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SUBMITTAL

Project: Highland Park Middle School
Beaverton, OR

Engineer: MFIA
Portland, OR

Specification Section: Packaged Water Chillers

Manufacturer: 

<u>Quantity</u>	<u>Tag</u>	<u>Model</u>
1	CH-1	AGZ170E

- Initial charge of R-410a refrigerant and oil
- Rotary scroll compressors
- Two independent refrigerant circuits
- Microchannel condenser coils
- Ultra-low noise direct drive condenser fans
- Fan cycling head pressure control to 32°F minimum
- Stainless steel brazed plate evaporator with thermal insulation
- Factory installed heaters for freeze protection to -20°F
- Factory installed thermal dispersion flow switch and factory strainer
- DDC controls with open protocol interface (BACnet MS/TP)
- Single point power connection with main disconnect switch and circuit protection
- 65 SCCR rating, factory coil louvers and base wire guards
- Factory startup service
- 5 year standard parts and labor warranty

Notes:

1. Please verify voltage – 460V/60/3
2. Labor warranty for 2-5th year requires regular maintenance and maintenance logs. Logs must conform to manufactures regular maintenance requirements.
3. Please confirm bacnet connection type (MSTP or IP – currently submittted as MSTP)

Rob Grace
Oregon Air Reps, Inc.



SUBMITTAL DATA

for

Highland Park ES

Prepared for

Beaverton School District

Prepared by

Rob Grace

3/19/2019

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Unit Dimensions



Unit and Center of Gravity Dimensions						
Units	A (No Strainer)	B (With Strainer)	Connection Size (Victaulic)	Center of Gravity		
				X	Y	Z
in	119.0	64.3	4.0	43.2	40.4	83.6
mm	3022	1634	102	1096	1025	2123



A water strainer must be installed at the inlet of the evaporator to protect it from damage. Please refer to the IOM for additional details. IT IS RECOMMENDED THAT THE SIDE LOCATIONS BE USED FOR POWER ENTRY WIRE SIZES LARGER THAN 350 MCM.

No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.

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AGZ-E Guards: Condenser Coil Louvers, Base Wire Grilles, Painted Base

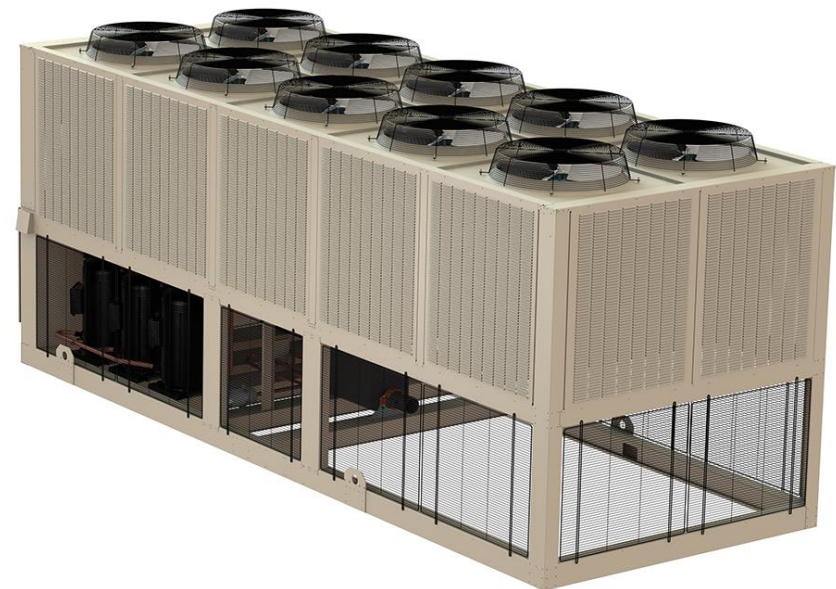
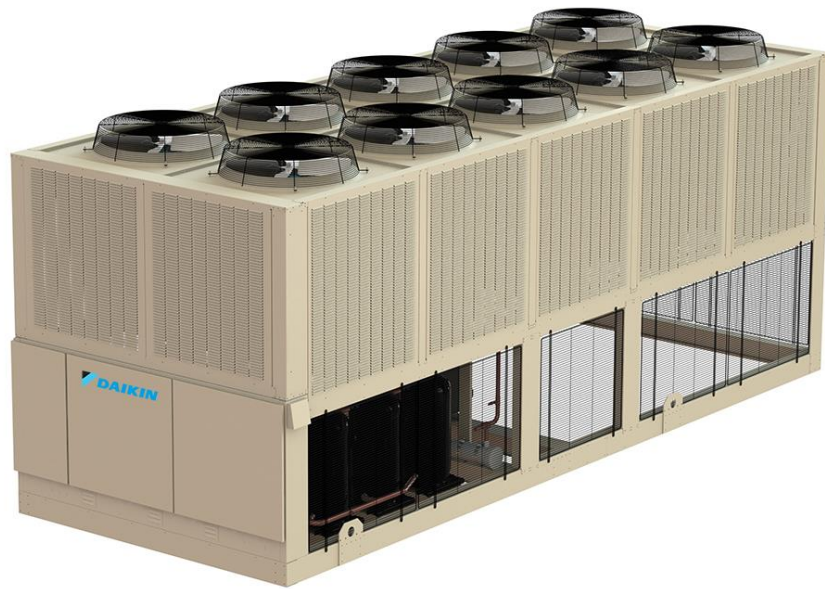


