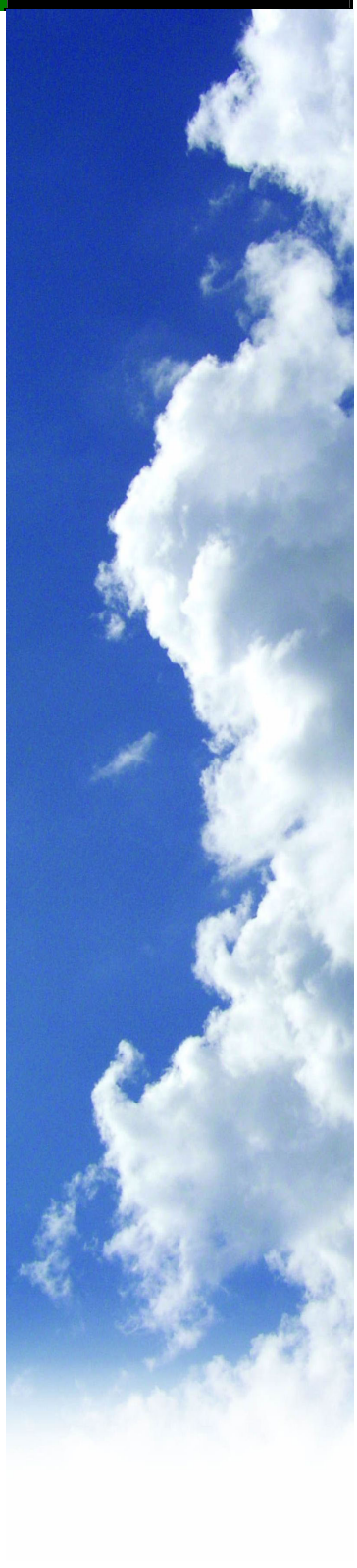
Air-Cooled Scroll Compressor Units

ACZ010BS – ACZ 039BS Condensing Units
AGZ010BS – AGZ 034BS Chillers
AGZ010BM – AGZ 034BM Chillers with Remote Evaporators

10 to 40 Tons (35 to 140 kW)
60 Hertz
R-407C



McQuay Air Conditioning

Engineered for flexibility and performance. ™

Table of Contents

Introduction

This catalog covers air-cooled, single circuit, R-407C, scroll compressor chillers and condensing units as follows:

- ACZ 010BS – ACZ 039BS condensing units, 10 to 39 tons
- AGZ 010BS – AGZ 034BS packaged chillers, 10 to 34 tons
- AGZ 010BM – AGZ 034BM chiller with remote, 10 to 34 tons, matching water cooler, shipped separately for field installation, usually indoors

These units utilize a single refrigerant circuit using a set of tandem scroll compressors. They continue McQuay's legacy of high quality, high efficiency, latest technology and quiet operation. These features make the ACZ and AGZ the best overall value in air-cooled units available today.

Latest Control Technology

These units have the latest control technology through utilization of McQuay's MicroTech II™ microprocessor. Integrating with your building automation system is easy with the McQuay's Open Choices™ feature using LONMARK®, BACnet® or Modbus® network communication, requiring only the addition of a small communication module to the unit controller.

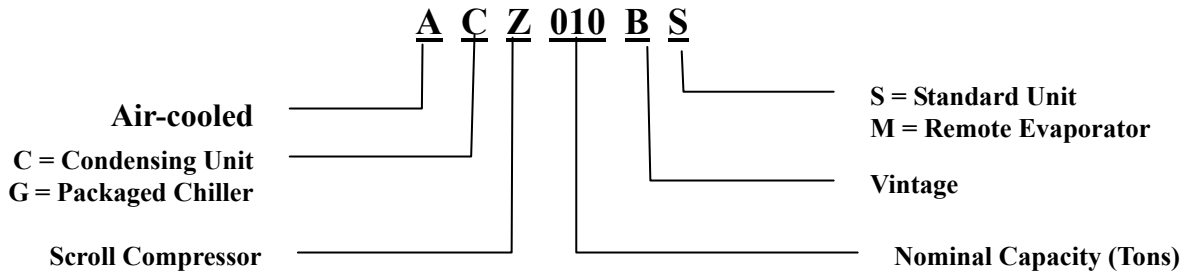
Compact Size

Our reputation for compact designs with small footprints to minimize space requirements continues to be a primary feature.

Quiet Operation

The ACZ and AGZ units further enhance McQuay's reputation for low operating sound levels to make these units "neighborhood friendly".

NOMENCLATURE



Features and Benefits

ACZ-AGZ, Single Circuit Units

Great values also come in small packages. The ACZ and AGZ units have a single refrigerant circuit with capacities from 10 to over 34 tons. Customer benefits include high efficiency operation, low sound levels, efficient and reliable scroll compressor technology, and MicroTech II™ controls.

High Efficiency Operation

These units operate at high efficiency with IPLVs up to 14.6 EER. Through the use of tandem scroll compressors and the latest control technology, excellent part load performance occurs. With a single compressor running, the entire unit's condenser surface is utilized, lowering condenser pressure and reducing power input.

Quiet Operation

ACZ and AGZ units have low sound ratings through the use of scroll compressors. These compressors are housed in a sheet metal enclosure to further reduce the levels. All units have a sound power rating of 90 dBA or less. For additional sound attenuation, optional acoustic blankets are also available. See page 25 for more information regarding our low sound levels.

Superior Control with MicroTech II™

They have the MicroTech II™ controller providing control strategies expected of much larger units.

Building Automation System Integration

The MicroTech II™ controller allows for easy BAS integration through our Open Choice™ feature using LONMARK, BACnet or Modbus communications. This is another advanced feature typical of larger units.

Figure 1, Model ACZ 033, 30-ton Condensing Unit

Design Features

The McQuay air-cooled, scroll compressor units are a product of the McQuay commitment to offer quiet, reliable, energy efficient equipment. These units incorporate high quality compressors, state-of-the-art coil design, and innovative packaging.

Construction

Factory assembled and mounted on a heavy-gauge steel channel base. The base rails, supports and cabinetry are powder-coat painted. The base distributes the unit weight for roof loading. Varied and convenient installation is possible by virtue of the unit's small footprint.

Compressors

Copeland's Compliant Scroll™ tandem compressors are used. These rugged hermetic compressors are constructed with an integral cast iron frame, cast iron scrolls, three Teflon impregnated bearings, and three oil filtration devices for each compressor.

Using Copeland's Compliant Scroll tandem compressors provides two steps of capacity modulation. One compressor can run alone, depending on the load of the system, utilizing the entire unit's condenser surface, which results in excellent part-load efficiency. The refrigerant circuit has specially designed oil and gas equalization lines to control oil migration.

The design also offers radial and axial compliance (no tip seals), a large internal volume for liquid handling, a removable suction screen, and a rotary dirt trap and oil screen. In addition, the compressor is self-compensating for wear, handles liquid and debris, and inherently yields the highest efficiency for its class.

This well protected compressor includes a solid-state motor protection module, 4 individual motor-winding sensors, a patented internal discharge temperature probe, and a patented shutdown feature that prevents reverse rotation. An internal discharge check valve helps prevent shutdown noise and comes standard with high and low pressure taps with Schrader valves, a sight glass, an oil level adjustment valve, and an off cycle crankcase heater.

Units are available in 60 Hertz electrical voltage configurations from 208 to 575 volt operating at 3500 rpm.

Condenser Coils

Condenser coils have internally enhanced seamless copper tubes arranged in a staggered row pattern. The coils are mechanically expanded into McQuay lanced and rippled aluminum fins with full fin collars. A variety of optional coil material and coatings are available for corrosive atmospheres. The external condenser coils are fitted with a protective wire mesh guard as standard equipment.

Condenser Fans and Motors

Multiple direct-drive, dynamically balanced, propeller fans operate in formed venturi openings at low tip speeds for maximum efficiency and minimum noise and vibration. A heavy-gauge vinyl-coated fan guard protects each fan.

Each condenser fan motor is heavy-duty, 3-phase, Totally Enclosed Air Over (TEAO) with permanently lubricated ball bearings and inherent overload protection. SpeedTrol option includes a single-phase motor with fan speed control on the lead fan.

Evaporator

Stainless steel, brazed plate evaporators are used on the AGZ units. They have counter-flow operation and very high efficiencies.

Electrical Control Center

Operating and equipment protection controls and motor starting components are separately housed in a centrally located, weather-resistant control panel with hinged and tool-locked doors. In addition to the MicroTech II™ controller described in the next sections, the following components are housed in the panel:

- Standard single-point, terminal block connection
- Control, input, and output terminal block
- Control transformer
- Phase voltage monitor with under/over voltage and phase reversal protection
- Fan contactors with short circuit protective devices
- The standard FanTrol™ head pressure control system controls refrigerant discharge pressure by fan staging. The FanTrol system cycles condenser fans based on discharge pressure and outdoor temperature and is designed for operation down to 35°F (1.7°C).
- Optional SpeedTrol™ control using both fan cycling and fan speed control on the lead fan per circuit and allows operation to 0°F (-18°C) outdoor temperature.
- Mechanical high pressure cutout
- Power connections are per following table:

Power Connection	Power Block	Disc. Swt.	Comp. Circuit Breakers	High Interr Disconnect Switch Current Rating	High Short Circuit Current Rating w/ Disconnect Switch
ACZ 010-039, Single-Point Connection	Std.	Opt	Not Avail.	Opt.	Opt.
AGZ 010-034 Single Point Connection	Std.	Opt	Not Avail.	Opt.	Opt.

Definitions:

1. **Power Block:** An electrical device to directly accept field wiring without any disconnecting means.
2. **Disconnect Switch:** A molded case switch that accepts field wiring and disconnects main power to the entire unit or each main power supply if the multi-point power supply option is selected. This option does not provide overcurrent protection.
3. **Unit Circuit Breaker with High Interrupting Capacity:** A molded case circuit breaker acting as the main disconnect switch with short circuit current rating (formally known as "withstand"). One circuit breaker is provided. The circuit breaker provides overcurrent protection for the power supply.
4. **Control Panel High Short Circuit Current Rating:** (Previously known as "withstand rating"). The entire control panel is designed for short circuit current rating. In the event of a short circuit, the damage is contained within the control panel enclosure.

Control System

The MicroTech II™ advanced DDC unit controller surpasses all other microprocessor-based unit control systems available today on this class of equipment. This powerful, user-friendly control system provides the flexibility and performance needed for either stand-alone unit operation or the controller can be easily tied into your building automation system of choice using McQuay's exclusive Open Choices™ feature that allows you to choose from open standard protocols such as BACnet®, Modbus®, and LonTalk® to communicate easily with the building automation system that best meets your facility requirements. These optional communications modules are available factory-installed or can be easily field installed.

MicroTech II™'s state-of-the-art design will not only permit the unit to run more efficiently, but will also simplify troubleshooting if a system failure occurs. Every MicroTech II controller is programmed and tested prior to shipment.

Operator-friendly

The MicroTech II control menu structure is separated into four distinct categories that provide the operator or service technician with a full description of current unit status, control parameters, and alarms. Security protection helps prevent unauthorized changing of the setpoints and control parameters.

MicroTech II continuously performs self-diagnostic checks, pressures and protection devices, monitoring system temperatures, and it will automatically shutdown a compressor, or the entire unit, if a fault occurs. The

cause of the shutdown will be retained in memory and can be easily displayed in English or metric units for operator review.

The MicroTech II unit controller can also retain and display the time that the fault occurred and the operating conditions that were present at the time of the fault, an extremely useful feature for troubleshooting. In addition to displaying alarm diagnostics, the MicroTech II controller also provides the operator with a warning of pre-alarm conditions. Alarm notification data can also be passed on to your BAS through an optional communications module.

Staging

On ACZ condensing units, temperature control for the system is provided by the installer through a field supplied temperature controller. The field-supplied staging signals are provided to the MicroTech II controller which correspondingly activates and deactivates the scroll compressors. The temperature controller is required to close normally-open 24 volt contacts on a demand for cooling. These closure signals are field wired to the terminal strip (TB2) in the condensing unit. Refer to the typical field wiring diagram on page 34 for details. Two control stages are required:

Lead/lag is automatic and switched based on operating hours and compressor starts.

Equipment Protection

The unit is 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 can activate a remote alarm signal. Limit alarms activate a signal on the controller.

Shutdown Alarms

- High condenser pressure
- No chilled water flow
- Motor protection system
- Phase voltage protection (Optional on ACZ-B and AGZ-B)
- Outside ambient temperature
- Sensor failures

Limit Alarms

- Condenser pressure stage down, unloads unit at high discharge pressures
- Low ambient lockout, shuts off unit at low ambient temperatures
- Low evaporator pressure hold, holds stage #1 until pressure rises
- Low evaporator pressure unload, shuts off stage #2

Unit Enable Selection

- Enables unit operation from either local keypad, digital input, or BAS

Unit Mode Selection

- Selects standard cooling, or test operation mode

Digital Inputs

- Unit off switch
- Remote start/stop
- Flow switch

Digital Outputs

- Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
- Evaporator pump or air handler fan motor; field wired, starts when unit is set to start

Condenser fan control

The MicroTech II™ controller provides control of condenser fans. The controller stages condenser fans based on discharge pressure.

Building Automation System (BAS) Interface

The following BAS standard protocols are supported through McQuay's Open Choices™ option:

- BACnet/IP®
- BACnet MS/TP®
- BACnet Ethernet®
- LonTalk ®
- Modbus®

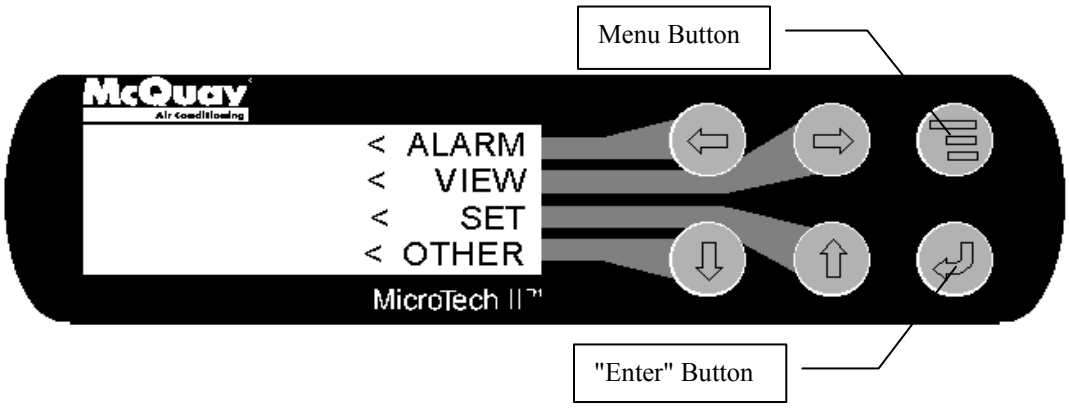
The following functions are generally available depending on the application and protocol in use:

- Enable/disable operation
- Select operating mode
- Set the network limit variable
- Read all digital and analog inputs and outputs
- Read operating mode and status
- Send a description of each alarm when it occurs

Keypad/Display

A 4-line by-20 character/line liquid crystal display and 6-key keypad is mounted on the unit controller. Its layout is shown in Figure 2.

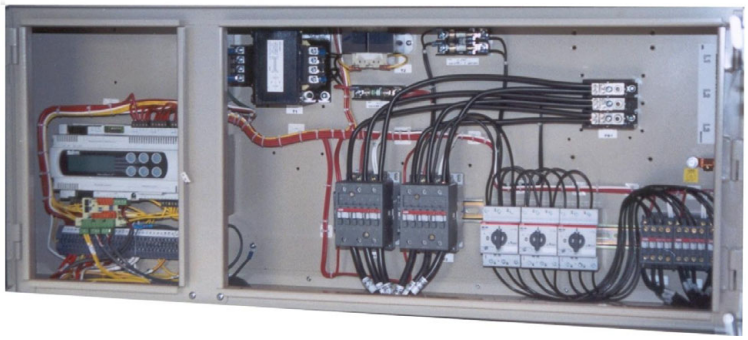
Figure 2, MicroTech II™ Keypad



The four arrow buttons (UP, DOWN, LEFT, RIGHT) have three modes of use.

- Scroll between data screens as indicated by the arrows (default mode).
- Select a specific data screen in a hierarchical fashion using dynamic labels on the right side of the display (this mode is entered by pressing the MENU button).
- Change field values in edit mode.

Figure 3, ACZ/AGZ-B Control Panel



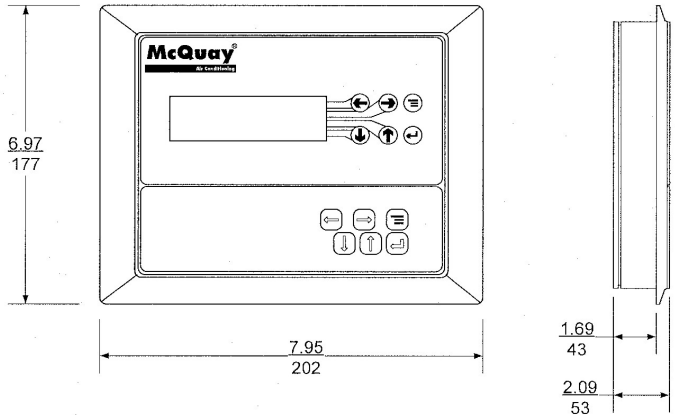
Optional Remote Interface Panel

The ACZ/AGZ units can be individually equipped with a remote user interface. It provides convenient access to unit diagnostics and control adjustments, remote from the condensing unit panel. A separate panel is required for each chiller on a job site.

Each remote user interface is similar to its unit-mounted counterpart and offers the same functionality, including:

- Touch-sensitive keypad with a 4 line by 20-character display format
- Digital display of messages in English language
- All operating conditions, system alarms, control parameters

Figure 4, Remote Interface Panel Dimensions



Features

- Can be wired up to 1,640 feet (500 meters) from the unit for flexibility in placing each remote user interface within your building.
- The main control is isolated from the remote user interface wiring so that wiring problems are less likely to damage the unit user interface.
- Can be placed on a desk or surface or recessed wall mounted.

Benefits

- Allows you to access the user interface for each unit from one location, inside the building.
- Users need to learn one format because the remote user interface is identical to the unit-mounted version.
- No additional field commissioning is required for the remote user interface.
- Can be retrofit after unit installation.
- All the BAS communications options are still available with the remote interface panel.

Cable and Wiring Recommendations

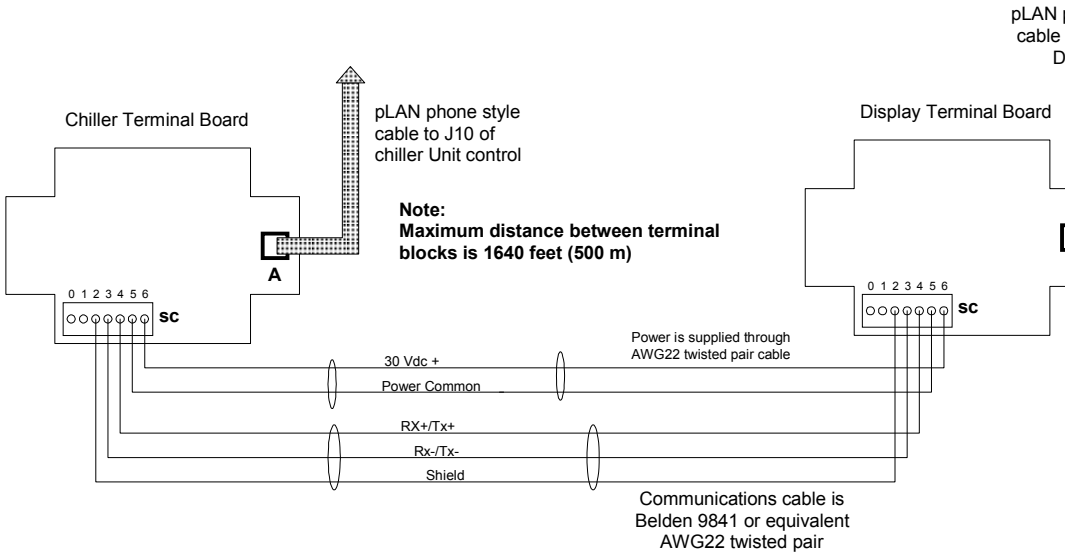
No more than 1,640 feet (500 meters) of wiring can be used to connect the remote user interface to the unit.

