
- B. **Related Work Specified Elsewhere:** General Requirements of Division One and Section 15010 “Basic Mechanical Requirements” pertain to and are hereby made part of the work of this Section of the specifications.

#### 1.02 QUALITY ASSURANCE

- A. Chiller modules shall be constructed in accordance with the UL 1995 and NEC standards and be UL or ETL listed.
- B. Chiller modules shall be rated and tested in accordance with ARI 550/590 – Standard for Water Chilling Packages.
- C. Chiller modules shall meet the safety standards of ANSI/ASHRAE 15 – Safety Standard for Refrigerated Systems.

#### 1.03 SUBMITTALS

- A. Submit complete drawings including cabinet dimensional details and anchor point locations, required clearances, location and sizes of field connections, performance data, electrical wiring diagrams, dry and operation weights, and all required electrical data.
- B. Submit manufacturer’s installation instructions, including any remote panel installation instructions.
- C. Operating and Maintenance manuals: provide two copies of current commercial manuals.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting chiller modules.
- B. Protect chiller modules on site from physical damage after unloading.

#### 1.05 WARRANTY

- A. Entire chiller system: One-year parts. Compressor: five years parts.

### PART 2 PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. ArctiChill SuperMod (Basis of Design)
- B. Engineer Approved Equal (provide complete submittal, listing all exceptions to specification, to Engineer for evaluation prior to bid, per Substitution Request requirements)

#### 2.02 CHILLER

- A. General:

Each module shall be assembled on a powder coated, formed sheet metal frame and panels. The chiller modules shall be shipped as individual modules and assembled on site. Each module shall be fully charged with refrigerant and factory tested for capacity and controller functions prior to shipment. The electrical supply conduit for each module shall be factory assembled and shipped with each module for field connection into the electrical distribution panel on the master chiller module. Master module shall include a phase monitor to protect against low voltage, phase unbalance, phase loss, and phase reversal conditions.
- B. Frame:

The frame shall be constructed of formed sheet metal and be powder coated with an oven baked finish.
- C. Cabinet Panels:

The cabinet panels shall be powder coated steel and easily removable for servicing. Access panels shall be removable via stainless steel fasteners.
- D. Compressors:

Hermetically sealed scroll tandem compressor set, variable speed and fixed speed, on a single refrigeration circuit with rotalock connections, oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and in-line circuit breaker protection. There shall be two compressors per tandem set and one refrigerant circuit per module. Compressors shall be mounted to the steel frame with rubber-in-shear vibration isolators. Rotalock service valves shall be

provided for service isolation and ease of compressor replacement.

E. Variable Speed Drive:

The lead scroll compressor shall have a variable speed package containing a brushless permanent-magnet compressor motor and variable speed AC motor drive. The lag circuit shall have fixed speed scroll compressor. The variable speed drive (VSD) scroll compressor shall provide smooth and efficient operation from 30 Hz to 100 Hz for close temperature control. This part load operation shall lower operating noise as well as the compressor condensing temperatures thereby lowering power consumption during low cooling load demands.

F. Evaporators:

Brazed plate, single circuit evaporator in each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each evaporator shall include an electronic and a manual isolation valve to allow servicing of each module individually, while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Evaporators shall be insulated with ¾" closed cell insulation.

G. Condensers:

Single circuit, brazed plate condensers constructed of 316 stainless steel plates and copper brazing. The supply and return water piping connections to each condenser shall include manual and electronic modulating valves to allow servicing of each module individually, while the remaining modules continue to operate and to allow variable low and head pressure control. The water connections to each condenser shall use roll grooved couplings for service convenience and ease of installation. The minimum working pressure shall be 650 psi.

H. Electronic control valves:

Each evaporator branch line shall include an electronic isolation valve that allows system flow to the active module to match the cooling requirements to the system load. The valves shall be the slow opening type to minimize the sudden change in flow to the previously active modules. The valves shall have a minimum opening cycle time of 60 seconds between the fully closed and open position. The valves shall have a minimum close off pressure of 75 psi.

I. Filters:

A 40-mesh industrial grade filter strainer shall be factory installed between the header system and each evaporator and condenser inlet. The strainer shall be serviceable by individual manual isolation valves that permit each strainer to be removed and cleaned without shutting down fluid flow or power to the entire system and allowing the remaining modules to continue to operate. In-line strainers that require complete system shutdown for service and isolation are not acceptable.

J. Refrigerant piping:

Piping shall be Type L seamless copper and shall have suction lines insulated using closed cell pipe insulation, compressor rotalock service valves, solenoid valves for

compressor pumpdown, and Schrader service valves in the suction, discharge, and liquid lines.

K. Fluid Piping:

The fluid piping shall be Schedule 10 steel and be insulated using closed cell pipe insulation to prevent condensation and maintain fluid temperature. Each chiller module shall have service valves for the independent isolation of each evaporator strainer and flow switch, without affecting the fluid flow to the remaining modules. Each chiller module shall connect to the adjacent module using roll grooved steel couplings and neoprene gaskets. Any type of module-to-module connection external to the modules is unacceptable.

L. Controls:

The master chiller module shall incorporate the master microprocessor controller. The master microprocessor shall communicate with the remaining slave microprocessors in each module via a local network communications protocol. The master controller shall read all analog and fault port values from all slave module controllers and shall pass these values to the Building Automation System via BACnet, Modbus or Lonworks protocols.

Each chiller control system shall include: High- and low-pressure transmitters to provide indication of refrigeration pressures in each circuit; high and low refrigeration pressure alarms including shutting shut down the responsible compressor(s); anti-short cycling compressor timers; minimum compressor run timers; connection to Building Automation System.

M. Microprocessor:

The microprocessor shall provide the following minimum functions and alarms:

1. Adjustable fluid temperature set point
2. Multiple stage compressor control, including compressor rotation to provide even compressor usage and wear.
3. High and low fluid temperature alarm set points
4. Fluid inlet and outlet temperature
5. Suction and discharge refrigeration pressures
6. Compressor run status
7. Current alarm status
8. Demand load
9. Compressor run hours
10. Alarm logging with minimum of previously 100 logged alarms with time and date of each occurrence
11. Remote start stop input

N. Interface Panel:

An operator 7" touch screen interface panel with graphical display shall be installed on the master module to allow chiller operation monitoring, adjustment of user set

points, and alarm monitoring.