Diagram Notes

Diagram simulates wrap, grille and louver options as selected only. Refrigeration components may vary depending on selected options.

AGZ140-180E_CndLuv_BsGrL_PntBs_Drawing for CH-1

Job Number:
Job Name:

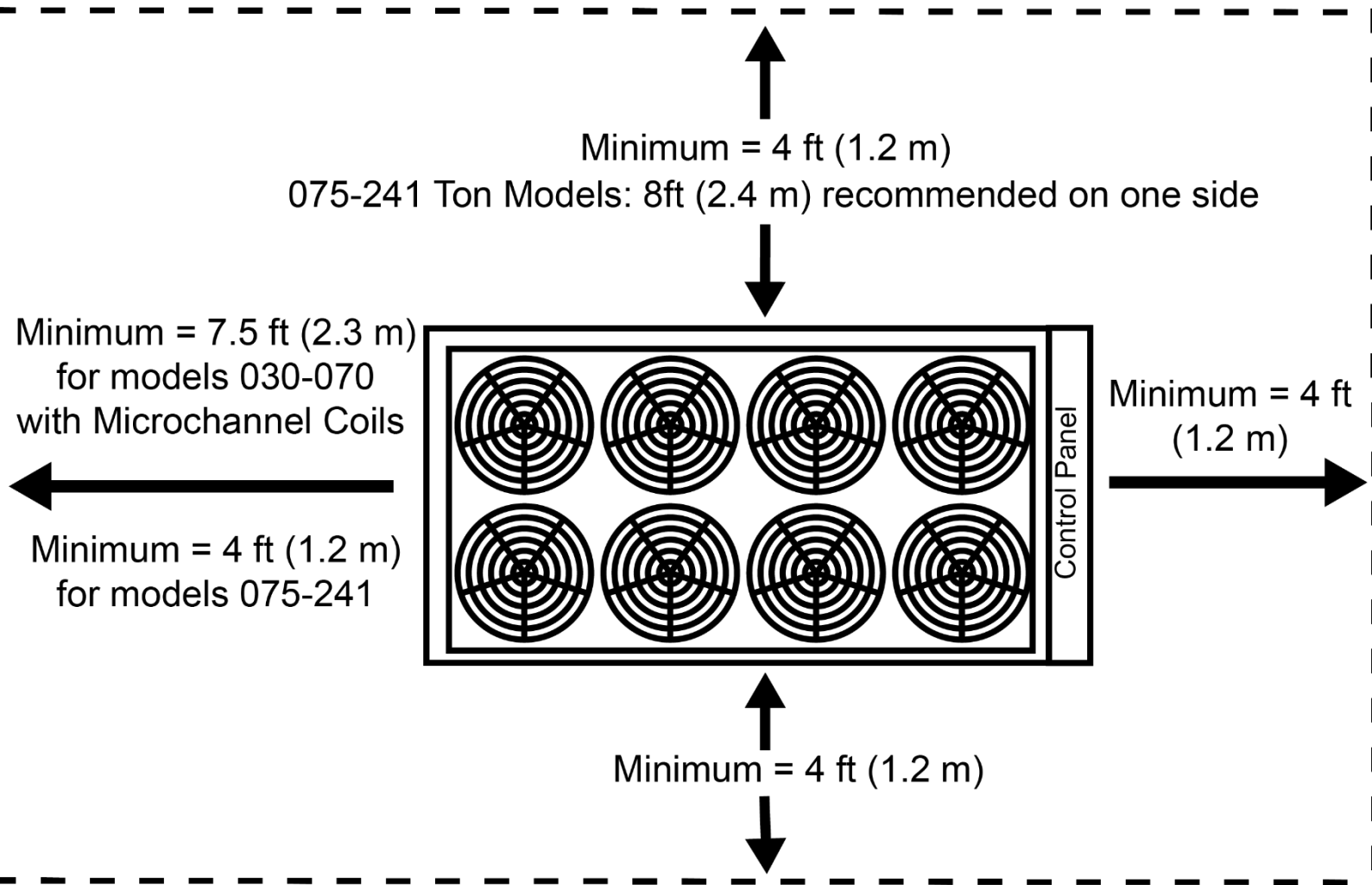
CD7ACE
Highland Park EC

Date:
11 of 19


Prepared Date:

2/10/2010
www.DaikinApplied.com

AGZ-E Service Clearance



*NOTE: Additional clearance is required for proper airflow. Please consult Close Spacing drawings and IOM for additional details.

Product Drawing	Unit Tag: CH-1			Sales Office: Air Reps, LLC (Oregon)			 13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 09.60
Product: Air-Cooled Scroll Chiller	Project Name: Highland Park ES			Sales Engineer: Robert Grace			
Model: AGZ-E	Mar. 19, 2019	Ver/Rev:	Sheet: 1 of 1	Scale: NTS	Tolerance: +/- 1.0"	Dwg Units: in [mm]	
No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.							

Technical Data Sheet for CH-1

Job Information		Technical Data Sheet
Job Name	Highland Park ES	
Date	3/19/2019	
Submitted By	Robert Grace	
Software Version	09.60	
Unit Tag	CH-1	



Unit Overview					
Model Number	Capacity ton	Voltage	Unit Starter Type	ASHRAE 90.1	LEED Enhanced Refrigerant Management Credit ¹
AGZ170E	164.5	460 V / 60 Hz / 3 Ph	Across the Line	'07, '10, '13 & '16	Pass

* IPLV reflects AHRI standard rating conditions and does not change with user defined conditions.

¹ Previously LEED EA Credit 4 Under LEED V2009

Unit								