Power: AWG 22 twisted pair cable.

Communications: Belden 9841 or equal AWG 22 twisted pair.

A separate small communication terminal board is used at the unit and at the remote panel.

Figure 5, Remote User Interface Wiring Diagram



ACZ Condensing Unit Performance

Selection Procedure

ACZ condensing units are selected in conjunction with some kind of evaporator equipment. The ACZ ratings are based on saturated suction temperature at the compressor inlet and on ambient air dry-bulb temperature. For a system selection, the ACZ condensing unit is usually selected first, and then the line loss added to the condensing unit saturated suction temperature to determine the saturated evaporating temperature. This temperature is then used for the selection of the evaporator, whether it is a DX cooling coil or water heat exchanger. The pipe size can be determined from procedures and data in the Refrigerant Piping Section. For selection purposes, the tubing size is based on a pressure equivalent of a two-degree F line loss (equal to about 3-psi pressure drop).

The correction for altitude found in Table 1 is applied, if applicable, by dividing the *required job* capacity by the correction factor to ascertain the necessary unit capacity in the Capacity Tables.

R-407C NOTE: R-407C is an azeotrope and as such has a glide characteristic. An evaporator mid-point temperature will be about four-degrees higher than the dew point temperature. For example, an R-22 evaporator selected at a 40°F evaporating temperature would be comparable to 44°F with R-407C.

Selection example, Inch-Pound units

Given:

200 Mbh job requirement	95°F ambient temperature
40°F saturated suction temperature	2,000 foot altitude
R-22	

1. To select the correct size unit, correct for altitude by dividing the required capacity by the correction factor found in Table 1.

   200 Mbh required / 0.986 factor = 202 Mbh corrected requirement.

2. From Table 2 on the following page, an ACZ 020 at the given conditions will produce 202.5 Mbh with a unit power input of 20.0 kW and a unit EER of 10.1.
3. Correct for altitude:

   Capacity: 202.5 Mbh x 0.986 = 200 Mbh

   Power: 20.0 kW x 1.009 = 20.2 kW

   EER: 10.1 EER x 0.986/1.009 = 9.9 EER
4. An evaporator would be selected at 42°F saturated evaporating temperature.

Selection example-SI units

Use the same procedure as for Inch-Pounds but use SI tables and units.

Application Adjustment Factors

Altitude Correction Factors

Performance tables are based at sea level. Elevations other than sea level affect the performance of the unit. The decreased air density will reduce condenser capacity, consequently reducing the unit's performance.

Table 1, Altitude Correction Factors

Altitude	Capacity	Power
Sea Level	1.000	1.000
2000 ft (610 m)	0.986	1.009
4000 ft (1220) m	0.973	1.021
6000 ft (1830) m	0.959	1.031

ACZ Performance Data

Table 2, R-407C, I-P Units, 60 Hz

ACZ Unit Size	Suction Dewpoint Temp (F)	Fan & Control Power (kW)	Ambient Air Temperature (F)														
			75			85			95			105			115		
			Unit Mbh	PWR kWi	Unit EER	Unit Mbh	PWR kWi	Unit EER	Unit Mbh	PWR kWi	Unit EER	Unit Mbh	PWR kWi	Unit EER	Unit Mbh	PWR kWi	Unit EER
010	30	1.8	85.6	8.2	10.4	84.4	8.6	9.9	79.7	9.2	8.7	74.9	10.0	7.5	70.2	10.8	6.5
	35	1.8	95.1	8.3	11.4	92.8	8.7	10.7	88.0	9.4	9.4	83.2	10.1	8.2	77.3	10.9	7.1
	40	1.8	104.7	8.6	12.2	102.3	8.9	11.5	96.3	9.5	10.2	91.6	10.3	8.9	85.6	11.1	7.7
	45	1.8	114.2	8.7	13.2	111.8	9.0	12.5	**105.8**	**9.7**	**10.9**	99.9	10.4	9.6	93.9	11.3	8.3
	50	1.8	124.9	8.9	14.1	122.5	9.2	13.4	116.5	9.9	11.8	109.4	10.6	10.3	103.5	11.5	9.0
	55	1.8	135.6	9.2	14.8	133.2	9.5	14.0	126.1	10.1	12.5	120.1	10.9	11.0	113.0	11.7	9.6
013	30	1.8	112.4	11.1	10.2	108.8	11.6	9.4	103.9	12.5	8.3	97.9	13.7	7.1	91.9	15.0	6.1
	35	1.8	125.7	11.4	11.1	122.1	11.8	10.3	116.0	12.9	9.0	110.0	14.0	7.8	102.7	15.3	6.7
	40	1.8	140.2	11.6	12.1	136.6	12.1	11.3	130.5	13.1	10.0	123.3	14.2	8.7	116.0	15.6	7.4
	45	1.8	155.9	12.0	13.0	152.3	12.4	12.2	**145.0**	**13.4**	**10.8**	136.6	14.6	9.4	129.3	15.9	8.1
	50	1.8	171.6	12.3	13.9	168.0	12.8	13.2	159.5	13.8	11.5	152.3	15.0	10.2	142.6	16.3	8.8
	55	1.8	188.6	12.6	14.9	184.9	13.2	14.0	176.5	14.1	12.5	166.8	15.3	10.9	157.1	16.7	9.4
016	30	1.8	154.7	16.1	9.6	150.9	16.8	9.0	143.4	18.3	7.8	136.0	20.1	6.8	128.5	21.9	5.9
	35	1.8	170.9	16.4	10.4	165.9	17.1	9.7	158.4	18.5	8.5	149.7	20.3	7.4	140.9	22.2	6.3
	40	1.8	187.1	16.7	11.2	183.3	17.4	10.6	174.6	18.9	9.2	165.9	20.7	8.0	155.9	22.6	6.9
	45	1.8	205.8	17.0	12.1	200.8	17.7	11.3	**192.1**	**19.3**	**10.0**	182.1	21.0	8.7	170.9	22.9	7.5
	50	1.8	225.8	17.4	13.0	220.8	18.1	12.2	209.5	19.6	10.7	199.6	21.4	9.3	187.1	23.3	8.0
	55	1.8	247.0	17.8	13.8	242.0	18.5	13.0	229.5	20.1	11.4	218.3	21.9	10.0	205.8	23.7	8.7
020	30	1.8	178.1	17.3	10.3	174.5	18.0	9.7	165.0	19.7	8.4	155.4	21.5	7.2	145.8	23.4	6.2
	35	1.8	196.0	17.7	11.1	191.3	18.4	10.4	181.7	20.1	9.0	170.9	21.9	7.8	160.2	23.9	6.7
	40	1.8	215.2	18.1	11.9	210.4	18.8	11.2	198.4	20.6	9.6	187.7	22.5	8.4	175.7	24.4	7.2
	45	1.8	235.5	18.5	12.7	229.5	19.4	11.9	**217.6**	**21.0**	**10.4**	205.6	22.9	9.0	192.5	24.9	7.7
	50	1.8	255.8	19.1	13.4	249.8	19.9	12.6	236.7	21.5	11.0	223.5	23.4	9.6	210.4	25.4	8.3
	55	1.8	278.5	19.6	14.2	271.4	20.4	13.3	257.0	22.0	11.7	242.7	24.0	10.1	228.3	26.1	8.8
025	30	2.7	238.0	23.4	10.2	233.1	24.3	9.6	220.9	26.5	8.3	207.4	28.7	7.2	193.9	31.3	6.2
	35	2.7	262.6	23.9	11.0	256.5	24.9	10.3	243.0	27.0	9.0	229.5	29.4	7.8	214.7	32.0	6.7
	40	2.7	288.4	24.4	11.8	281.0	25.5	11.0	267.5	27.7	9.7	251.5	30.0	8.4	235.6	32.6	7.2
	45	2.7	315.4	25.1	12.6	308.0	26.1	11.8	**292.0**	**28.2**	**10.4**	276.1	30.7	9.0	258.9	33.4	7.8
	50	2.7	344.8	25.8	13.3	336.2	26.8	12.5	319.0	29.0	11.0	300.6	31.3	9.6	282.2	34.0	8.3
	55	2.7	374.3	26.5	14.1	365.7	27.6	13.3	347.3	29.7	11.7	327.6	32.1	10.2	308.0	34.9	8.8
028	30	2.7	261.5	26.9	9.7	255.3	28.0	9.1	241.8	30.3	8.0	227.0	33.0	6.9	212.2	35.9	5.9
	35	2.7	288.6	27.6	10.5	281.2	28.7	9.8	266.4	31.1	8.6	250.4	33.8	7.4	234.4	36.6	6.4
	40	2.7	315.8	28.3	11.1	308.4	29.4	10.5	292.3	31.9	9.2	275.1	34.5	8.0	257.8	37.5	6.9
	45	2.7	345.4	29.1	11.9	336.7	30.2	11.1	**319.5**	**32.6**	**9.8**	302.2	35.4	8.5	282.5	38.4	7.4
	50	2.7	376.2	30.0	12.5	367.6	31.1	11.8	349.1	33.5	10.4	329.3	36.3	9.1	308.4	39.3	7.8
	55	2.7	409.5	30.9	13.3	399.7	32.0	12.5	378.7	34.4	11.0	357.7	37.2	9.6	335.5	40.3	8.3
033	30	2.7	307.8	30.9	10.0	300.8	32.3	9.3	285.7	35.4	8.1	269.5	38.8	7.0	253.2	42.3	6.0
	35	2.7	339.2	31.8	10.7	331.0	33.1	10.0	313.6	36.2	8.7	296.2	39.6	7.5	278.8	43.3	6.4
	40	2.7	371.7	32.6	11.4	362.4	34.0	10.7	343.8	37.2	9.2	325.2	40.5	8.0	305.5	44.3	6.9
	45	2.7	405.4	33.6	12.1	396.1	35.0	11.3	**376.3**	**38.1**	**9.9**	355.4	41.6	8.5	334.5	45.4	7.4
	50	2.7	441.4	34.6	12.8	430.9	36.0	12.0	410.0	39.2	10.5	387.9	42.7	9.1	364.7	46.5	7.8
	55	2.7	479.7	35.7	13.5	468.1	37.1	12.6	444.8	40.3	11.0	420.5	43.8	9.6	394.9	47.7	8.3
039	30	2.7	382.2	42.1	9.1	372.8	43.8	8.5	353.0	47.6	7.4	330.9	51.6	6.4	306.4	55.8	5.5
	35	2.7	420.6	43.2	9.7	410.1	45.0	9.1	388.0	48.9	7.9	363.5	53.1	6.9	337.9	57.4	5.9
	40	2.7	460.2	44.6	10.3	448.6	46.4	9.7	424.1	50.3	8.4	398.5	54.5	7.3	370.5	59.0	6.3
	45	2.7	501.0	46.0	10.9	488.2	47.9	10.2	**462.6**	**51.8**	**8.9**	434.6	56.2	7.7	405.5	60.6	6.7
	50	2.7	544.1	47.6	11.4	531.3	49.4	10.8	502.2	53.4	9.4	473.0	57.8	8.2	440.4	62.5	7.1
	55	2.7	590.7	49.2	12.0	575.6	51.1	11.3	544.1	55.1	9.9	511.5	59.6	8.6	477.7	64.3	7.4

NOTES:

1. Ratings based on R-407C, and sea level altitude.
2. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
3. KWi and EER are for the entire unit, including compressors, fan motors and control power.
4. Rated in accordance with ARI Standard 365-2002.

Table 3, R-407C, SI, 60 Hz

ACZ Unit Size	Suction Dewpoint Temp (C)	Fan & Control Power (kW)	Ambient Air Temperature (F)														
			24°C			30°C			35°C			41°C			47°C		
			Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP
010	-1	1.8	25.1	7.6	3.3	23.9	8.3	2.9	22.7	8.8	2.6	21.3	9.6	2.2	19.8	10.5	1.9
	2	1.8	27.9	7.8	3.6	26.6	8.4	3.2	25.3	9.0	2.8	23.8	9.8	2.4	22.2	10.7	2.1
	5	1.8	30.9	7.9	3.9	29.5	8.6	3.4	28.0	9.2	3.0	26.4	10.0	2.6	24.7	10.9	2.3
	8	1.8	34.1	8.1	4.2	32.5	8.8	3.7	**31.0**	**9.4**	**3.1**	29.2	10.2	2.9	27.4	11.1	2.5
	11	1.8	37.5	8.4	4.5	35.7	9.0	4.0	34.1	9.6	3.6	32.2	10.4	3.1	30.2	11.3	2.7
	13	1.8	39.9	8.5	4.7	38.0	9.1	4.2	36.3	9.7	3.7	34.2	10.6	3.2	32.1	11.5	2.8
013	-1	1.8	32.8	10.2	3.2	31.1	11.2	2.8	29.7	12.1	2.5	27.9	13.3	2.1	26.0	14.7	1.8
	2	1.8	37.1	10.5	3.5	35.3	11.4	3.1	33.7	12.4	2.7	31.7	13.6	2.3	29.5	15.0	2.0
	5	1.8	41.7	10.8	3.8	39.7	11.8	3.4	37.9	12.7	3.0	35.8	13.9	2.6	33.4	15.3	2.2
	8	1.8	46.6	11.2	4.1	44.4	12.2	3.6	**42.5**	**13.0**	**3.1**	40.1	14.2	2.8	37.4	15.6	2.4
	11	1.8	51.8	11.6	4.5	49.4	12.5	4.0	47.2	13.4	3.5	44.6	14.6	3.0	41.8	16.0	2.6
	13	1.8	55.3	11.9	4.7	52.8	12.8	4.1	50.5	13.6	3.7	47.7	14.8	3.2	44.8	16.3	2.7
016	-1	1.8	45.4	14.9	3.0	43.0	16.4	2.6	41.2	17.6	2.3	38.8	19.5	2.0	36.3	21.4	1.7
	2	1.8	50.5	15.3	3.3	47.9	16.6	2.9	45.8	18.0	2.5	43.2	19.8	2.2	40.5	21.7	1.9
	5	1.8	55.9	15.6	3.6	53.2	17.0	3.1	50.8	18.3	2.8	48.0	20.1	2.4	44.9	22.1	2.0
	8	1.8	61.9	15.9	3.9	58.7	17.3	3.4	**56.3**	**18.7**	**2.9**	53.2	20.5	2.6	49.7	22.5	2.2
	11	1.8	68.3	16.3	4.2	64.9	17.8	3.7	62.1	19.1	3.2	58.6	20.9	2.8	54.9	23.0	2.4
	13	1.8	72.7	16.6	4.4	69.2	18.1	3.8	66.2	19.3	3.4	62.5	21.3	2.9	58.4	23.2	2.5
020	-1	1.8	52.5	15.9	3.3	49.7	17.5	2.8	47.3	18.9	2.5	44.3	20.8	2.1	41.3	22.8	1.8
	2	1.8	58.1	16.3	3.6	55.1	17.9	3.1	52.5	19.4	2.7	49.3	21.3	2.3	46.0	23.3	2.0
	5	1.8	64.2	16.8	3.8	60.8	18.4	3.3	57.9	19.9	2.9	54.4	21.8	2.5	50.8	23.8	2.1
	8	1.8	70.6	17.3	4.1	66.9	18.9	3.5	**63.8**	**20.4**	**3.0**	59.9	22.2	2.7	55.9	24.4	2.3
	11	1.8	77.4	17.8	4.3	73.3	19.4	3.8	69.9	20.9	3.3	65.6	22.8	2.9	61.3	25.0	2.4
	13	1.8	82.0	18.1	4.5	77.8	19.8	3.9	74.1	21.3	3.5	69.6	23.2	3.0	65.0	25.4	2.6
025	-1	2.7	69.9	21.7	3.2	66.4	23.6	2.8	63.3	25.5	2.5	59.3	27.9	2.1	55.0	30.5	1.8
	2	2.7	77.6	22.2	3.5	73.7	24.2	3.0	70.2	26.1	2.7	65.9	28.5	2.3	61.3	31.3	2.0
	5	2.7	85.9	22.8	3.8	81.5	24.9	3.3	77.7	26.7	2.9	72.9	29.2	2.5	68.0	32.0	2.1
	8	2.7	94.6	23.5	4.0	89.8	25.5	3.5	**85.6**	**27.3**	**3.0**	80.4	29.9	2.7	75.0	32.7	2.3
	11	2.7	103.7	24.2	4.3	98.4	26.2	3.8	94.0	28.1	3.3	88.3	30.6	2.9	82.4	33.4	2.5
	13	2.7	110.1	24.8	4.4	104.5	26.7	3.9	99.6	28.6	3.5	93.7	31.2	3.0	87.5	33.9	2.6
028	-1	2.7	76.8	24.9	3.1	72.9	27.2	2.7	69.4	29.3	2.4	64.8	32.0	2.0	59.9	35.0	1.7
	2	2.7	85.1	25.7	3.3	80.8	27.9	2.9	77.0	30.1	2.6	72.1	32.8	2.2	66.8	35.9	1.9
	5	2.7	94.0	26.4	3.6	89.3	28.7	3.1	85.1	30.8	2.8	79.8	33.7	2.4	74.1	36.8	2.0
	8	2.7	103.4	27.3	3.8	98.2	29.5	3.3	**93.6**	**31.7**	**2.8**	87.8	34.5	2.5	81.7	37.7	2.2
	11	2.7	113.5	28.2	4.0	107.7	30.5	3.5	102.6	32.6	3.1	96.3	35.5	2.7	89.7	38.7	2.3
	13	2.7	120.3	28.9	4.2	114.1	31.1	3.7	108.8	33.2	3.3	102.1	36.1	2.8	95.2	39.3	2.4
033	-1	2.7	90.5	28.5	3.2	85.8	31.4	2.7	81.9	34.1	2.4	77.1	37.5	2.1	72.0	41.2	1.7
	2	2.7	100.2	29.4	3.4	95.2	32.3	2.9	90.8	34.9	2.6	85.5	38.4	2.2	79.9	42.2	1.9
	5	2.7	110.6	30.2	3.7	105.1	33.2	3.2	100.3	35.9	2.8	94.3	39.5	2.4	88.2	43.3	2.0
	8	2.7	121.5	31.2	3.9	115.5	34.2	3.4	**110.3**	**36.9**	**2.8**	103.8	40.5	2.6	97.0	44.5	2.2
	11	2.7	133.1	32.3	4.1	126.4	35.2	3.6	120.8	38.1	3.2	113.6	41.7	2.7	106.2	45.7	2.3
	13	2.7	141.0	33.1	4.3	134.0	36.1	3.7	128.0	38.8	3.3	120.4	42.5	2.8	112.6	46.6	2.4
039	-1	2.7	112.4	38.9	2.9	106.7	42.5	2.5	101.4	45.8	2.2	94.5	50.0	1.9	86.9	54.3	1.6
	2	2.7	124.4	40.1	3.1	117.9	43.8	2.7	112.2	47.1	2.4	104.8	51.4	2.0	96.6	55.9	1.7
	5	2.7	137.0	41.5	3.3	129.9	45.3	2.9	123.6	48.7	2.5	115.5	53.1	2.2	106.7	57.7	1.8
	8	2.7	150.4	42.9	3.5	142.5	46.8	3.0	**135.6**	**50.2**	**2.6**	126.8	54.7	2.3	117.4	59.5	2.0
	11	2.7	164.4	44.6	3.7	155.7	48.5	3.2	148.1	52.0	2.8	138.5	56.5	2.4	128.4	61.3	2.1
	13	2.7	174.0	45.7	3.8	164.8	49.6	3.3	156.7	53.1	2.9	146.6	57.7	2.5	135.9	62.7	2.2

NOTES:

1. Ratings based on R-407C and sea level altitude.
2. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
3. KWi and COP are for the entire unit, including compressors, fan motors and control power.

ACZ Part Load Data

Table 4, IP Units, 60Hz

R-407C Part Load Data

ACZ Unit Size	% Load	Outdoor Air Temp	Suct Dew Point Temp (°F)	Cap. Mbh	Power kWi	EER	IPLV
010B	100	95.0	45.0	105.8	9.7	10.9	**13.0**
	100	80.0	50.0	123.7	9.0	13.8	
	53	80.0	50.0	63	4.2	12.5	
013B	100	95.0	45.0	145.0	13.4	10.8	**13.4**
	100	80.0	50.0	169.8	12.5	13.6	
	53	80.0	50.0	87	6.5	13.3	
016B	100	95.0	45.0	192.1	19.3	10.0	**13.0**
	100	80.0	50.0	223.3	17.7	12.6	
	53	80.0	50.0	116	8.6	13.4	
020B	100	95.0	45.0	217.6	21.0	10.4	**13.5**
	100	80.0	50.0	252.8	19.4	13.0	
	53	80.0	50.0	132	9.5	13.9	
025B	100	95.0	45.0	292.0	28.2	10.4	**13.6**
	100	80.0	50.0	340.5	26.4	12.9	
	53	80.0	50.0	177	12.6	14.0	
028B	100	95.0	45.0	319.5	32.6	9.8	**13.0**
	100	80.0	50.0	371.9	30.5	12.2	
	53	80.0	50.0	197	14.7	13.4	
033B	100	95.0	45.0	376.3	38.1	9.9	**13.2**
	100	80.0	50.0	436.2	35.2	12.4	
	53	80.0	50.0	231	16.7	13.8	
039B	100	95.0	45.0	462.6	51.8	8.9	**12.2**
	100	80.0	50.0	537.7	48.4	11.1	
	53	80.0	50.0	285	21.9	13.0	

NOTES:
1. Certified according to ARI Standard 365-2002.
2. The 100 percent load, 95°F, performance data is for information only and is not a factor in calculating a condensing unit IPLV.

AGZ Chiller Selection Procedure

Packaged Chiller, Model BS

Selection with Inch-Pound (I-P) units

Table 13 and Table 14 cover the range of leaving evaporator water temperatures and outside ambient temperatures included under ARI Standard 550/590-2003. The tables are based on a 10 degree F (5.5 degree C) temperature drop through the evaporator. Adjustment factors for applications having other than a 10 degree F (5.5 degree C) drop can be found in Table 7. The minimum leaving chilled water temperature setpoint without glycol is 40°F (4°C). For brine selections, see Table 5 through Table 6 for glycol adjustment factors. Ratings are based on a 0.0001 ft^2 x hr x °F/Btu fouling factor in the evaporator at sea level operation. For other fouling factors, different Delta-Ts, or altitude correction factors see Table 7. For applications outside the catalog ratings contact your local McQuay sales representative.

Selection example

- 20 tons minimum requirement
- 95°F ambient temperature
- 48 gpm, 54°F to 44°F chilled water
- 0.0001 evaporator fouling factor

1. From Table 13, an AGZ 020B at the given conditions will produce 21.5 tons with a unit kW input of 29.0 and a unit EER of 8.9.
2. Use the following formula to calculate any unknown elements.

$$\frac{tons \times 24}{°F} = \text{gpm} \qquad \text{(water only)}$$

3. Determine the evaporator pressure drop. Using Figure 7 on page, enter at 48 gpm and follow up to the AGZ 020B line intersect. Read horizontally to obtain an evaporator pressure drop of 5.9 feet of water. Note the allowable minimum and maximum flows.

Selection example using ethylene glycol

- 20 tons minimum requirement
- 95°F ambient air temperature
- 54°F - 44°F chilled water temperature
- 0.0001 evaporator fouling factor
- Protect from freezing down to 0°F

1. From Table 5, select an ethylene glycol concentration of 40% to protect against freezing at 0°F.
2. At 40% ethylene glycol, the adjustment factors are: Capacity =0.980, kW = 0.992, GPM = 1.132, pressure drop = 1.557
3. Select the AGZ 020B from Table 13 and correct with 40% ethylene glycol factors.
4. Correct capacity = 0.980 X 21.5 tons = 21.1 tons
5. Correct compressor kW = 0.992 X 29.0 kW = 28.8 kW
6. Calculate chilled water flow:

$$\text{Water flow (at corrected capacity)} = \frac{20.0\,tons \times 24}{10°F} = 48\ \text{gpm}$$

Glycol flow (at 40% solution) = 1.132 X 48.0 gpm = 54.3 gpm

Determine the evaporator pressure drop. Using Figure 7, enter at 20 gpm (water) and follow up to the AGZ 020B line intersect. Read horizontally to obtain an evaporator pressure drop of 5.9 feet. Correct the pressure drop for 40% solution = 1.557 x 5.9 feet = 9.2 feet for ethylene glycol.

Selection example, SI Units

The selection procedure for Metric units is identical to English except that metric data and tables are used.

Remote Evaporator, Model BM

Inch-Pound (I-P) Units

Since the AGZ-BM units always include a specific remote evaporator, packaged chiller ratings are used. The ratings are based on leaving chilled water temperature and ambient air temperature with correction for the effect of the interconnecting refrigerant piping.

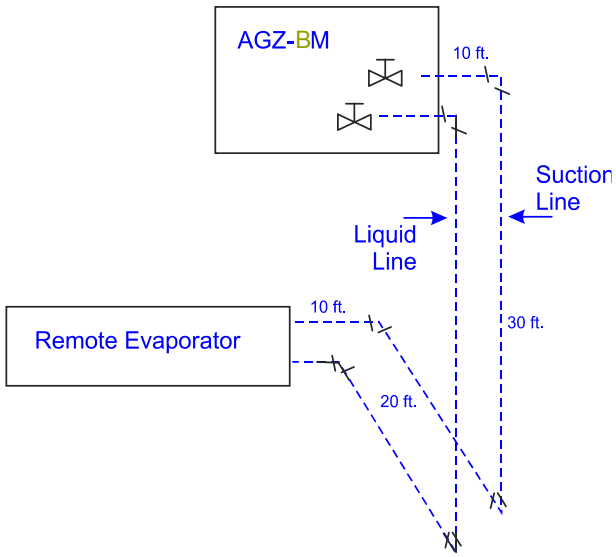
Table 13 and Table 14 cover the range of leaving evaporator water temperatures and outside ambient temperatures included under ARI 550/590-2003. The tables are based on a 10-degree F (5.5-degree C) temperature drop through the evaporator. Adjustment factors for applications having other than a 10-degree F (5.5-degree C) drop can be found in Table 7. The minimum leaving chilled water temperature setpoint without glycol is 40°F (4°C). For brine selections, see Table 5 or Table 6 for glycol adjustment factors. Ratings are based on a 0.0001 ft^2 x hr x °F/Btu fouling factor in the evaporator at sea level operation. For other fouling factors, different Delta-Ts, or altitude correction factors see Table 7. For applications outside the catalog ratings, contact your local McQuay sales representative.

The length and configuration of the field installed interconnecting refrigerant piping will affect the system capacity. Derates based on equivalent length of line are given in Table 12.

The steps for selecting an AGZ-BM are as follows:

1. Add 3% to the required cooling capacity (to approximate the effect of the correction factors to be determined) and make a preliminary unit selection from Table 13 and Table 14.
2. Divide the required capacity by the appropriate capacity correction factors: glycols from Table 5 or Table 6, altitude, chilled water Delta T, or fouling factor from Table 7, and refrigerant piping derate from Table 12 as explained in step 3 below.
3. Determine the suction line size by first summing the equivalent feet (from table 10) of all the fittings (use a sketch of the piping layout) and adding the sum of these fitting losses to the actual linear feet of tubing. This will equal the total equivalent feet. (To use the equivalent feet table 10, start with the unit suction connection size from table 13 and correct if required.)
4. If the unit rated capacity in the tables is less than the corrected required capacity, redo the selection with the next larger unit. In most cases the line size will be the unit connection size. If the selection is satisfactory, correct the power (if applicable) and determine water pressure drop. Selection example

Figure 6, Sample Piping Layout



English Units

Given:

- 20 tons required capacity
- 95°F ambient temperature
- Cool 48 gpm from 54°F to 44°F
- 0.0001 evaporator fouling factor

- 2,000 foot altitude

1. Add 3% to the required capacity for approximate derate: 20 x 1.03 = 20.6 tons. From Table 13 an AGZ-020B at the given conditions will produce 21.5 tons with a unit kW input of 29.0 and a unit EER of 8.9.
2. Determine derate factors:

   Altitude correction from Table 7:

   0.998 Capacity, 1.009 Power
3. Piping correction:

   Assume 1 5/8" suction line based on line size in Table 11.

   (3) 90° Standard ells 3 x 4 ft =12 ft

   Plus actual linear feet 70 ft

   Total Equivalent Feet 82 ft

   This puts it between 1 5/8" and 2 1/8" line size.

   Check Table 9 and find that 1 5/8" is maximum size for oil carry.

   This means that the 1 5/8 riser will be satisfactory, but with a slightly higher pressure drop.

   The capacity correction factor from Table 12 is between 0.97 and 0.98. Use 0.975.
4. The corrected capacity of the AGZ is: 21.5 tons x 0.998{altitude} x 0.98{piping} = 21.0 tons This satisfies the 20 ton requirement.
5. Correct the unit power required: 29.0 kW x 1.009{altitude} = 29.3 kW.
6. Calculate the unit EER based on the correct capacity and power:

   EER = (21 tons x 12,000)/ (29.3 kW x 1,000) = 8.6
7. Determine the evaporator pressure drop. Enter the pressure drop curves, (Figure 7) at 48 gpm and read up to AGZ 020, read over to pressure drop of 5.9 ft.

Selection example, SI Units

The selection procedure for Metric units is identical to English except that metric data and tables are used.

Application Adjustment Factors

Ethylene and Propylene Glycol Factors

AGZ units can operate with a leaving chilled fluid temperature range of 20°F (-6°C) to 60°F (10°C). A glycol solution is required when leaving chilled fluid temperature is below 40°F (4.6°C). The use of glycol will reduce the performance of the unit depending on concentration.

Altitude Correction Factors

Performance tables are based at sea level. Elevations other than sea level affect the performance of the unit. The decreased air density will reduce condenser capacity consequently reducing the unit's performance. For performance at elevations other than sea level refer to Table 7.

Evaporator Temperature Drop Factors

Performance tables are based on a 10°F (5°C) temperature drop through the evaporator. Adjustment factors for applications with temperature ranges from 6°F to 16°F (3.3°C to 8.9°C) are in Table 3. Temperature drops outside this 6°F to 16°F (3.3°C to 8.9°C) range can affect the control system's capability to maintain acceptable control and are not recommended.

The maximum water temperature that can be circulated through the evaporator in a non-operating mode is 100°F (37.8°C).

Table 5, Ethylene Glycol Factors

% E.G.	Freeze Point		Capacity	Power	Flow	PD
	°F	°C				
10	26	-3.3	0.998	0.998	1.036	1.097
20	18	-7.8	0.993	0.997	1.060	1.226
30	7	-13.9	0.987	0.995	1.092	1.369
40	-7	-21.7	0.980	0.992	1.132	1.557
50	-28	-33.3	0.973	0.991	1.182	1.791

Table 6, Propylene Glycol Factors

% P.G.	Freeze Point		Capacity	Power	Flow	PD
	°F	°C				
10	26	-3.3	0.995	0.997	1.016	1.100
20	19	-7.2	0.987	0.995	1.032	1.211
30	9	-12.8	0.978	0.992	1.057	1.380
40	-5	-20.6	0.964	0.987	1.092	1.703
50	-27	-32.8	0.952	0.983	1.140	2.251

NOTE: Ethylene and propylene glycol ratings are outside the scope of ARI Standard 550/590-2003 certification program.

Fouling Factor

Performance tables are based on water with a fouling factor of
$0.0001 ft^2 \times hr \times °F / BTU \quad or \quad (0.0176 m^2 \times °C / kW)$ per ARI 550/590-2003.

As fouling is increased, performance decreases. For performance at other than 0.0001 (0.0176) fouling factor refer to Table 7. Foreign matter in the chilled water system will adversely affect the heat transfer capability of the evaporator and could increase the pressure drop and reduce the water flow. Maintain proper water treatment to provide optimum unit operation.

Table 7, Capacity and Power Derates

Altitude	Chilled Water Delta T		Fouling Factor							
			0.0001 (0.0176)		0.00025 (0.044)		0.00075 (0.132)		0.00175 (0.308)	
	°F	°C	Cap.	Power	Cap.	Power	Cap.	Power	Cap.	Power
Sea Level	6	3.3	0.978	0.993	0.975	0.991	0.963	0.987	0.940	0.980
	8	4.4	0.989	0.996	0.986	0.994	0.973	0.990	0.950	0.983
	10	5.6	1.000	1.000	0.996	0.999	0.984	0.994	0.961	0.987
	12	6.7	1.009	1.003	1.005	1.001	0.993	0.997	0.969	0.990
	14	7.7	1.018	1.004	1.014	1.003	1.002	0.999	0.978	0.991
	16	8.9	1.025	1.007	1.021	1.006	1.009	1.001	0.985	0.994
2000 feet	6	3.3	0.977	1.001	0.973	1.000	0.961	0.996	0.938	0.989
	8	4.4	0.987	1.006	0.984	1.004	0.971	1.000	0.948	0.993
	10	5.6	0.998	1.009	0.995	1.007	0.982	1.003	0.959	0.996
	12	6.7	1.007	1.011	1.004	1.010	0.991	1.006	0.967	0.998
	14	7.7	1.014	1.014	1.011	1.013	0.998	1.009	0.974	1.001
	16	8.9	1.022	1.016	1.018	1.014	1.005	1.010	0.981	1.003
4000 feet	6	3.3	0.973	1.011	0.970	1.010	0.957	1.006	0.935	0.998
	8	4.4	0.984	1.014	0.980	1.013	0.968	1.009	0.945	1.001
	10	5.6	0.995	1.019	0.991	1.017	0.979	1.013	0.955	1.005
	12	6.7	1.004	1.021	1.000	1.020	0.987	1.016	0.964	1.008
	14	7.7	1.011	1.024	1.007	1.023	0.994	1.018	0.971	1.011
	16	8.9	1.018	1.027	1.014	1.026	1.002	1.021	0.978	1.014
6000 feet	6	3.3	0.969	1.021	0.966	1.020	0.954	1.016	0.931	1.008
	8	4.4	0.980	1.026	0.977	1.024	0.964	1.020	0.942	1.013
	10	5.6	0.989	1.029	0.986	1.027	0.973	1.023	0.950	1.015
	12	6.7	0.998	1.033	0.995	1.031	0.982	1.027	0.959	1.020
	14	7.7	1.007	1.036	1.004	1.034	0.991	1.030	0.967	1.022
	16	8.9	1.014	1.037	1.011	1.036	0.998	1.031	0.974	1.024

Table 8, Equivalent Feet for Fittings

Fitting Type	7/8	1 1/8	1 3/8	1 5/8	2 1/8	2 5/8	3 1/8
Elbows							
90° Standard	2.0	2.6	3.3	4.0	5.0	6.0	7.5
90° Long Radius	1.4	1.7	2.3	2.6	3.3	4.1	5.0
90° Street	3.2	4.1	5.6	6.3	8.2	10	12
45° Standard	0.9	1.3	1.7	2.1	2.6	3.2	4.0
45° Street	1.5	2.1	3.0	3.4	4.5	5.2	6.4
180° Bend	3.2	4.1	5.6	6.3	8.2	10	12
Tees							
Full Size	1.4	1.7	2.3	2.6	3.3	4.1	5.0
Reducing	2.0	2.6	3.3	4.0	5.0	6.0	7.5
Valves							
Globe Valve, Open	22	29	38	43	55	69	84
Gate Valve, Open	0.9	1.0	1.5	1.8	2.3	2.8	3.2
Angle Valve, Open	9.0	12	15	18	24	29	35

Table 9, Maximum Line Size (R-407C) For Oil Carry Up a Suction Riser

Unit Size	AGZ	AGZ	AGZ	AGZ	AGZ	AGZ	AGZ

	010	013	017	020	025	029	034
Line Size	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8

Table 10, Recommended Liquid Line Size, R-407C

AGZ-BM Unit Model	Connection Size At Unit	Recommended Liquid Line Size				
		Up to 50 Equiv. Ft	Up to 75 Equiv. Ft	Up to 100 Equiv. Ft	Up to 125 Equiv. Ft	Up to 150 Equiv. Ft
AGZ 01	7/8"	7/8 "	7/8 "	7/8 "	7/8 "	7/8 "
AGZ 013	7/8"	7/8 "	7/8 "	7/8 "	7/8 "	7/8 "
AGZ 016	7/8"	7/8 "	7/8 "	7/8 "	7/8 "	7/8 "
AGZ 020	7/8"	7/8 "	7/8 "	7/8 "	7/8 "	**1 1/8 "**
AGZ 025	7/8"	7/8 "	7/8 "	7/8 "	**1 1/8 "**	**1 1/8 "**
AGZ 029	7/8"	7/8 "	7/8 "	**1 1/8 "**	**1 1/8 "**	**1 1/8 "**
AGZ 034	7/8"	7/8 "	**1 1/8 "**	**1 1/8 "**	**1 1/8 "**	**1 1/8 "**

Table 11, Recommended Suction Line Size, R-407C

Unit Model	Connection Size At Unit	Recommended Suction Line Sizes				
		Up to 50 Equiv. Ft	Up to 75 Equiv. Ft	Up to 100 Equiv. Ft	Up to 125 Equiv. Ft	Up to 150 Equiv. Ft
AGZ 010AM	1 1/8"	**1 1/8"**	1 3/8"	1 3/8"	**1 5/8"**	**1 5/8"**
AGZ 013AM	1 1/8"	1 3/8"	**1 5/8"**	**1 5/8"**	**1 5/8"**	**1 5/8"**
AGZ 016AM	1 5/8"	**1 5/8"**	**1 5/8"**	**1 5/8"**	2 1/8"	2 1/8"
AGZ 020AM	1 5/8"	**1 5/8"**	**1 5/8"**	2 1/8"	2 1/8"	2 1/8"
AGZ 025AM	1 5/8"	**1 5/8"**	2 1/8"	2 1/8"	2 1/8"	2 1/8"
AGZ 029AM	2 1/8"	2 1/8"	2 1/8"	2 1/8"	2 1/8"	**2 5/8"**
AGZ 034AM	2 1/8"	2 1/8"	2 1/8"	**2 5/8"**	**2 5/8"**	**2 5/8"**

Note: For horizontal and vertical downflow only.