Unit Type				Platform			Unit Revision	
Air-Cooled Scroll Compressor Chiller				Packaged			00	
Head Pressure				Tubing				
Fantrol Only (32°F Min)				Replaceable Filter Dryer with Discharge & Liquid Valves, no HGBP				
Unit Controls				Display				
Electronic Expansion Valve				On Controller only				
Refrigerant Type				Refrigerant Weight				
R410A				160 lb (per unit)				
Pump Controls								
Dual Evaporator Pumps - Dual Control Output								
Approval								
ETL/cETL, AHRI & ASHRAE 90.1								
Evaporator								
Water Volume:		17.1 gal						
Connection Hand:		Universal Connection - Facing out back						
Connection Size:		4.0 in						
Insulation:		Single Layer Insulation to Suction at each Compressor						
Entering Fluid Temperature	Leaving Fluid Temperature	Fluid Type	Glycol Concentration	Fluid Flow	Fluid Flow (with glycol) Min / Max	Pressure Drop	Pressure Drop (with glycol) Min / Max	Fouling Factor
56.00 °F	44.00°F	Water & Propylene	20.0 %	342.5 gpm	252.5 / 673.4 gpm	14.0 ft H ₂ O	5.60 / 37.6 ft H ₂ O	0.000100 °F.ft².h/Btu
Note: Evaporator Pressure Drop includes Factory Installed Strainer. Pressure drop without strainer is 10.1. Minimum flow and Minimum DP are based on a Constant Flow Pumping System Type.								
Condenser								
Coil Fins:		MicroChannel						
Guards:		Condenser Coil Louvers & Base Frame Wire Grilles						
Design Ambient Air Temperature		Altitude		Fan Diameter			Minimum Design Ambient Temperature	
92.0 °F		0.000 ft		30.0 in			32.0 °F	