Table 12, Refrigerant Piping Derates

Unit Model	Capacity Loss Factor Due to Refrigerant Piping					
	At Unit	50 Equiv. Ft	75 Equiv. Ft	100 Equiv. Ft	125 Equiv. Ft	150 Equiv. Ft
AGZ 010AM	1.0	0.98	0.98	0.97	**0.98**	**0.97**
AGZ 013AM	1.0	0.98	**0.98**	**0.98**	**0.97**	**0.96**
AGZ 016AM	1.0	**0.99**	**0.98**	**0.98**	0.99	0.98
AGZ 020AM	1.0	**0.98**	**0.97**	0.98	0.98	0.97
AGZ 025AM	1.0	**0.98**	0.99	0.99	0.98	0.97
AGZ 029AM	1.0	0.99	0.98	0.97	0.96	**0.98**
AGZ 034AM	1.0	0.99	0.98	**0.98**	**0.97**	**0.97**

AGZ Chiller Performance Data

Table 13, Performance Data, R-407C, IP Units, 60 Hz

AGZ Unit Size	Fan & Control Power (kW)	LWT (F)	Ambient Air Temperature (F)														
			75			85			95			105			115		
			Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER
010	2.3	42	10.2	10.8	11.4	9.8	11.7	10.1	9.4	12.8	8.8	9.0	14.1	7.7	8.5	15.4	6.6
		44	10.7	10.9	11.8	10.2	11.8	10.4	**9.8**	**12.9**	**9.1**	9.4	14.2	8.0	8.9	15.5	6.9
		46	11.1	11.0	12.2	10.7	11.9	10.8	10.2	13.0	9.4	9.7	14.3	8.2	9.3	15.7	7.1
		48	11.5	11.1	12.5	11.1	12.0	11.1	10.6	13.1	9.7	10.1	14.4	8.4	9.6	15.8	7.3
		50	12.0	11.1	13.0	11.5	12.1	11.4	11.0	13.2	10.0	10.5	14.5	8.7	10.0	15.9	7.5
013	2.3	42	14.0	14.7	11.5	13.5	16.0	10.1	12.9	17.5	8.9	12.3	19.2	7.7	11.7	21.0	6.7
		44	14.6	14.9	11.8	14.0	16.2	10.4	**13.4**	**17.7**	**9.1**	12.8	19.4	7.9	12.2	21.2	6.9
		46	15.2	14.9	12.2	14.5	16.3	10.7	13.9	17.8	9.4	13.3	19.5	8.2	12.6	21.4	7.1
		48	15.7	15.1	12.4	15.2	16.5	11.0	14.4	18.0	9.6	13.7	19.8	8.3	13.1	21.6	7.3
		50	16.3	15.2	12.8	15.7	16.6	11.3	15.0	18.1	9.9	14.2	19.9	8.6	13.5	21.7	7.5
017	2.3	42	16.2	17.0	11.4	15.6	18.5	10.1	14.9	20.2	8.8	14.2	22.1	7.7	13.5	24.3	6.7
		44	16.9	17.1	11.8	16.2	18.7	10.4	**15.5**	**20.4**	**9.1**	14.8	22.3	8.0	14.0	24.5	6.9
		46	17.4	17.2	12.1	16.7	18.7	10.7	16.0	20.5	9.3	15.3	22.5	8.1	14.5	24.6	7.1
		48	18.0	17.4	12.4	17.4	18.9	11.0	16.6	20.7	9.6	15.8	22.7	8.3	15.0	24.9	7.2
		50	18.6	17.0	13.1	17.9	18.5	11.6	17.2	20.2	10.2	16.4	22.1	8.9	15.6	24.3	7.7
020	3.2	42	21.2	22.2	11.5	20.4	24.2	10.1	19.5	26.4	8.9	18.6	28.9	7.7	17.7	31.7	6.7
		44	22.0	22.4	11.8	21.1	24.4	10.4	**20.2**	**26.6**	**9.1**	19.3	29.2	7.9	18.3	32.0	6.9
		46	22.7	22.5	12.1	21.9	24.5	10.7	20.9	26.8	9.3	19.9	29.4	8.1	18.9	32.2	7.0
		48	23.6	22.8	12.4	22.7	24.8	11.0	21.7	27.1	9.6	20.7	29.7	8.4	19.7	32.6	7.2
		50	24.4	23.1	12.7	23.4	25.1	11.2	22.4	27.5	9.8	21.4	30.1	8.5	20.3	33.0	7.4
025	3.2	42	23.3	24.4	11.5	22.4	26.5	10.2	21.5	29.0	8.9	20.5	31.7	7.7	19.5	34.9	6.7
		44	24.2	24.6	11.8	23.2	26.8	10.4	**22.2**	**29.3**	**9.1**	21.3	32.2	7.9	20.2	35.2	6.9
		46	25.1	25.0	12.1	24.1	27.1	10.7	23.0	29.6	9.3	21.9	32.5	8.1	20.9	35.6	7.0
		48	25.9	25.2	12.4	24.9	27.5	10.9	23.8	30.0	9.5	22.7	32.8	8.3	21.6	36.0	7.2
		50	27.0	25.5	12.7	26.0	27.7	11.3	24.8	30.3	9.8	23.6	33.2	8.5	22.4	36.3	7.4
029	3.2	42	28.5	29.9	11.5	27.4	32.4	10.1	26.2	35.5	8.9	25.0	38.7	7.8	23.8	42.6	6.7
		44	29.6	30.1	11.8	28.4	32.8	10.4	**27.2**	**35.8**	**9.1**	25.9	39.2	7.9	24.7	43.0	6.9
		46	30.7	30.5	12.1	29.4	33.2	10.6	28.1	36.2	9.3	26.9	39.6	8.1	25.5	43.5	7.0
		48	31.6	30.7	12.4	30.5	33.5	10.9	29.1	36.6	9.5	27.8	40.0	8.3	26.4	44.0	7.2
		50	32.7	31.1	12.6	31.4	33.8	11.2	30.1	37.0	9.8	28.7	40.5	8.5	27.3	44.4	7.4
034	3.2	42	35.1	37.4	11.3	33.7	40.6	10.0	32.2	44.4	8.7	30.7	48.6	7.6	29.2	53.4	6.6
		44	36.3	37.7	11.5	34.9	41.1	10.2	**33.3**	**44.9**	**8.9**	31.7	49.2	7.7	30.2	53.9	6.7
		46	37.5	38.2	11.8	36.0	41.5	10.4	34.4	45.4	9.1	32.8	49.7	7.9	31.1	54.6	6.9
		48	38.8	38.5	12.1	37.3	42.0	10.6	35.6	45.9	9.3	33.9	50.2	8.1	32.2	55.2	7.0
		50	40.1	39.0	12.4	38.6	42.3	10.9	36.9	46.4	9.5	35.2	50.8	8.3	33.4	55.7	7.2

NOTES:
1. Ratings based on R-407C, evaporator fouling factor of 0.0001, evaporator water flow of 2.4 gpm/ton and sea level altitude.
2. KW input is for the entire unit including compressors, fan motors and control power.
3. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. For LWT below 40°F please refer to Application Considerations.
5. Use anti-freeze below 42.0°F.

SI Units

Table 14, Performance Data, R-407C, SI Units, 60 Hz

AGZ Unit Size	Fan & Control Power (kW)	LWT (C)	Ambient Air Temperature (C)														
			25			30			35			40			45		
			Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP	Unit kW	PWR kWi	Unit COP
010	2.3	6.0	35.9	10.8	3.3	34.7	11.7	3.0	33.2	12.8	2.6	31.9	14.1	2.3	30.6	15.4	2.0
		7.0	37.3	10.9	3.4	35.9	11.8	3.0	**34.5**	**12.9**	**2.7**	33.2	14.2	2.3	31.7	15.5	2.0
		8.0	38.7	11.0	3.5	37.4	11.9	3.1	35.8	13.0	2.7	34.4	14.3	2.4	32.9	15.7	2.1
		9.0	40.0	11.1	3.6	38.7	12.0	3.2	37.2	13.1	2.8	35.6	14.4	2.5	34.0	15.8	2.1
		10.0	41.5	11.1	3.7	40.1	12.1	3.3	38.4	13.2	2.9	36.8	14.5	2.5	35.3	15.9	2.2
013	2.3	6.0	49.2	14.7	3.3	47.5	16.0	3.0	45.6	17.5	2.6	43.8	19.2	2.3	41.9	21.0	2.0
		7.0	50.9	14.9	3.4	49.1	16.2	3.0	**47.2**	**17.7**	**2.7**	45.4	19.4	2.3	43.4	21.2	2.0
		8.0	52.8	14.9	3.5	50.9	16.3	3.1	48.8	17.8	2.7	46.8	19.5	2.4	44.8	21.4	2.1
		9.0	54.4	15.1	3.6	52.6	16.5	3.2	50.5	18.0	2.8	48.3	19.8	2.4	46.2	21.6	2.1
		10.0	56.2	15.2	3.7	54.3	16.6	3.3	52.1	18.1	2.9	49.9	19.9	2.5	47.7	21.7	2.2
017	2.3	6.0	56.7	17.0	3.3	54.8	18.5	3.0	52.5	20.2	2.6	50.5	22.1	2.3	48.3	24.3	2.0
		7.0	58.8	17.1	3.4	56.6	18.7	3.0	**54.5**	**20.4**	**2.7**	52.3	22.3	2.3	50.0	24.5	2.0
		8.0	60.4	17.2	3.5	58.4	18.7	3.1	55.9	20.5	2.7	53.7	22.5	2.4	51.4	24.6	2.1
		9.0	62.3	17.4	3.6	60.3	18.9	3.2	58.0	20.7	2.8	55.4	22.7	2.4	53.0	24.9	2.1
		10.0	64.4	17.0	3.8	62.3	18.5	3.4	59.7	20.2	3.0	57.3	22.1	2.6	54.8	24.3	2.3
020	3.2	6.0	74.4	22.2	3.4	71.8	24.2	3.0	68.8	26.4	2.6	66.0	28.9	2.3	63.3	31.7	2.0
		7.0	76.6	22.4	3.4	73.9	24.4	3.0	**71.0**	**26.6**	**2.7**	68.3	29.2	2.3	65.3	32.0	2.0
		8.0	79.1	22.5	3.5	76.3	24.5	3.1	73.3	26.8	2.7	70.3	29.4	2.4	67.2	32.2	2.1
		9.0	81.6	22.8	3.6	79.0	24.8	3.2	76.0	27.1	2.8	72.7	29.7	2.4	69.4	32.6	2.1
		10.0	84.2	23.0	3.7	81.3	25.1	3.2	78.0	27.5	2.8	74.8	30.1	2.5	71.6	33.0	2.2
025	3.2	6.0	81.8	24.4	3.3	78.9	26.5	3.0	75.7	29.0	2.6	72.8	31.7	2.3	69.6	34.9	2.0
		7.0	84.4	24.6	3.4	81.4	26.8	3.0	**78.2**	**29.3**	**2.7**	75.2	32.2	2.3	71.9	35.2	2.0
		8.0	87.2	25.0	3.5	84.2	27.1	3.1	80.8	29.6	2.7	77.6	32.5	2.4	74.1	35.6	2.1
		9.0	89.7	25.2	3.6	86.8	27.5	3.2	83.4	30.0	2.8	79.8	32.8	2.4	76.3	36.0	2.1
		10.0	93.3	25.5	3.7	90.1	27.7	3.3	86.5	30.3	2.9	82.8	33.2	2.5	79.3	36.3	2.2
029	3.2	6.0	99.9	29.8	3.4	96.5	32.6	3.0	92.5	35.5	2.6	88.9	38.9	2.3	85.0	42.7	2.0
		7.0	103.2	30.1	3.4	99.4	32.8	3.0	**95.6**	**35.8**	**2.7**	91.9	39.2	2.3	87.9	43.0	2.0
		8.0	106.6	30.4	3.5	102.9	33.2	3.1	98.7	36.2	2.7	94.7	39.7	2.4	90.7	43.5	2.1
		9.0	109.6	30.8	3.6	106.1	33.6	3.2	102.0	36.7	2.8	97.6	40.1	2.4	93.2	44.0	2.1
		10.0	113.1	31.0	3.6	109.3	33.8	3.2	104.8	37.0	2.8	100.5	40.4	2.5	96.2	44.4	2.2
034	3.2	6.0	122.9	37.9	3.2	118.6	41.3	2.9	113.8	45.1	2.5	109.3	49.4	2.2	104.6	54.2	1.9
		7.0	126.5	37.7	3.4	121.9	41.1	3.0	**117.2**	**44.9**	**2.6**	112.6	49.2	2.3	107.6	53.9	2.0
		8.0	130.2	38.7	3.4	125.7	42.2	3.0	120.6	46.1	2.6	115.7	50.5	2.3	110.7	55.4	2.0
		9.0	133.9	39.2	3.4	129.6	42.6	3.0	124.6	46.6	2.7	119.1	51.0	2.3	113.9	56.0	2.0
		10.0	138.6	39.6	3.5	133.9	43.1	3.1	128.4	47.1	2.7	123.2	51.6	2.4	117.9	56.6	2.1

NOTES:

1. Ratings based on R-407C, evaporator fouling factor of 0.0176, 5.6°C evaporator delta-T, and sea level altitude.
2. KW input is for the entire unit including compressors, fan motors and control power.
3. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. For LWT below 5.0°C please refer to Application Considerations.

AGZ Part Load Data

Table 15, R-22 and R-407C, IP Units, 60Hz

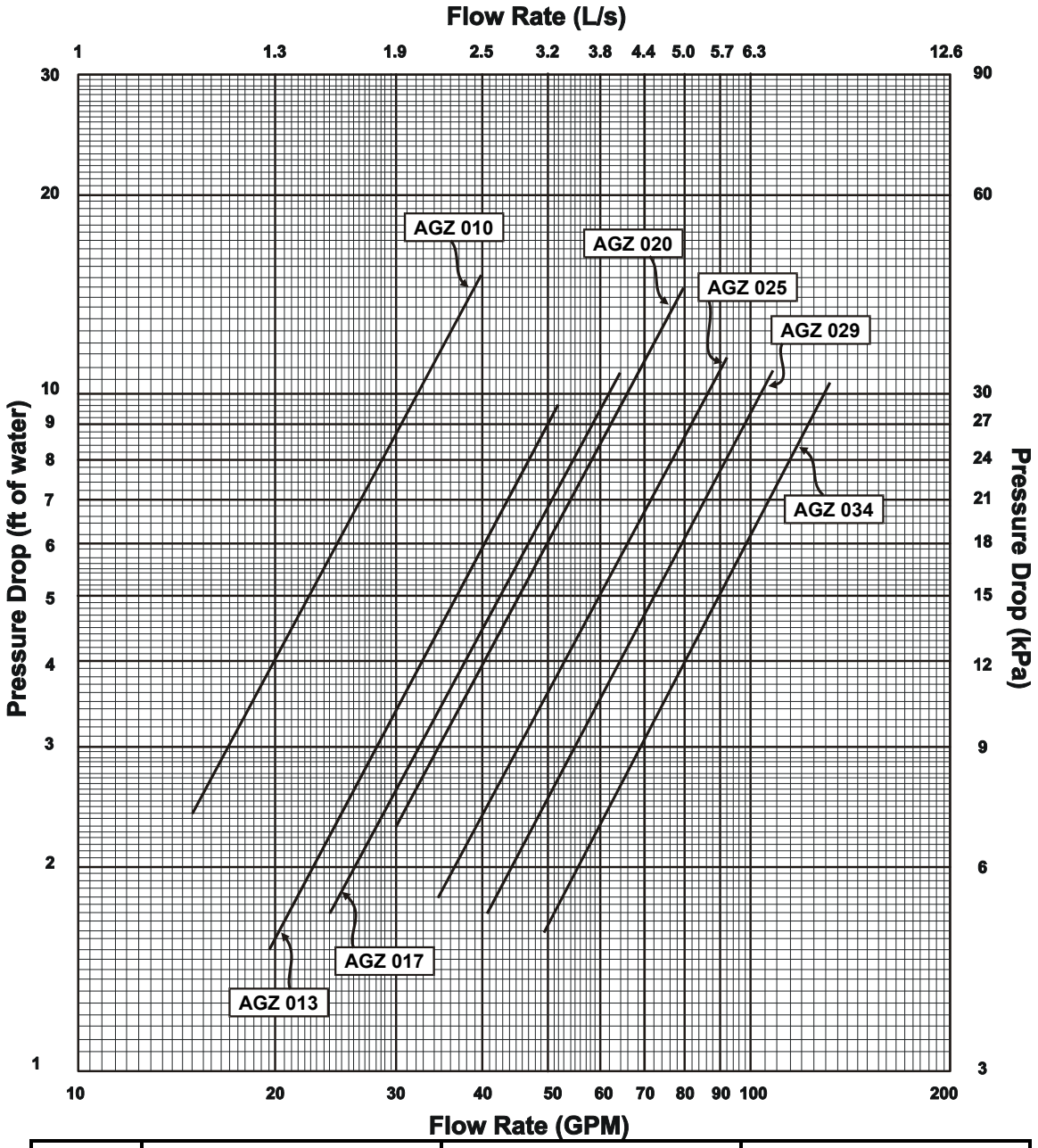
R-407C

AGZ Unit Size	% Load	Capacity Tons	Power kWi	EER	IPLV
010	100.0	9.8	12.9	9.1	**13.2**
	75.0	7.4	7.4	11.9	
	50.0	4.9	4.2	14.0	
	25.0	2.5	2.0	15.0	
013	100.0	13.4	17.7	9.1	**13.3**
	75.0	10.1	10.1	12.0	
	50.0	6.7	5.7	14.1	
	25.0	3.4	2.7	15.1	
017	100.0	15.5	20.4	9.1	**13.4**
	75.0	11.6	11.5	12.1	
	50.0	7.7	6.5	14.3	
	25.0	3.9	3.0	15.3	
020	100.0	20.2	26.6	9.1	**14.0**
	75.0	15.1	14.5	12.5	
	50.0	10.1	8.1	15.0	
	25.0	5.0	3.8	16.0	
025	100.0	22.2	29.3	9.1	**14.0**
	75.0	16.7	16.0	12.5	
	50.0	11.1	8.9	15.0	
	25.0	5.6	4.2	16.0	
029	100.0	27.2	35.8	9.1	**13.7**
	75.0	20.4	19.7	12.4	
	50.0	13.6	11.2	14.5	
	25.0	6.8	5.3	15.5	
034	100.0	33.3	44.9	8.9	**13.5**
	75.0	25.0	24.6	12.2	
	50.0	16.7	13.9	14.4	
	25.0	8.3	6.6	15.2	

NOTE: Certified according to ARI Standard 550/590-2003.

Pressure Drop Curves

Figure 7, AGZ 010B – 034B, Evaporator Pressure Drops



AGZ Unit Model	Minimum				Nominal				Maximum			
	Inch-Pound		S.I.		Inch-Pound		S.I.		Inch-Pound		S.I.	
	gpm	DP ft.	lps	DP kpa	gpm	DP ft.	lps	DP kpa	gpm	DP ft.	lps	DP kpa
AGZ 010B	15	2.3	0.9	6.9	24	5.7	1.5	17.0	39	14.8	2.5	44.1
AGZ 013B	20	1.6	1.3	4.8	32	4.0	2.0	11.9	53	10.5	3.3	31.3
AGZ 017B	24	1.7	1.5	5.1	38	4.3	2.4	12.8	64	11.2	4.0	33.4
AGZ 020B	31	2.6	1.9	7.7	49	6.2	3.1	18.5	82	16.3	5.2	48.6
AGZ 025B	34	2.0	2.2	6.0	55	4.8	3.5	14.3	91	12.7	5.7	37.8
AGZ 029B	43	2.2	2.7	6.6	68	5.3	4.3	15.8	113	14.1	7.1	42.0
AGZ 034B	51	2.2	3.2	6.6	82	5.3	5.2	15.8	136	14.2	8.6	42.3

Sound Data

AGZ/ACZ Units

Table 16, Sound Pressure, w/o Sound Insulation

AGZ Unit Model	ACZ Unit Model	Octave Band at Center Frequency								Overall A-Weighted
		63	125	250	500	1000	2000	4000	8000	
--	010B	52	52	52	54	48	46	44	42	55
010B	013B	52	52	52	54	48	46	44	42	55
013B	016B	53	54	54	55	48	47	45	42	56
017B	020B	58	56	55	53	52	50	48	48	57
020B	025B	58	57	56	54	52	50	48	48	58
025B	028B	58	58	56	55	52	50	48	48	58
029B	033B	59	59	61	58	54	53	51	50	61
034B	039B	61	62	63	59	55	54	53	51	63

Note: Data at:
1. 30 feet (9m) from side of unit.
2. Q=2, unit on a flat roof or ground with no adjacent wall.
3. Octave band readings are flat dB, overall is “A” weighted.

Table 17, Sound Power, w/o Sound Insulation

AGZ Unit Model	ACZ Unit Model	Octave Band at Center Frequency (per ARI Standard 370)								Overall A-Weighted
		63	125	250	500	1000	2000	4000	8000	
--	010B	79	79	79	81	75	73	71	69	82
010B	013B	79	79	79	81	75	73	71	69	82
013B	016B	80	81	81	82	75	74	72	69	83
017B	020B	85	83	82	80	79	77	75	75	84
020B	025B	85	84	83	81	79	77	75	75	85
025B	028B	85	85	83	82	79	77	75	75	85
029B	033B	86	86	88	85	81	80	78	77	88
034B	039B	88	89	90	86	82	81	80	78	90

Note: Octave band readings are flat dB, overall is “A” weighted.

Table 18, Sound Pressure w/ Sound Insulation

AGZ Unit Model	ACZ Unit Model	Octave Band at Center Frequency								Overall A-Weighted
		63	125	250	500	1000	2000	4000	8000	
--	010B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
010B	013B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
013B	016B	52	53	51	53	47	45	43	41	54
017B	020B	52	53	53	54	47	45	44	42	55
020B	025B	53	54	54	55	48	46	45	43	56
025B	028B	54	54	54	55	48	46	45	43	56
029B	033B	54	54	55	56	49	47	46	43	57
034B	039B	55	55	56	57	50	48	47	43	58

Notes: Data at:
1. 30 feet (9m) from side of unit.
2. Q=2, unit on a flat roof or ground with no adjacent wall.
3. Octave band readings are flat dB, overall is “A” weighted.

Table 19, Sound Power w/ Sound insulation

AGZ Unit Model	ACZ Unit Model	Octave Band at Center Frequency (per ARI Standard 370)								Overall A-Weighted
		63	125	250	500	1000	2000	4000	8000	
--	010B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
010B	013B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
013B	016B	79	80	78	80	74	72	70	68	81
017B	020B	79	80	80	81	74	72	71	69	82
020B	025B	80	81	81	82	75	73	72	70	83
025B	028B	81	81	81	82	75	73	72	70	83
029B	033B	81	81	82	83	76	74	73	70	84
034B	039B	82	82	83	84	77	75	74	70	85

Note: Octave band readings are flat dB, overall is “A” weighted.

Quiet Operation

Sound levels can be as important as unit cost and efficiency, and must be addressed before the start of any development program. Efforts by McQuay Design Engineers to design units that are sensitive to the sound requirements of the market, combined with inherently quiet scroll compressors, have paid off.

Background Information

Sound is a vibration in an elastic medium and is essentially a pressure and particle displacement phenomena. A vibrating body produces compression waves, and as the waves are emitted from the vibrating body, molecules are ultimately compressed. These values are transmitted through gas, liquid, solid—anything which is elastic or viscous.

The sound data provided in this section is presented with both sound pressure and sound power levels. Sound power is the total sound energy radiated by a source per unit of time integrated over the surface through which the sound is radiated. Sound power is a calculated quantity and cannot be measured directly like sound pressure. Sound power is not dependent on the surrounding environment or distance from the source, as is sound pressure.

Sound pressure varies with the distance from the source and is dependent on its surroundings. For example, a brick wall located 10 feet from a unit will affect the sound pressure measurements differently than a brick wall at 20 feet. Sound pressure is measured in decibels (dB), which is a dimensionless ratio (on a logarithmic scale) between measured sound pressure and a reference sound pressure level.

Sound Pressure Levels - Full Load

All sound pressure tables give the overall "A" weighted sound pressure levels which are considered typical of what can be measured in a free field with a hand held sound meter, in the absence of any nearby reflective surfaces. The sound pressure levels are measured at 30 feet (10 meters) from the side of the unit at 100% unit load and ARI conditions. 95°F (35°C) ambient air temperature and 50°F suction temperature.

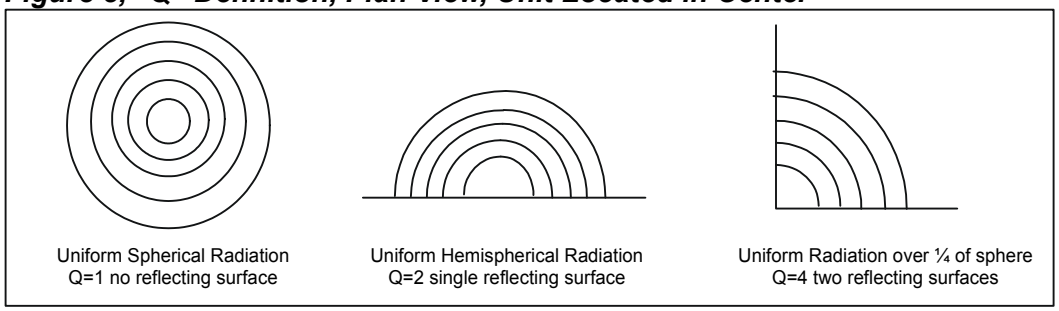
Sound Power Levels

Acoustical consultants can require sound power octave band data to perform a detailed acoustical analysis. The tables present sound power levels per ARI Standard 370, “Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment”. These standards were developed to establish uniform methods of determining the sound power radiated by large outdoor and indoor equipment. The aforementioned methods are based on providing sound power levels by octave band and the overall ‘A’ weighted value. Measurements are taken over a prescribed area around the unit and the data is mathematically calculated to give the sound power, dB. Sound power can be thought of as basic sound level emanating from the unit without consideration of distance or obstructions.

Sound Reduction due to Distance from the Unit

The distance between a source of sound and the location of the sound measurement plays an important role in minimizing sound problems. The equation below can be used to calculate the sound pressure level at any distance if the sound power is known. Results for typical distances are tabulated in Table 19. Another way of determining the effect of distance is to work from sound pressure only. “Q”, the directionality factor, is a dimensionless number that compensates for the type of sound reflection from the source. For example, a unit sitting on a flat roof or ground with no other reflective surfaces or attenuation due to grass, snow, etc., between source and receiver: Q=2.

Figure 8, "Q" Definition, Plan View, Unit Located in Center



Sound pressure can be calculated at any distance from the unit if the sound power is known.
Lp=Lw-(20 log r) + (10 log Q) - .5

Lp = sound pressure r = distance from unit in feet

Lw = sound power Q = directionality factor

With Q=1, Unit suspended in space (theoretical condition), the equation simplifies to:
Lp = Lw – (20)(log r) –0.5

With Q=2, for a unit sitting on a flat roof or ground with no adjacent vertical wall as a reflective surface, the equation simplifies to:
Lp = Lw – (20)(log r) + 2.5

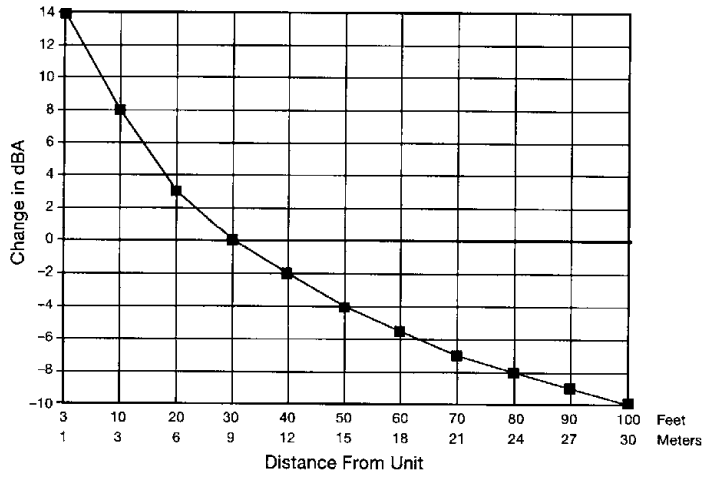
With Q=4 for a unit sitting on a flat roof or ground with one adjacent vertical wall as a reflective surface, the equation simplifies to:
Lp = Lw – (20)(log r) + 5.5

The equations are reduced to table form in Table 19 for various distances and the two most usual cases of "Q" type of location.

Table 20, dB Conversion of Sound Power to Pressure for Distance

Distance from Sound Source ft. (m)	dB Reduction from Sound Power at the Source to Sound Pressure at Referenced Distance	
	Q=2	Q=4
30 (9)	27.1	24.0
50 (15)	31.6	28.5
75 (23)	35.1	32.0
100 (30)	37.6	34.5
150 (46)	41.1	38.0
200 (61)	43.6	40.5
300 (91)	47.6	44.0

Figure 9, Sound Pressure Attenuation Due to Distance from Unit



Sound Pressure Reduction - Low Ambient Conditions

Unit operation at a lower ambient temperature than 95°F (35°C) will also result in lower sound pressure levels. The sound pressure level will decrease 1 dBA for ambient temperatures between 85°F and 94°F (29.4°C and 34.4°C), 2 dBA for ambient temperatures between 75°F and 84°F (23.9°C and 28.9°C), and 3 dBA for ambient temperatures between 65°F and 74°F (18.3°C and 23.3°C).

Optional Acoustic Packages

For sound-critical applications, optional acoustical blankets can be factory-installed on each compressor. They are also available for retrofit field installation.

Electrical Data

Field Wiring

Wiring must comply with all applicable codes and ordinances. Warranty is void if wiring is not in accordance with specifications. Copper wire is required for all power lead terminations at the unit.

ACZ-B and AGZ-B units have single-point power connection. A single field supplied fused disconnect is required or it can be supplied as a factory-mounted option. The control transformer is factory mounted.

ACZ/AGZ-B units are rated to 115°F (46°C) maximum operating ambient air temperature as standard. There is no high ambient option of vents or fans.

Electrical Data, R-407C

Table 20, AGZ/ACZ-B, Electrical Data, R-407C

AGZ Unit Size	ACZ Unit Size	Volts	Minimum Circuit Ampacity (MCA)	Power Supply				Field Fuse or Breaker Size	
				Field Wire		Hub (Conduit Connection)			
				Quantity	Wire Gauge 75C	Quantity	Nominal Size In. (mm)	Recommended	Maximum
--	010B	208	45	3	8 AWG	1	1.00 (25)	50	50
		230	45	3	8 AWG	1	1.00 (25)	50	50
		460	22	3	10 AWG	1	1.00 (25)	25	25
		575	19	3	10 AWG	1	1.00 (25)	20	20
010B	013B	208	58	3	6 AWG	1	1.00 (25)	70	70
		230	54	3	6 AWG	1	1.00 (25)	60	70
		460	27	3	10 AWG	1	1.00 (25)	30	35
		575	22	3	10 AWG	1	1.00 (25)	25	25
013B	016B	208	77	3	4 AWG	1	1.00 (25)	90	100
		230	77	3	4 AWG	1	1.00 (25)	90	100
		460	39	3	8 AWG	1	1.00 (25)	45	50
		575	30	3	10 AWG	1	1.00 (25)	35	40
017B	020B	208	82	3	4 AWG	1	1.00 (25)	110	110
		230	80	3	4 AWG	1	1.00 (25)	90	100
		460	41	3	8 AWG	1	1.00 (25)	50	50
		575	33	3	10 AWG	1	1.00 (25)	40	40
020B	025B	208	113	3	2 AWG	1	1.25 (32)	125	150
		230	113	3	2 AWG	1	1.25 (32)	125	150
		460	51	3	6 AWG	1	1.00 (25)	60	60
		575	41	3	8 AWG	1	1.00 (25)	50	50
025B	028B	208	129	3	1 AWG	1	1.25 (32)	150	175
		230	129	3	1 AWG	1	1.25 (32)	150	175
		460	61	3	6 AWG	1	1.00 (25)	70	80
		575	51	3	6 AWG	1	1.00 (25)	60	60
029B	033B	208	148	3	1/0 AWG	1	1.50 (38)	175	200
		230	139	3	1/0 AWG	1	1.50 (38)	175	175
		460	72	3	4 AWG	1	1.00 (25)	80	100
		575	58	3	6 AWG	1	1.00 (25)	80	80
034B	039B	208	187	3	3/0 AWG	1	2.00 (51)	250	250
		230	182	3	3/0 AWG	1	2.00 (51)	250	250
		460	85	3	4 AWG	1	1.00 (25)	100	110
		575	73	3	4 AWG	1	1.00 (25)	100	100

NOTE: See page 33for all Electrical Data notes.

Table 21, AGZ/ACZ-B, Compressor & Condenser Fan Motor Amp Draw, R-407C

AGZ Unit Size	ACZ Unit Size	Volts	Rated Load Amps			No. of Fan Mtrs	Locked Rotor Amps		
			Compressors		F.L. Amps Fan Motor (Each)		L.R.Amps Fan Motor (Each)	Compressors	
								Across-The-Line	
			No. 1	No. 2				No. 1	No. 2
--	010B	208	14.8	14.8	5.8	2	21.4	91	91
		230	14.8	14.8	5.8	2	23.7	91	91
		460	7.1	7.1	2.8	2	10.7	50	50
		575	5.8	5.8	2.5	2	11.0	37	37
010B	013B	208	20.3	20.3	5.8	2	21.4	156	156
		230	18.6	18.6	5.8	2	23.7	156	156
		460	9.2	9.2	2.8	2	10.7	75	75
		575	7.4	7.4	2.5	2	11.0	54	54
013B	016B	208	28.8	28.8	5.8	2	21.4	195	195
		230	28.8	28.8	5.8	2	23.7	195	195
		460	14.7	14.7	2.8	2	10.7	95	95
		575	10.8	10.8	2.5	2	11.0	80	80
017B	020B	208	31.2	31.2	5.8	2	21.4	225	225
		230	30.1	30.1	5.8	2	23.7	225	225
		460	15.5	15.5	2.8	2	10.7	114	114
		575	12.1	12.1	2.5	2	11.0	80	80
020B	025B	208	42.3	42.3	5.8	3	21.4	245	245
		230	42.3	42.3	5.8	3	23.7	245	245
		460	18.6	18.6	2.8	3	10.7	125	125
		575	14.6	14.6	2.5	3	11.0	100	100
025B	028B	208	49.4	49.4	5.8	3	21.4	300	300
		230	49.4	49.4	5.8	3	23.7	300	300
		460	23.1	23.1	2.8	3	10.7	150	150
		575	19.2	19.2	2.5	3	11.0	109	109
029B	033B	208	57.9	57.9	5.8	3	21.4	340	340
		230	53.8	53.8	5.8	3	23.7	340	340
		460	28.2	28.2	2.8	3	10.7	173	173
		575	22.4	22.4	2.5	3	11.0	132	132
034B	039B	208	75.0	75.0	5.8	3	21.4	505	505
		230	73.1	73.1	5.8	3	23.7	505	505
		460	34.0	34.0	2.8	3	10.7	225	225
		575	28.8	28.8	2.5	3	11.0	180	180

NOTE: See page 33 for all Electrical Data notes.

Table 22, AGZ/ACZ-B, Field Wiring Data, R-407C

AGZ Unit Size	ACZ Unit Size	Volts	Wiring to Standard Power Block Terminal		Wiring to Optional Disconnect Switch		Wiring to High Interrupt or HSCCR Circuit Breaker	
			Maximum Terminal Amps	Connector Wire Range (Copper Wire Only)	Disconnect Size	Connector Wire Range (Copper Wire Only)	Max. Amps	Connector Wire Range (Copper Wire Only)
--	010B	208	175	14 AWG – 2/0	60	14 AWG – 1 AWG	70	10 AWG - 1/0
		230	175	14 AWG – 2/0	60	14 AWG – 1 AWG	70	10 AWG - 1/0
		460	175	14 AWG – 2/0	60	14 AWG – 1 AWG	35	10 AWG - 1/0
		575	175	14 AWG – 2/0	60	14 AWG – 1 AWG	30	10 AWG - 1/0
010B	013B	208	175	14 AWG – 2/0	60	14 AWG – 1 AWG	90	10 AWG - 1/0
		230	175	14 AWG – 2/0	60	14 AWG – 1 AWG	80	10 AWG - 1/0
		460	175	14 AWG – 2/0	60	14 AWG – 1 AWG	40	10 AWG - 1/0
		575	175	14 AWG – 2/0	60	14 AWG – 1 AWG	35	10 AWG - 1/0
013B	016B	208	175	14 AWG – 2/0	100	8 AWG - 1/0	125	3 AWG - 3/0
		230	175	14 AWG – 2/0	100	8 AWG - 1/0	125	3 AWG - 3/0
		460	175	14 AWG – 2/0	60	14 AWG – 1 AWG	60	10 AWG - 1/0
		575	175	14 AWG – 2/0	60	14 AWG – 1 AWG	50	10 AWG - 1/0
017B	020B	208	175	14 AWG – 2/0	100	8 AWG - 1/0	125	3 AWG - 3/0
		230	175	14 AWG – 2/0	100	8 AWG - 1/0	125	3 AWG - 3/0
		460	175	14 AWG – 2/0	60	14 AWG – 1 AWG	70	10 AWG - 1/0
		575	175	14 AWG – 2/0	60	14 AWG – 1 AWG	50	10 AWG - 1/0
020B	025B	208	175	14 AWG – 2/0	125	3 AWG – 3/0	175	6 AWG - 350 kcmil
		230	175	14 AWG – 2/0	125	3 AWG - 3/0	175	6 AWG - 350 kcmil
		460	175	14 AWG – 2/0	60	14 AWG – 1 AWG	80	10 AWG - 1/0
		575	175	14 AWG – 2/0	60	14 AWG – 1 AWG	70	10 AWG - 1/0
025B	028B	208	175	14 AWG – 2/0	225	2 AWG - 4/0	200	6 AWG - 350 kcmil
		230	175	14 AWG – 2/0	225	2 AWG - 4/0	200	6 AWG - 350 kcmil
		460	175	14 AWG – 2/0	100	8 AWG - 1/0	100	10 AWG - 1/0
		575	175	14 AWG – 2/0	60	14 AWG – 1 AWG	80	10 AWG - 1/0
029B	033B	208	175	14 AWG – 2/0	225	2 AWG - 4/0	225	6 AWG - 350 kcmil
		230	175	14 AWG – 2/0	225	2 AWG - 4/0	225	6 AWG - 350 kcmil
		460	175	14 AWG – 2/0	100	8 AWG - 1/0	125	3 AWG - 3/0
		575	175	14 AWG – 2/0	100	8 AWG - 1/0	90	10 AWG - 1/0
034B	039B	208	335	6 AWG – 400 kcmil	225	2 AWG - 4/0	N/A	Note 1
		230	335	6 AWG – 400 kcmil	225	2 AWG - 4/0	N/A	Note 1
		460	175	14 AWG – 2/0	100	8 AWG - 1/0	150	6 AWG - 350 kcmil
		575	175	14 AWG – 2/0	100	8 AWG - 1/0	125	3 AWG - 3/0

NOTES:

1. High Interruptor or HSCCR Circuit Breakers are not available in these sizes.
2. See page 33 for all Electrical Data notes.