Technical Data Sheet for CH-1

Unit Performance											
Design											
Capacity		Input Power			Efficiency (EER)			IPLV.IP* (EER)			
164.5 ton		190.0 kW			10.39 Btu/W.h			16.13 Btu/W.h			
Performance Points rated at AHRI Ambient Relief											
Unit					Evaporator				Condenser		
Point #	% Load	Capacity ton	Input Power kW	Efficiency (EER) Btu/W.h	Fluid Flow gpm	Pressure Drop ft H ₂ O	Entering Fluid Temperature °F	Leaving Fluid Temperature °F	Ambient Air Temperature °F	Altitude ft	
1	100.0	164.5	190.0	10.39	342.5	10.1	56.00	44.00	92.0	0.000	
2	90.0	148.1	150.2	11.83	342.5	10.1	54.80	44.00	86.5	0.000	
3	80.0	131.6	118.5	13.33	342.5	10.1	53.60	44.00	80.9	0.000	
4	70.0	115.2	91.37	15.12	342.5	10.1	52.40	44.00	75.3	0.000	
5	60.0	98.70	69.07	17.15	342.5	10.1	51.20	44.00	69.8	0.000	
6	50.0	82.25	57.15	17.27	342.5	10.1	50.00	44.00	64.3	0.000	
7	40.0	65.80	46.63	16.93	342.5	10.1	48.80	44.00	58.7	0.000	
8	30.0	49.35	32.40	18.28	342.5	10.1	47.60	44.00	55.0	0.000	
9*	20.0	32.90	19.96	19.78	342.5	10.1	46.40	44.00	55.0	0.000	
10	10.0	This load point is below the chiller minimum load.									
* IPLV reflects AHRI standard rating conditions and does not change with user defined conditions											
Note: Evaporator Pressure Drop in this table does Not include strainer. For strainer pressure drop data see 'Evaporator' table on page 1.											
Sound (without insulation)											
Sound Pressure (at 30 feet)											
63 Hz dB	125 Hz dB	250 Hz dB	500 Hz dB	1 kHz dB	2 kHz dB	4 kHz dB	8 kHz dB	Overall dBA	75% Load dBA	50% Load dBA	25% Load dBA
69	71	69	67	64	61	60	58	70	69	67	66
Sound Power											
63 Hz dB	125 Hz dB	250 Hz dB	500 Hz dB	1 kHz dB	2 kHz dB	4 kHz dB	8 kHz dB	Overall dBA	75% Load dBA	50% Load dBA	25% Load dBA
96	98	96	94	91	88	88	85	97	96	94	93
Octave band is non 'A' weighted and overall readings are 'A' weighted. Sound data rated in accordance with AHRI Standard-370.											
Physical											
Unit											
Length*		Height		Width*		Shipping Weight*		Operating Weight*			
238 in		99 in		88 in		7670 lb		7807 lb			
*Shipping and Operating Weights include the below Option weights only and do not include the weights of any Accessories. Contact Chiller Applications for additional information.											
Option Weights											
Louvers:		500 lb									
Total:		500 lb									

Technical Data Sheet for CH-1

Electrical

Unit Electrical Data						
Voltage	Starter Type	Fan Motor Quantity		LRA Fan Motor (each)		FLA Fan Motors (each)
460 V / 60 Hz / 3 Ph	Across the Line	10		18 A		3.6 A
Power Connection Type:	High Short Circuit Current Rating with Single Point Disconnect Switch and Circuit Protection					
Short Circuit Current Rating:	65 kA					
Single Point Power Connection						
MCA:	354.8 A					
Fuse Size (recommended):	400 A					
Fuse Size (maximum):	400 A					
Connector Wire Range:	(2) 3/0-500MCM					
Compressor Electrical Data						
Compressor Type		Compressor Quantity			Starter Type	
Scroll		6			Across the Line	
Circuit #:	1			2		
Compressor #:	1	3	5	2	4	6
RLA:	37.8 A	37.8 A	57.2 A	57.2 A	57.2 A	57.2 A
Inrush Current:	320 A	320 A	310 A	310 A	310 A	310 A

Note: Power wiring connections to the chiller may be done with either copper or aluminum wiring. Wire should be sized per NEC and/or local codes. Wire sizing and wire count must fit in the power connection lug sizing listed in latest installation manual. Please contact your local sales office for more information.

Options

Basic Unit	
Suction Shut-off Valve:	Included
Evaporator Strainer:	Factory Installed Evaporator Strainer – 175 PSI Pressure Rating
Control	
Communication:	BACnet MS/TP
Electrical	
Water Flow Indicator:	Thermal Dispersion Type

Warranty

Unit Startup	By Others
Standard Warranty:	1st Year Entire Unit Parts & Labor
Extended Compressor Warranty:	Compressor Only; extended 4 years parts & labor (5 Years Total)

AHRI Certification



Certified in accordance with the AHRI Air-Cooled Water-Chilling Packages Using Vapor Compression Cycle Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Unit containing freeze protection fluids in the condenser or in the evaporator with a leaving chilled fluid temperature above 32°F [0°C] is certified when rated per the Standard with water. Certified units may be found in the AHRI Directory at www.ahridirectory.org.

PART 1: GENERAL

1.01 CHILLER COMPONENTS

A. Compressor

1. The compressors shall be sealed hermetic, scroll type with crankcase oil heater and suction strainer. The compressor motor shall be refrigerant gas cooled, high torque, hermetic induction type, two-pole, with inherent thermal protection on all three phases and shall be mounted on RIS vibration isolator pads. The compressors shall be equipped with an internal module providing compressor protection and communication capability.

B. Evaporator

1. The evaporator shall be a compact, high efficiency, dual circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless steel plates.
2. The evaporator shall be protected with an external, electric resistance heater plate and insulated with 3/4" (19mm) thick closed-cell polyurethane insulation. This combination shall provide freeze protection down to -20°F (-29°C) ambient air temperature.
3. The water-side maximum design pressure shall be rated at a minimum of 653 psig (4502 kPa). Evaporators shall be designed and constructed according to, and listed by Underwriters Laboratories (UL).

C. Condenser

1. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct-drive fan motors. The fans shall be equipped with a heavy-gauge vinyl-coated fan guard. Fan motors shall be TEAO type with permanently lubricated ball bearings, inherent overload protection, three-phase, direct-drive, 1140 rpm. Each fan section shall be partitioned to avoid cross circulation.
2. Coil shall be microchannel design and shall have a series of flat tubes containing multiple, parallel flow microchannels layered between the refrigerant manifolds. Tubes shall be 9153 aluminum alloy. Tubes made of 3102 alloy or other alloys of lower corrosion resistance shall not be accepted. Coils shall consist of a two-pass arrangement. Each condenser coil shall be factory leak tested with high-pressure air under water. Coils shall withstand 1000+ hour acidified synthetic sea water fog (SWAAT) test (ASTM G85-02) at 120°F (49°C) with 0% fin loss and develop no leaks.

D. Refrigerant Circuit

1. Each of the two refrigerant circuits shall include a replaceable-core refrigerant filter-drier, sight glass with moisture indicator, liquid line solenoid valve (no exceptions), expansion valve, and insulated suction line.

E. Construction

1. Unit casing and all structural members and rails shall be fabricated of pre-painted or galvanized steel. Painted parts shall be able to meet ASTM B117, 1000-hour salt spray test.
2. Upper section of unit shall have protective and decorative louvers covering the coils and unit end; base section of unit shall have protective, 12 GA, PVC-coated, wire grille guards and have painted steel wraps enclosing the coil end sections and piping.