Notes for Electrical Data:

1. Unit wire size ampacity (MCA) is equal to 125% of the largest compressor-motor RLA plus 100% of RLA of all other loads in the circuit.
2. The control transformer is furnished and no separate 115V power supply is required.
3. For a separate 115V control circuit power supply, use 10 amps for all unit sizes.
4. Recommended power lead wire sizes for 3 conductors per conduit are based on 100% conductor ampacity in accordance with NEC. Voltage drop has not been included. Therefore, it is recommended that power leads be kept short. All terminal block connections must be made with copper wire.
5. "Recommended Fuse Sizes" are selected at approximately 175% of the largest compressor RLA, plus 100% of the RLA of all other loads in the circuit.
6. "Maximum Fuse or breaker size" is selected at approximately 225% of the largest compressor RLA, plus 100% of all other loads in the circuit.
7. The recommended power lead wire sizes are based on an ambient temperature of 86°F (30°C). Ampacity correction factors must be applied for other ambient temperatures. Refer to the National Electrical Code Handbook.
8. The unit must be electrically grounded according to national and local electrical codes.

Voltage Limitations:

Within ± 10 percent of nameplate rating

Important: Voltage unbalance not to exceed 2% with a resultant current unbalance of 6 to 10 times the voltage unbalance per NEMA MG-1, 1998 Standard. This is an important restriction that must be adhered to.

Notes for "Compressor and Condenser Fan Amp Draw":

1. Compressor RLA values are for wiring sizing purposes only but may not reflect normal operating current draw at rated capacity.
2. Fan motor FLA values are approximate fan motor amp values at rated voltage.

Notes for "Field Wiring Data"

1. Requires a single disconnect to supply electrical power to the unit. This power supply must either be fused or use a circuit breaker.
2. All field wiring to unit power block or optional non-fused disconnect switch must be copper.
3. All field wire size values given in table apply to 75°C rated wire per NEC.

Circuit Breakers

The circuit breaker used in the High Short Circuit panel option may have a higher trip rating than the unit Maximum Overload Protection (MOP) value shown on the unit nameplate. The circuit breaker is installed as a service disconnect switch and does not function as branch circuit protection, mainly that the protection device must be installed at the point of origin of the power wiring. The breaker (disconnect switch) is oversized to avoid nuisance trips at high ambient temperature conditions.

Figure 10, Typical ACZ Single-Point Connection Field Wiring

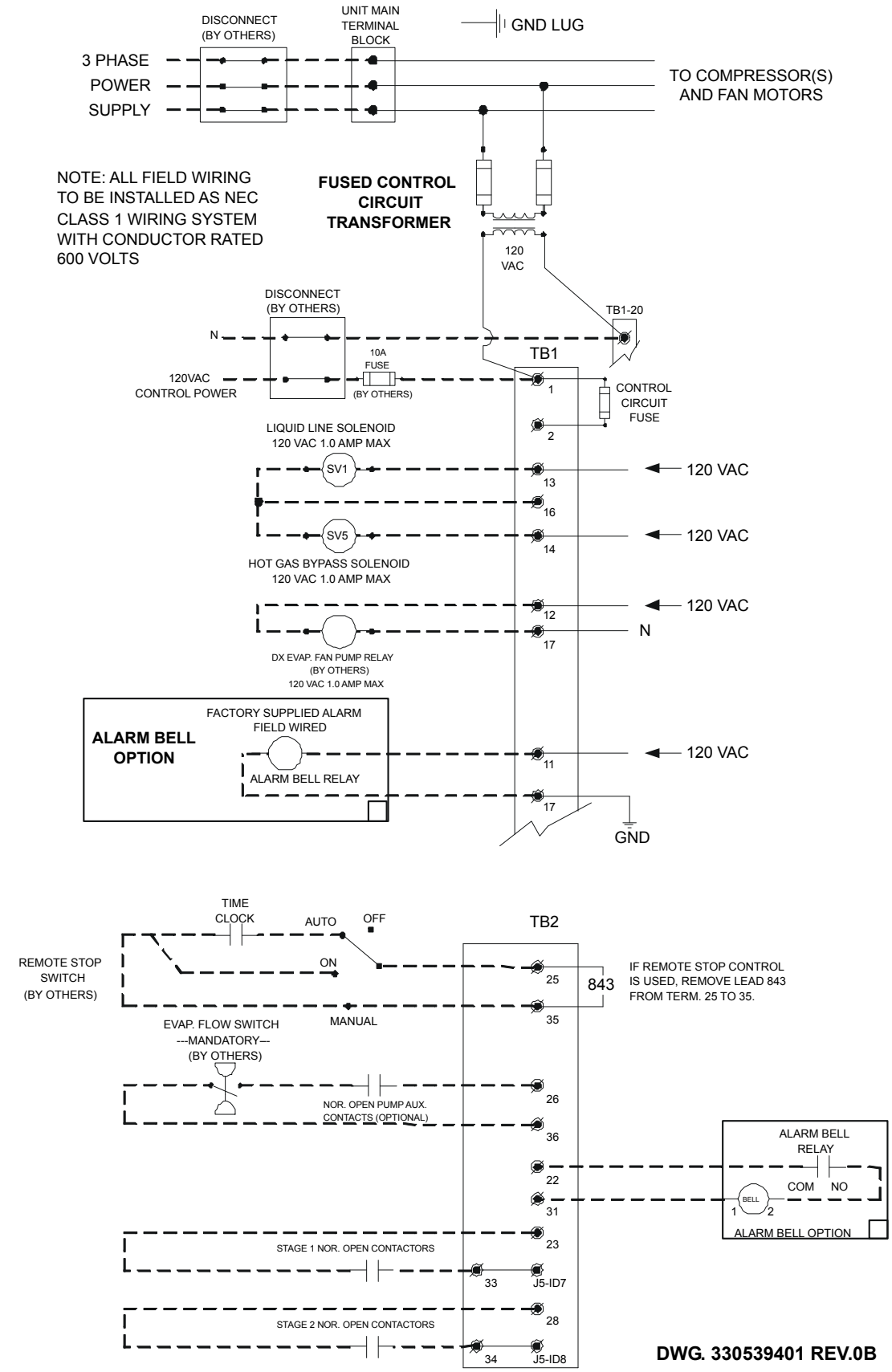
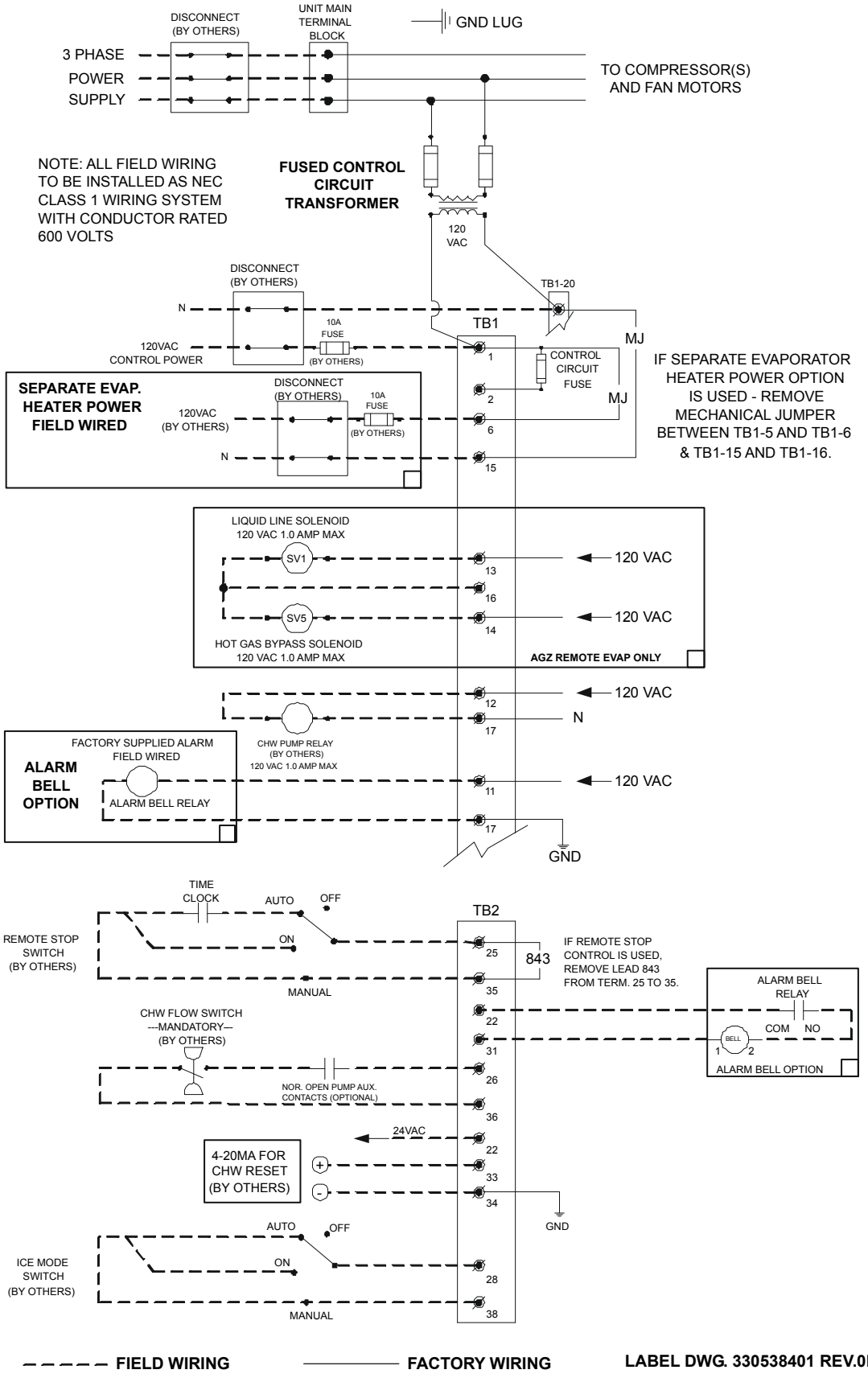


Figure 11, AGZ 010B through AGZ 034B, Typical Field Wiring Diagram



Note: See control and power wiring diagrams on unit control panel for specific unit information.

AGZ-BS, R-407C

Table 23, Physical Data, AGZ 010BS through 017BS, Packaged, R-407C

PHYSICAL DATA	AGZ MODEL NUMBER		
	010B	013B	017B
BASIC DATA			
Unit Capacity @ ARI Conditions (1), Tons (kW)	10.0 (36.2)	13.7 (48.2)	15.8 (55.6)
Number Of Refrigerant Circuits	1	1	1
Unit Operating Charge, R-407C, Lb. (kg)	22.0 (10.0)	24.0 (10.9)	31.0 (14.1)
Cabinet Dimensions, LxWxH, In.	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8
Cabinet Dimensions, LxWxH, (mm)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)
Unit Operating Weight, Lb. (kg)	1095 (498)	1190 (541)	1300 (591)
Unit Shipping Weight, Lb. (kg)	1085 (493)	1170 (532)	1280 (582)
Add'l Weight If Copper Finned Coils, Lb. (kg)	176 (80.0) [176 (80.0)]	176 (80.0) [176 (80.0)]	264 (120.0) [264 (120.0)]
COMPRESSORS			
Type	Scroll	Scroll	Scroll
Nominal Horsepower	6.0 / 6.0	7.5 / 7.5	9.0 / 9.0
Oil Charge Per Compressor of a Tandem Set, oz. (g)	60 (1701)	85 (2410)	110 (3119)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DSPLACEMENT			
Standard Staging	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING			
Coil Face Area, One of Two Sides, Sq. Ft. (M^2)	30.3 (2.8)	30.3 (2.8)	30.3 (2.8)
Finned Height x Finned Length, In.	84 x 52	84 x 52	84 x 52
Finned Height x Finned Length, (mm)	(2134) x (1321)	(2134) x (1321)	(2134) x (1321)
Fins Per Inch x Rows Deep:	16 x 2 [16 x 2]	16 x 2 [16 x 2]	16 x 3 [16 x 3]
Pumpdown Capacity Lb. (kg)	35.3 (16.0)	35.3 (16.0)	52.9 (24.0)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE			
Number Of Fans - Fan Diameter, In. (mm)	2 – 26 (660)	2 – 26 (660)	2 – 26 (660)
Number Of Motors - HP (kW)	2 – 1.0 (0.75)	2 – 1.0 (0.75)	2 – 1.0 (0.75)
Fan And Motor RPM, 60 Hz	1140	1140	1140
60 Hz Total Unit Airflow, CFM (l/s)	13950 (6584)	13950 (6584)	12000 (5664)
DIRECT EXPANSION EVAPORATOR - BRAZED PLATE-TO-PLATE			
Connection Size Victaulic, In. (mm)	2 (51)	2 (51)	2 (51)
Water Volume, Gallons (L)	0.9 (3.6)	1.7 (6.3)	2.0 (7.6)
Maximum Refrigerant Working Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)
Maximum Water Pressure, psig (kPa)	350 (2413)	350 (2413)	350 (2413)

NOTE: Nominal capacity based on 95°F ambient air and 54°F/44°F water range.

Table 24, Physical Data, AGZ 020BS through 034BS, Packaged, R-22/R-407c

PHYSICAL DATA	AGZ MODEL NUMBER			
	020B	025B	029B	034B
BASIC DATA				
Unit Capacity @ ARI Conditions (1), Tons (kW)	20.6 (72.4)	22.7 (79.8)	27.7 (97.5)	34.0 (119.5)
Number Of Refrigerant Circuits	1	1	1	1
Unit Operating Charge, Lb. (kg)	34.0 (15.4) [38.0 (17.3)]	42.0 (19.1)	47.0 (21.3)	50.0 (22.7)
Cabinet Dimensions, LxWxH, In.	106.2x 46.3 x 50.8	106.2x 46.3 x 50.8	106.2x 46.3 x 58.8	106.2x 46.3 x 58.8
Cabinet Dimensions, LxWxH, (mm)	(2697) x (1176) x (1289)	(2697) x (1176) x (1289)	(2697) x (1176) x (1493)	(2697) x (1176) x (1493)
Unit Operating Weight, Lbs. (kg)	1590 (723)	1635 (743)	1830 (832)	2315 (1052)
Unit Shipping Weight, Lbs. (kg)	1570 (714)	1610 (732)	1800 (818)	2270 (1032)
Add'l Weight If Copper Finned Coils, Lb. (kg) R-22 and [R-407C]	284 (129) [426 (194)]	426 (194) [426 (194)]	508 (231) [508 (231)]	508 (231) [508 (231)]
COMPRESSORS				
Type	Scroll	Scroll	Scroll	Scroll
Nominal Horsepower	12.0 / 12.0	13.0 / 13.0	15.0 / 15.0	20.0 / 20.0
Oil Charge Per Compressor of a Tandem Set, oz. (g)	110 (3119)	110 (3119)	110 (3119)	158 (4479)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT				
Standard Staging	0 –50 - 100	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING				
Coil Face Area, One of Two Sides, Sq. Ft. (M^2)	49.0 (4.6)	49.0 (4.6)	58.3 (5.4)	58.3 (5.4)
Finned Height x Finned Length, In.	84 x 84	84 x 84	100 x 84	100 x 84
Finned Height x Finned Length, (mm)	(2134) x (2134)	(2134) x (2134)	(2545) x (2134)	(2545) x (2134)
Fins Per Inch x Rows Deep: R22 and [R407C]	16 x 2 [16 x 3]	16 x 3 [16 x 3]	16 x 3 [16 x 3]	16 x 3 [16 x 3]
Pumpdown Capacity, R-22 and [R-407C] Lb. (kg)	56.9 (25.9) [85.4 (38.8)]	85.4 (38.8)	101.6 (46.2)	101.6 (46.2)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE				
Number Of Fans - Fan Diameter, In. (mm)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)
Number Of Motors - HP (kW)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)
Fan And Motor RPM, 60 Hz	1140	1140	1140	1140
60 Hz Total Unit Airflow, CFM (l/s)	20925 (9877)	20925 (9877)	19800 (9346)	19800 (9346)
DIRECT EXPANSION EVAPORATOR - BRAZED PLATE-TO-PLATE				
Connection Size Victaulic, In. (mm)	2 (51)	2 (51)	2 (51)	2 (51)
Water Volume, Gallons (L)	2.2 (8.2)	3.0 (11.5)	4.0 (15.1)	5.6 (21.0)
Max. Refrigerant Working Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)	450 (3103)
Maximum Water Pressure, psig (kPa)	350 (2413)	350 (2413)	350 (2413)	350 (2413)

NOTE: Nominal capacity based on 95°F ambient air and 54°F/44°F water range.

ACZ-BS, R-22/R-407C

Table 25, Physical Data, ACZ 010BS through 020BS, R-22/R-407C

PHYSICAL DATA	ACZ MODEL NUMBER			
	010B	013B	016B	020B
BASIC DATA				
Number Of Refrigerant Circuits	1	1	1	1
Operating Charge, R-22/R-407C, Lb. (kg), Note	22.0 (10.0)	22.0 (10.0)	24.0 (10.9)	31.0 (14.1)
Cabinet Dimensions, LxWxH, In.	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8
Cabinet Dimensions, LxWxH, (mm)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)
Unit Operating Weight, Lbs. (kg)	1015 (461)	1015 (461)	1090 (495)	1190 (541)
Unit Shipping Weight, Lbs. (kg)	1000 (454)	1000 (454)	1065 (484)	1150 (523)
Add'l Weight If Copper Finned Coils, Lb. (kg) R-22 and [R-407C]	176 (80.0) [176 (80.0)]	176 (80.0) [176 (80.0)]	176 (80.0) [176 (80.0)]	264 (120.0) [264 (120.0)]
COMPRESSORS				
Type	Scroll	Scroll	Scroll	Scroll
Nominal Horsepower	4.0 / 4.0	6.0 / 6.0	7.5 / 7.5	9.0 / 9.0
Oil Charge Per Compressor of a Tandem Set, oz. (g)	57 (1616)	60 (1701)	140 (3969)	140 (3969)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT				
Standard Staging	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING				
Coil Face Area,Sq. Ft. (M^2)	30.3 (2.8)	30.3 (2.8)	30.3 (2.8)	30.3 (2.8)
Finned Height x Finned Length, In.	84 x 52	84 x 52	84 x 52	84 x 52
Finned Height x Finned Length, (mm)	(2134) x (1321)	(2134) x (1321)	(2134) x (1321)	(2134) x (1321)
Fins Per Inch x Rows Deep: R-22 and R-407C	16 x 2	16 x 2	16 x 2	16 x 3
Pumpdown Capacity lb. (kg)	35.3 (16.0)	35.3 (16.0)	35.3 (16.0)	50.3 (22.8)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE				
Number Of Fans - Fan Diameter, In. (mm)	2 – 26 (660)	2 – 26 (660)	2 – 26 (660)	2 – 26 (660)
Number Of Motors - HP (kW)	2 – 1.0 (0.75)	2 – 1.0 (0.75)	2 – 1.0 (0.75)	2 – 1.0 (0.75)
Fan And Motor RPM, 60 Hz	1140	1140	1140	1140
Total Unit Airflow, CFM (l/s), 60 Hz	13950 (6584)	13950 (6584)	13950 (6584)	12000 (5664)

Note: Operating charge is for the condensing unit only. Refrigerant lines and evaporator charge must be added.

Table 26, Physical Data, ACZ 025BS through 039BS, R-22/R-407C

PHYSICAL DATA	ACZ MODEL NUMBER			
	025B	028B	033B	039B
BASIC DATA				
Number Of Refrigerant Circuits	1	1	1	1
Operating Charge, R-22/R-407C, Lb. (kg), Note	34.0 (15.4)	36.0 (16.3)	47.0 (21.3)	50.0 (22.7)
Cabinet Dimensions, LxWxH, In.	106.2x 46.3 x 50.8	106.2x 46.3 x 50.8	106.2x 46.3 x 58.8	106.2x 46.3 x 58.8
Cabinet Dimensions, LxWxH, (mm)	(2697) x (1176) x (1289)	(2697) x (1176) x (1289)	(2697) x (1176) x (1493)	(2697) x (1176) x (1493)
Unit Operating Weight, Lbs. (kg)	1470 (667)	1490 (676)	1760 (799)	1960 (890)
Unit Shipping Weight, Lbs. (kg)	1580 (717)	1600 (726)	1890 (858)	2090 (949)
Add'l Weight If Copper Finned Coils, Lb. (kg)	350 (159) [426 (194)]	426 (194) [426 (194)]	435 (197) [435 (197)]	435 (197) [435 (197)]
COMPRESSORS				
Type	Scroll	Scroll	Scroll	Scroll
Nominal Horsepower	12.0 / 12.0	13.0 / 13.0	15.0 / 15.0	20.0 / 20.0
Oil Charge Per Compressor of a Tandem Set, oz. (g)	110 (3119)	110 (3119)	110 (3119)	158 (4479)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT				
Standard Staging	0 – 50 - 100	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING				
Coil Face Area,Sq. Ft. (M^2)	49.0 (4.6)	49.0 (4.6)	58.3 (5.4)	58.3 (5.4)
Finned Height x Finned Length, In.	84 x 84	84 x 84	100 x 84	100 x 84
Finned Height x Finned Length, (mm)	(2134) x (2134)	(2134) x (2134)	(2545) x (2134)	(2545) x (2134)
Fins Per Inch x Rows Deep: R-22 and R-407C	16 x 2	16 x 2	16 x 3	16 x 3
Pumpdown Capacity lb. (kg)	53.1 (24.0)	53.1 (24.0)	90.7 (41.1)	92.8 (42.0)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE				
Number Of Fans - Fan Diameter, In. (mm)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)
Number Of Motors - HP (kW)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)
Fan And Motor RPM, 60 Hz	1140	1140	1140	1140
Total Unit Airflow, CFM (l/s), 60 Hz	20925 (9877)	20925 (9877)	19800 (9346)	19800 (9346)

Note: Operating charge is for the condensing unit only. Refrigerant lines and evaporator charge must be added.

AGZ-BM, R-22/R-407C

Table 27, Physical Data, AGZ 010BM through 017BM, Remote Evaporator, R-22/R-407C

PHYSICAL DATA	AGZ MODEL NUMBER		
	010B	013B	017B
BASIC DATA			
Unit Capacity @ ARI Conditions (1), Tons (kW)	10.0 (36.2)	13.7 (48.2)	15.8 (55.6)
Number Of Refrigerant Circuits	1	1	1
Unit Operating Charge, Lb. (kg)	13 (5.9)	14 (5.3)	17 (7.7)
Cabinet Dimensions, LxWxH, In.	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8
Cabinet Dimensions, LxWxH, (mm)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)
Unit Operating Weight, Lb. (kg)	950 (431)	1276 (579)	1278 (580)
Unit Shipping Weight, Lb. (kg)	1025 (465)	1350 (613)	1363 (619)
Add'l Weight If Copper Finned Coils, Lb. (kg) R-22 and [R-407C]	176 (80.0) [176 (80.0)]	176 (80.0) [176 (80.0)]	264 (120.0) [264 (120.0)]
COMPRESSORS			
Type	Scroll	Scroll	Scroll
Nominal Horsepower	6.0 / 6.0	7.5 / 7.5	9.0 / 9.0
Oil Charge Per Compressor of a Tandem Set, oz. (g)	60 (1701)	85 (2410)	110 (3119)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DSPLACEMENT			
Standard Staging	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING			
Coil Face Area, One of Two Sides, Sq. Ft. (M^2)	30.3 (2.8)	30.3 (2.8)	30.3 (2.8)
Finned Height x Finned Length, In.	84 x 52	84 x 52	84 x 52
Finned Height x Finned Length, (mm)	(2134) x (1321)	(2134) x (1321)	(2134) x (1321)
Fins Per Inch x Rows Deep: R-22 and [R-407C]	16 x 2 [16 x 2]	16 x 2 [16 x 2]	16 x 3 [16 x 3]
Pumpdown Capacity Lb. (kg)	35.3 (16.0)	35.3 (16.0)	52.9 (24.0)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE			
Number Of Fans - Fan Diameter, In. (mm)	2 – 26 (660)	2 – 26 (660)	2 – 26 (660)
Number Of Motors - HP (kW)	2 – 1.0 (0.75)	2 – 1.0 (0.75)	2 – 1.0 (0.75)
Fan And Motor RPM, 60 Hz	1140	1140	1140
60 Hz Total Unit Airflow, CFM (l/s)	13950 (6584)	13950 (6584)	12000 (5664)
REMOTE DIRECT EXPANSION EVAPORATOR - BRAZED PLATE-TO-PLATE			
Water Connection Size Victaulic, In. (mm)	2 (51)	2 (51)	2 (51)
Water Volume, Gallons (L)	0.9 (3.6)	1.7 (6.3)	2.0 (7.6)
Liquid Line Conn. Braze, inches	1.125	1.125	1.125
Suction Line Conn. Braze, Inches	2.125	2.125	2.125
Temperature Sensor Conn. NPT, Inches	0.75	0.75	0.75
Dry Weight, lbs (kg)	50 (22)	75 (34)	87 (39)
Operating Weight, lbs (kg)	58 (26)	88 (40)	109 (49)
Maximum Refrigerant Working Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)
Maximum Water Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)
Vent and Drain Conn.	Field	Field	Field

NOTE: Nominal capacity based on 95°F ambient air and 54°F/44°F water range and does not take field-installed lines into account.

Table 28, Physical Data, AGZ 020BM through 034BM, Remote Evaporator, R-22/R-407C

PHYSICAL DATA	AGZ MODEL NUMBER			
	020B	025B	029B	034B
BASIC DATA				
Unit Capacity @ ARI Conditions (1), Tons (kW)	20.6 (72.4)	22.7 (79.8)	27.7 (97.5)	34.0 (119.5)
Number Of Refrigerant Circuits	1	1	1	1
Unit Operating Charge, Lb. (kg)	34.0 (15.4) [38.0 (17.3)]	42.0 (19.1)	47.0 (21.3)	50.0 (22.7)
Cabinet Dimensions, LxWxH, In.	106.2x 46.3 x 50.8	106.2x 46.3 x 50.8	106.2x 46.3 x 58.8	106.2x 46.3 x 58.8
Cabinet Dimensions, LxWxH, (mm)	(2697) x (1176) x (1289)	(2697) x (1176) x (1289)	(2697) x (1176) x (1493)	(2697) x (1176) x (1493)
Unit Operating Weight, Lbs. (kg)	1459 (662)	1478 (671)	1622 (737)	1817 (825)
Unit Shipping Weight, Lbs. (kg)	1558 (707)	1576 (716)	1719 (780)	1914 (869)
Add'l Weight If Copper Finned Coils, Lb. (kg) R-22 and [R-407C]	284 (129) [426 (194)]	426 (194) [426 (194)]	508 (231) [508 (231)]	508 (231) [508 (231)]
COMPRESSORS				
Type	Scroll	Scroll	Scroll	Scroll
Nominal Horsepower	12.0 / 12.0	13.0 / 13.0	15.0 / 15.0	20.0 / 20.0
Oil Charge Per Compressor of a Tandem Set, oz. (g)	110 (3119)	110 (3119)	110 (3119)	158 (4479)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT				
Standard Staging	0 –50 - 100	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING				
Coil Face Area, One of Two Sides, Sq. Ft. (M^2)	49.0 (4.6)	49.0 (4.6)	58.3 (5.4)	58.3 (5.4)
Finned Height x Finned Length, In.	84 x 84	84 x 84	100 x 84	100 x 84
Finned Height x Finned Length, (mm)	(2134) x (2134)	(2134) x (2134)	(2545) x (2134)	(2545) x (2134)
Fins Per Inch x Rows Deep:	16 x 2 [16 x 3]	16 x 3 [16 x 3]	16 x 3 [16 x 3]	16 x 3 [16 x 3]
Pumpdown Capacity, R-22 and [R-407C] Lb. (kg)	56.9 (25.9) [85.4 (38.8)]	85.4 (38.8)	101.6 (46.2)	101.6 (46.2)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE				
Number Of Fans - Fan Diameter, In. (mm)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)
Number Of Motors - HP (kW)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)
Fan And Motor RPM, 60 Hz	1140	1140	1140	1140
60 Hz Total Unit Airflow, CFM (l/s)	20925 (9877)	20925 (9877)	19800 (9346)	19800 (9346)
REMOTE DIRECT EXPANSION EVAPORATOR - BRAZED PLATE-TO-PLATE				
Connection Size Victaulic, In. (mm)	2 (51)	2 (51)	2 (51)	2 (51)
Water Volume, Gallons (L)	2.2 (8.2)	3.0 (11.5)	4. 0 (15.1)	5.6 (21.0)
Liquid Line Conn. Braze, inches	1.125	1.125	1.375	1.375
Suction Line Conn. Braze, Inches	2.125	2.125	2.125	2.125
Temperature Sensor Conn. NPT, Inches	0.75	0.75	0.75	0.75
Dry Weight, lbs (kg)	92 (42)	124 (56)	156 (71)	211 (96)
Operating Weight, lbs (kg)	110 (50)	148 (67)	188 (85)	255 (116)
Max. Refrigerant Working Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)	450 (3103)
Maximum Water Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)	450 (3103)
Drain and Vent Connections	Field	Field	Field	Field

NOTE: Nominal capacity based on 95°F ambient air and 54°F/44°F water range and does not take field-installed lines into account.

Dimensions & Weights

ACZ-BS Dimensions

Figure 12, ACZ 010BS - 020BS (See page 46 for additional dimensions and weights)

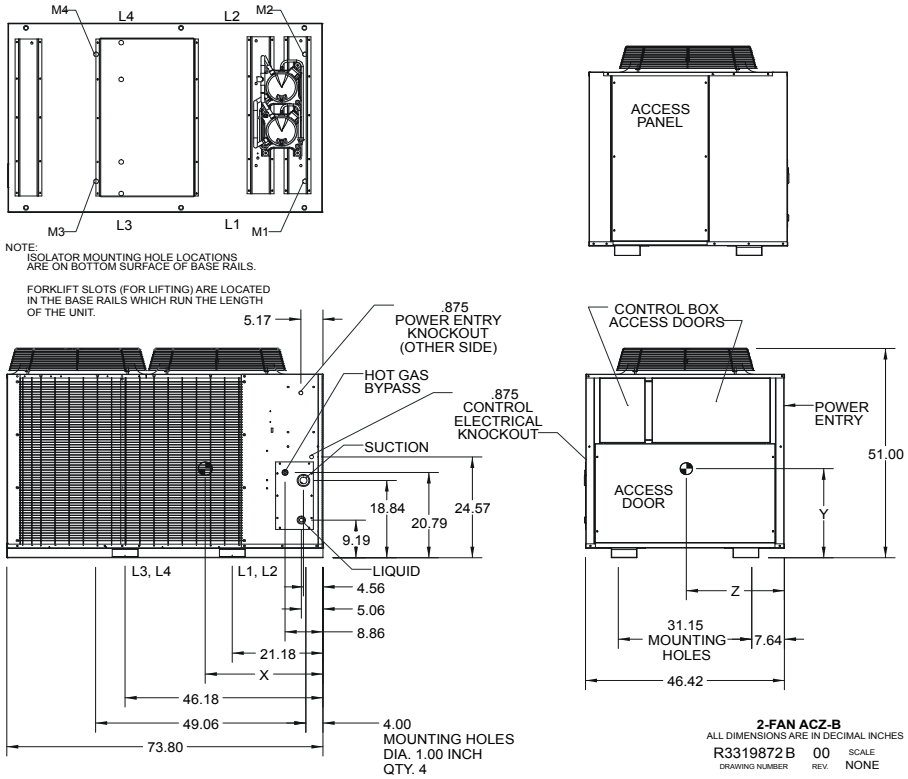
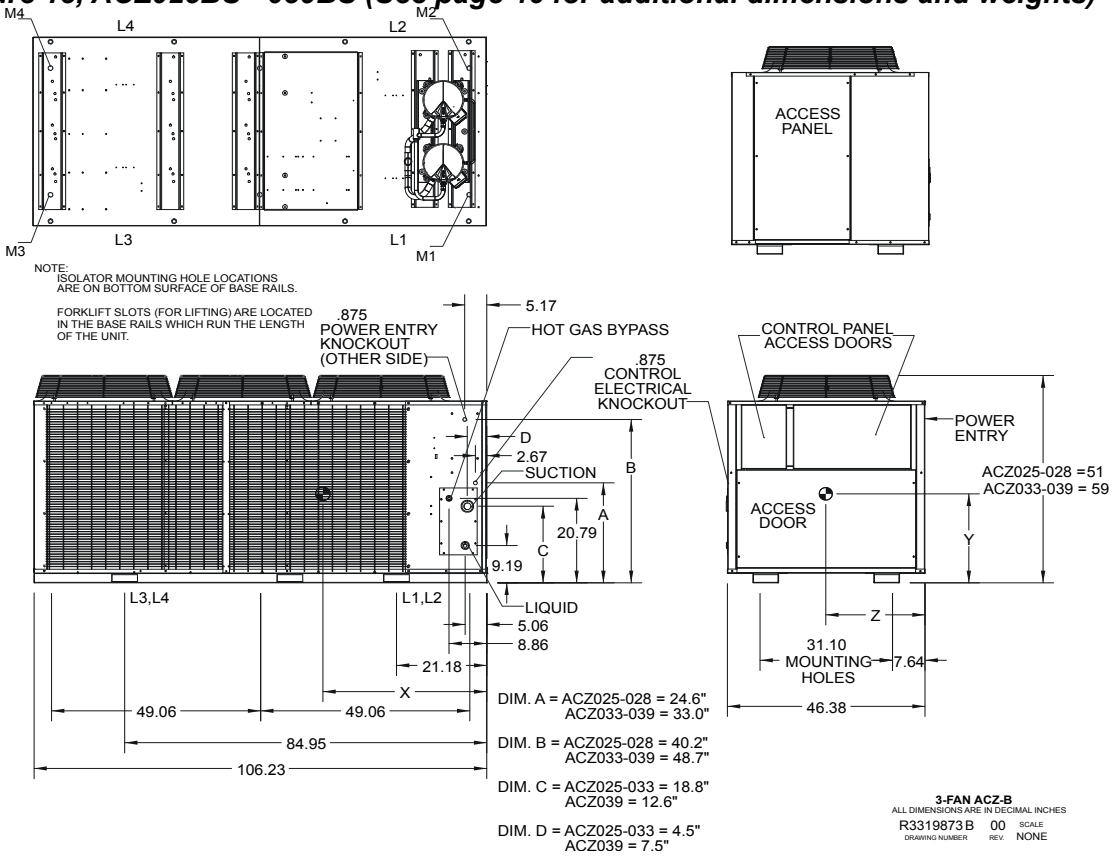


Figure 13, ACZ025BS - 039BS (See page 46 for additional dimensions and weights)



AGZ-BS Dimensions

Figure 14, AGZ 010BS - 017BS (See page 46 for additional dimensions and weights)

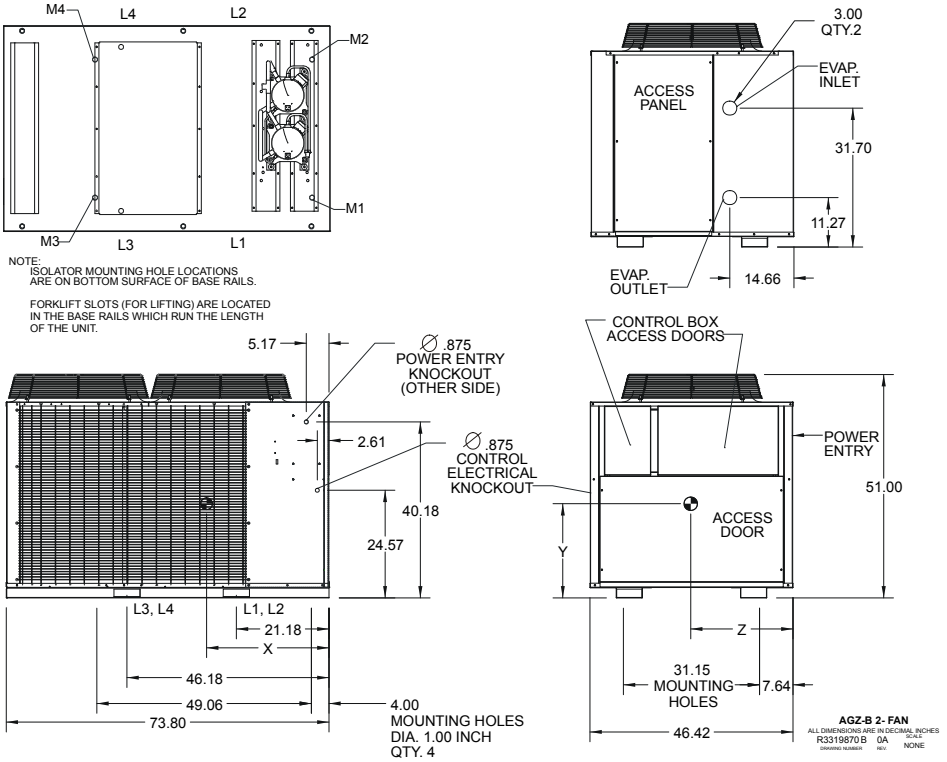
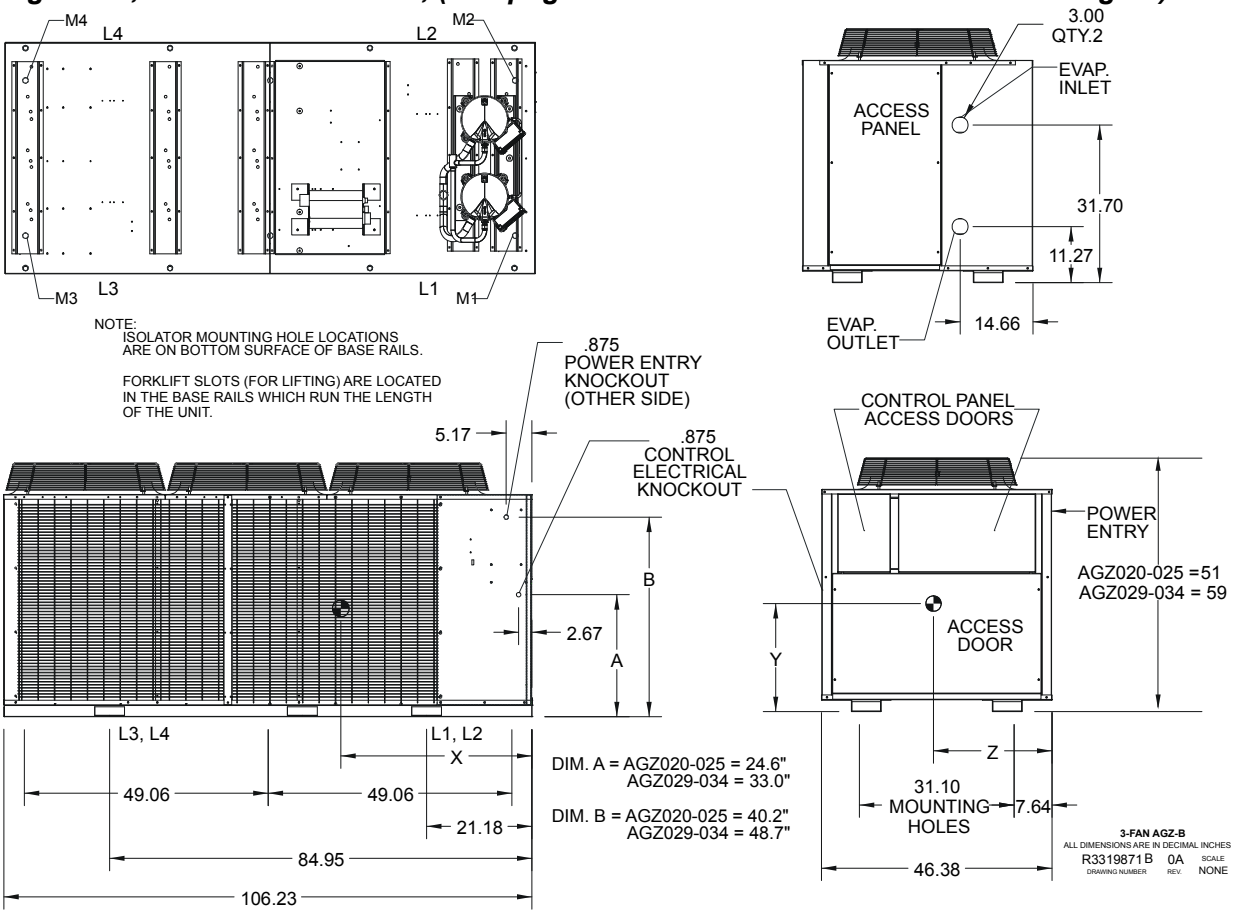