F. Control System

1. A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Box shall be designed in accordance with NEMA 3R rating. Power and starting components shall include factory circuit breaker for fan motors and control circuit, individual contactors for each fan motor, solid-state compressor three-phase motor overload protection, inherent fan motor overload protection and two power blocks (one per circuit) for connection to remote, contractor supplied disconnect switches. Hinged access doors shall be lockable. Barrier panels or separate enclosures are required to protect against accidental contact with line voltage when accessing the control system.
2. Shall include high short circuit current rating of 65,000 amps (25,000 amps at 575Volt) with single-point disconnect switch

G. Unit Controller

1. An advanced DDC microprocessor unit controller with a 5-line by 22-character liquid crystal display provides the operating and protection functions. The controller shall take preemptive limiting action in case of high discharge pressure or low evaporator pressure. The controller shall contain the following features as a minimum:
2. The unit shall be protected in two ways: (1) by alarms that shut the unit down and require manual reset to restore unit operation and (2) by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms shall activate an alarm signal.
3. Shutdown Alarms
 - a. No evaporator water flow (auto-restart)
 - b. Sensor failures
 - c. Low evaporator pressure
 - d. Evaporator freeze protection
 - e. High condenser pressure
 - f. Outside ambient temperature (auto-restart)
 - g. Motor protection system
 - h. Phase voltage protection (Optional)
4. Limit Alarms
 - a. Condenser pressure stage down, unloads unit at high discharge pressures.
 - b. Low ambient lockout, shuts off unit at low ambient temperatures.
 - c. Low evaporator pressure hold, holds stage #1 until pressure rises.
 - d. Low evaporator pressure unload, shuts off one compressor.
5. Unit Enable Section
 - a. Enables unit operation from either local keypad, digital input, or BAS
6. Unit Mode Selection
 - a. Selects standard cooling, ice, glycol, or test operation mode
7. Analog Inputs:
 - a. Reset of leaving water temperature, 4-20 mA\
 - b. Current Limit
8. Digital Inputs
 - a. Unit off switch
 - b. Remote start/stop
 - c. Flow switch
 - d. Ice mode switch, converts operation and setpoints for ice production
 - e. Motor protection
9. Digital Outputs
 - a. Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
 - b. Evaporator pump; field wired, starts pump when unit is set to start
10. Condenser fan control - The unit controller shall provide control of condenser fans based on compressor discharge pressure.
11. Building Automation System (BAS) Interface
 - a. Factory mounted DDC controller(s) shall support operation on a BACnet®, Modbus® or LONMARK® network via one of the data link / physical layers listed below as specified by the successful Building Automation System (BAS) supplier.
 - b. BACnet MS/TP master (Clause 9)
 - c. BACnet IP, (Annex J)
 - d. BACnet ISO 8802-3, (Ethernet)
 - e. LONMARK FTT-10A. The unit controller shall be LONMARK® certified.

- f. The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list.
- g. For chillers communicating over a LONMARK network, the corresponding LONMARK eXternal Interface File (XIF) shall be provided with the chiller submittal data.
- h. All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided along with the unit submittal.

1.02 OPTIONS AND ACCESSORIES

A. The following options are to be included:

- 1. Low Ambient Control: Provide fan cycling control to allow unit operation down to 32°F
- 2. BAS interface module to provide interface with the BACnet MSTP protocol.

3. The following accessories, if selected, are to be included:

- a. Factory-mounted thermal dispersion type flow switch
- b. Wye strainer, to be installed at the evaporator inlet and sized for the design flow rate , with perforation diameter of 0.063" with blowdown valve and Victaulic couplings (factory mounted or field installed)

PART 2: EXECUTION

2.01 INSTALLATION

- A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.
- B. Adjust and level chiller in alignment on supports.
- C. Coordinate electrical installation with electrical contractor.
- D. Coordinate controls with control contractor.
- E. Install a field-supplied or optional manufacturer-supplied strainer in the chilled water return line at the evaporator inlet that meets manufacturer perforation size specifications.