Figure 15, AGZ 020BS - 034BS, (See page 46 for additional dimensions and weights)



AGZ-BM, Remote Evaporator Dimensions

Figure 16, AGZ 010BM - 017BM (See page 46 for additional dimensions and weights)

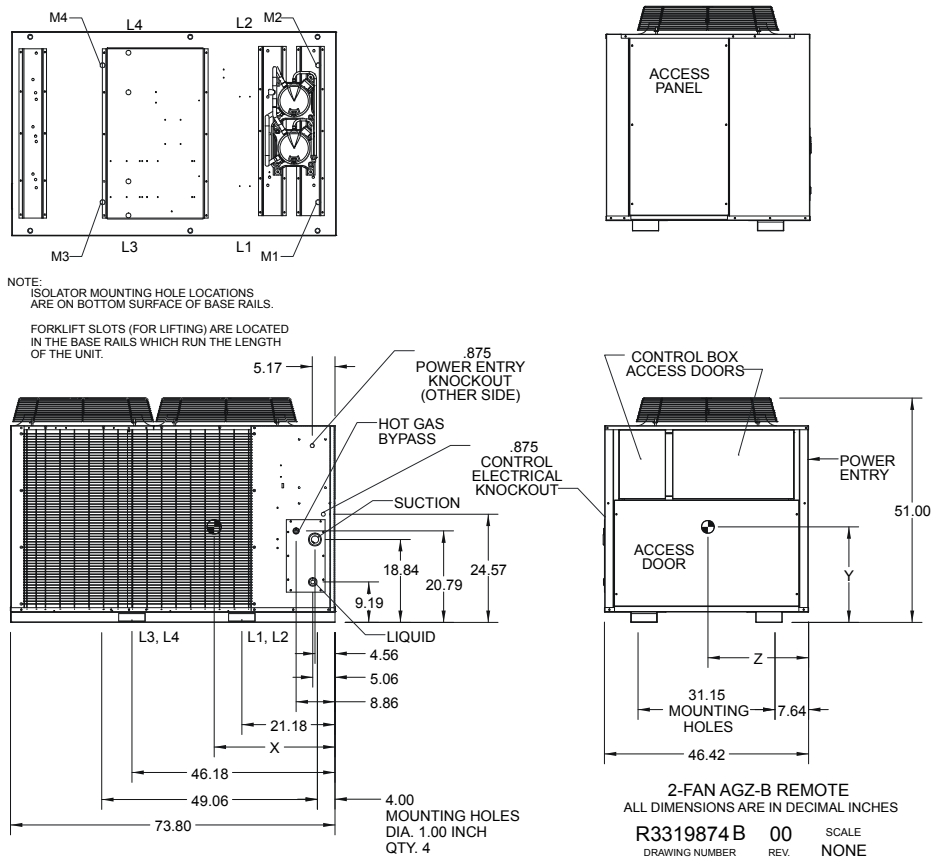
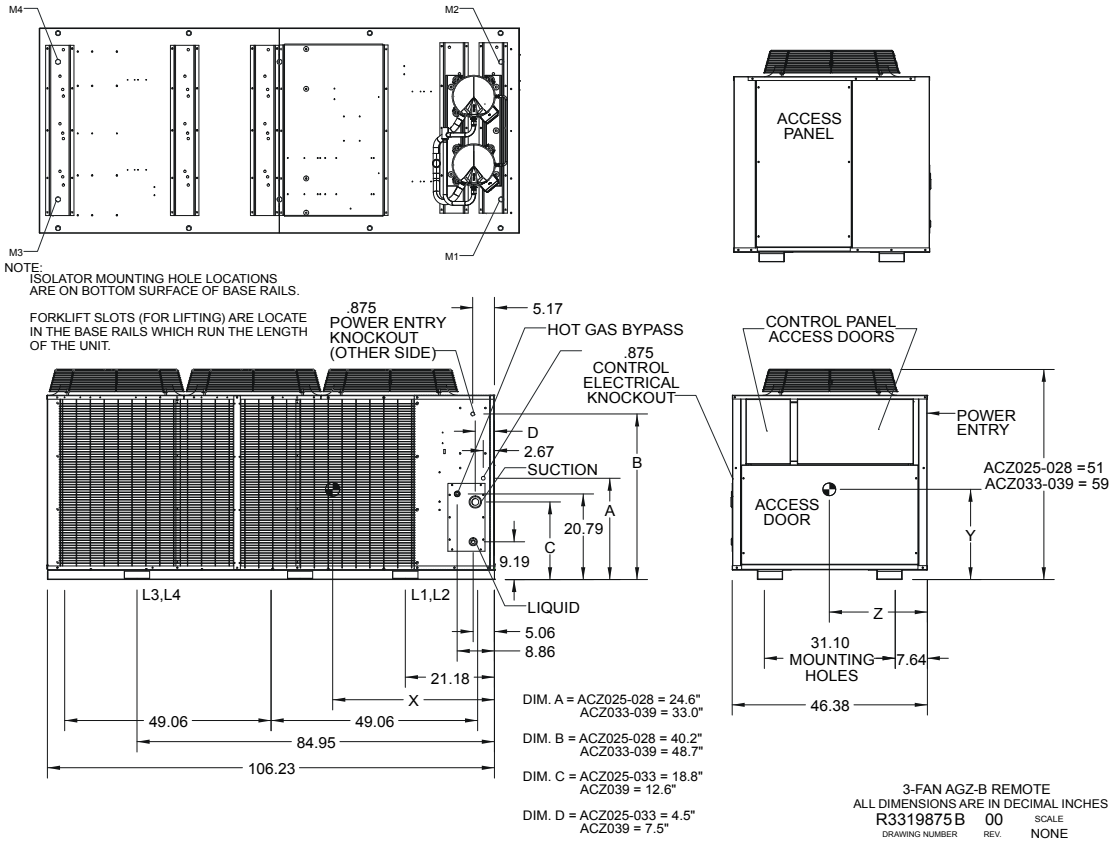
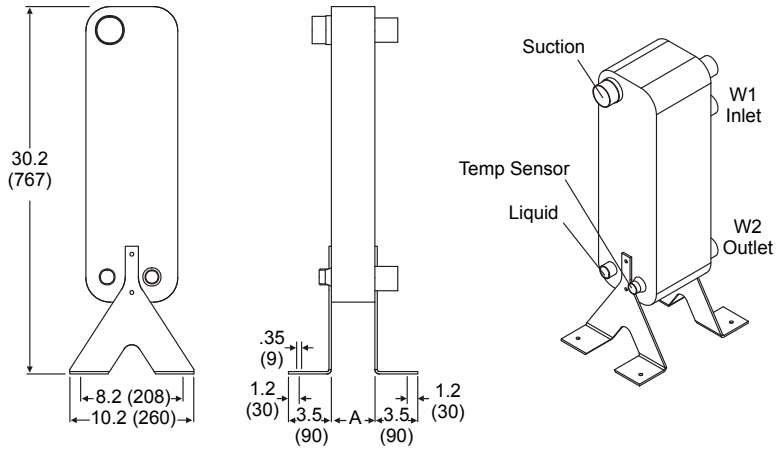


Figure 17, AGZ 020BM - 034BM (See page 46 for additional dimensions and weights)



Remote Evaporators

Figure 18, Remote Evaporators, for AGZ 010BM – 034BM



AGZ Model	Liquid Line Conn. Brazed, in (L).	Suction Line Conn. Brazed, in (S).	Temp. Sensor NPT, in. (TS)	Victaulic Water Conn. In. (W)	Dimension "A" in. (mm)
010	1.125	2.125	0.75	2.0	3.6 (91)
013	1.125	2.125	0.75	2.0	6.0 (153)
017	1.125	2.125	0.75	2.0	7.1 (181)
020	1.125	2.125	0.75	2.0	7.7 (195)
025	1.125	2.125	0.75	2.0	10.6 (271)
029	1.375	2.125	0.75	2.0	13,8 (351)
034	1.375	2.125	0.75	2.0	19.0 (483)

ACZ/AGZ Dimensions and Weights

Table 29, ACZ-BS Dimensions and Weights

ACZ SIZE	CENTER OF GRAVITY			SHIP WT. (LBS)	OPN. WT. (LBS)	LIFTING WEIGHTS (LBS)				CONNECTION SIZES (IN. O.D.)		
	X	Y	Z			LF	RF	LB	RB	SUCTION	LIQUID	HOT GAS
010-013B	27.50	21.70	22.90	1000	1015	369	379	124	128	1.125	0.875	0.625
016B	26.50	21.60	23.40	1065	1090	421	416	115	113	1.625	0.875	0.625
020B	26.60	21.80	23.30	1150	1190	454	449	124	123	1.625	0.875	0.625
025B	38.50	21.90	23.30	1370	1420	501	498	186	185	1.625	0.875	0.625
028B	38.50	19.10	23.30	1390	1445	508	505	189	188	1.625	0.875	0.625
033B	41.00	23.00	23.30	1565	1625	540	538	244	243	1.625	0.875	0.875
039B	34.60	24.00	22.40	1975	2050	753	807	201	215	2.125	0.875	0.875

Table 30, ACZ-BS Mounting Weights

ACZ SIZE	MOUNTING CORNER WEIGHTS (LBS.)			
	LF	RF	LB	RB
010-013B	257	264	236	243
016B	290	286	246	243
020B	312	309	266	263
025B	446	443	241	240
028B	453	449	245	243
033B	488	487	296	295
039B	656	703	297	318

Table 31, AGZ 010BS - 034BS, Packaged Chiller, Dimensions and Weights

AGZ UNIT SIZE	CENTER OF GRAVITY (IN.)			SHIP WT. (LBS)	OPN. WT. (LBS)	LIFTING WEIGHTS (LBS)				EVAP. CONN. (IN.) VICTAULIC	MOUNTING CORNER WEIGHTS (LBS.)			
	X	Y	Z			LF	RF	LB	RB		LF	RF	LB	RB
010B	28.00	21.50	23.40	1085	1095	398	392	149	147	2	279	275	267	263
013B	27.40	21.40	23.90	1170	1190	452	426	150	141	2	315	297	288	271
017B	27.50	21.60	24.00	1280	1300	493	463	167	157	2	344	323	316	297
020B	38.50	21.80	23.90	1505	1525	564	534	209	198	2	502	475	271	257
025B	39.50	19.40	24.00	1610	1635	593	554	239	224	2	531	496	301	282
029B	41.00	22.75	24.20	1800	1830	645	595	291	269	2	583	238	353	326
034B	35.60	23.70	23.50	2270	2315	890	869	259	253	2	779	761	369	361

Table 32, AGZ 010BM - 034BM, Remote Evaporator, Dimensions and Weights

AGZ REMOTE EVAP.	CENTER OF GRAVITY (IN.)			SHIP WT. (LBS)	OPN. WT. (LBS)	LIFTING WEIGHTS (LBS)				CONNECTION SIZES (IN. O.D.)		
	X	Y	Z			LF	RF	LB	RB	SUCTION	LIQUID	HOT GAS BYPASS
010B	27.50	21.70	22.90	1000	1015	369	379	124	128	1.125	0.875	0.625
013B	26.50	21.60	23.40	1065	1090	421	416	115	113	1.625	0.875	0.625
017B	26.60	21.80	23.30	1150	1190	454	449	124	123	1.625	0.875	0.625
020B	38.50	21.90	23.30	1370	1420	501	498	186	185	1.625	0.875	0.625
025B	38.50	19.10	23.30	1390	1445	508	505	189	188	1.625	0.875	0.625
029B	41.00	23.00	23.30	1565	1625	540	538	244	243	1.625	0.875	0.875
034B	34.60	24.00	22.40	1975	2050	753	807	201	215	2.125	0.875	0.875

Table 33, AGZ 010BM - 034BM, Mounting Weights

AGZ REMOTE EVAP	MOUNTING CORNER WEIGHTS (LBS.)			
	LF	RF	LB	RB
010B	257	264	236	243
013B	290	286	246	243
017B	312	309	266	263
020B	446	443	241	240
025B	453	449	245	243
029B	488	487	296	295
034B	656	703	297	318

Unit Placement

ACZ/AGZ units are for outdoor applications and can be mounted either on a roof or at ground level. For roof mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof. For ground level applications, install the unit on a substantial base that will not settle. Use a one-piece concrete slab with footings extended below the frost line. Be sure the foundation is level within 1/2" (13mm) over its length and width. The foundation must be strong enough to support the weights listed in the Dimension and Weight Tables on page 46.

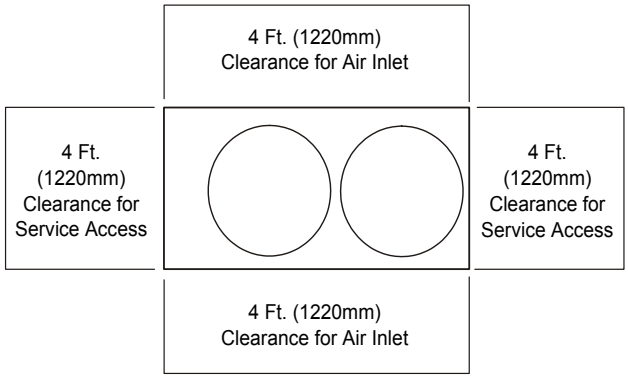
Clearances

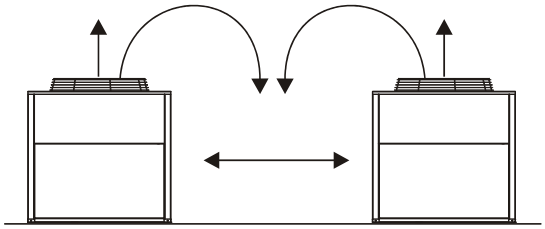
The flow of air to and from the condenser coil must not be limited. Restricting airflow or allowing air recirculation will result in a decrease in unit performance and efficiency. There must be no obstruction above the unit that would deflect discharge air downward where it could be recirculated back to the inlet of the condenser coil. The condenser fans are propeller type and will not operate with ductwork on the fan outlet.

Install the unit with enough side clearance for air entrance to the coil and for servicing. Provide service access to the evaporator, compressors, electrical control panel and piping components as shown in Figure 19. Do not block access to the unit with piping or conduit.

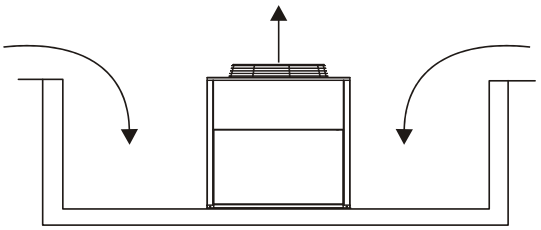
Do not allow debris to accumulate near the unit. Air movement may draw debris into the condenser coil causing air starvation. Give special consideration to low ambient operation where snow can accumulate. Keep condenser coils and fan discharge free of snow or other obstructions to permit adequate airflow.

Figure 19, Clearances

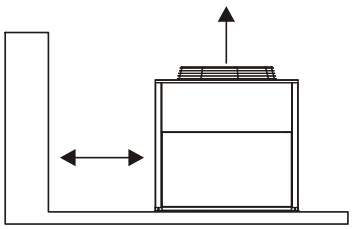




The recommended minimum side clearance between two units is 8 feet (2440mm).



The unit must not be installed in a pit or enclosure that is deeper or taller than the height of the unit unless extra space is provided. The minimum clearance on each side of the unit is 6 feet (1828mm) when installed in a pit. The pit cannot be deeper than the unit.



The minimum clearance to a side wall or building taller than the unit height is 6 feet (1828mm) provided no solid wall above 6 feet (1828mm) tall is closer than 12 feet (3658mm) to the opposite side of the unit.

Refrigerant Piping

Models ACZ BS condensing units and AGZ-BM chillers with remote evaporators require field refrigerant piping. Proper refrigerant piping makes the difference between a reliable or an inefficient problematic system. The primary concerns related to piping are refrigerant pressure drop, a solid liquid feed to the expansion valves, continuous oil return and properly sized refrigerant specialties.

The recommended source for refrigerant piping techniques and sizing is the ASHRAE 2002 Refrigeration Handbook, chapter #2.

Refrigerant specialties including the expansion valves, solenoid valves, filter drier and sight glasses for use with the remote evaporator applications are supplied and installed by the installing contractor. The remaining components including pipe, insulation, fittings and Schrader valves are also provided and piped by the installer. The optional hot gas bypass valve with solenoid valve can be provided as a field installed or factory installed option. A holding charge of nitrogen/helium or refrigerant is provided for the unit and in either case must be removed prior to charging. The installer must properly evacuate the piping system and provide the operating charge of refrigerant.

Although conflicting piping recommendations can be found in different sources, McQuay offers the following recommendations for these controversial issues.

The use of double risers for vertical gas risers is generally not required and should be used only as a last resort to maintain the minimum refrigerant flow to carry oil up the vertical risers. Slightly downsizing the vertical riser is a superior option to providing double risers.

Slope the refrigerant lines 1” per 10 feet of horizontal run in the direction of refrigerant flow to assist oil return.

Resist using hot gas bypass for applications when operation in ambient temperature below 40 degrees is expected. This recommendation helps to maintain adequate condensing pressures and liquid refrigerant at the expansion valve at maximum condenser capacity.

Pressure drops in the refrigerant lines should be maintained at or below the ASHRAE recommendations and line lengths should be made as short as possible. Exceeding these recommendations will decrease performance and could impact reliability.

Small traps should be provided at the base of each major vertical gas riser to assist in the collection of oil. If vertical risers exceed more than 25 feet, install a small trap at the midpoint and not to exceed more than 20 feet intervals.

Use caution in sizing the liquid line in applications where the evaporator is above the outdoor section. The weight of the liquid refrigerant in the vertical column will decrease the pressure at the top of the riser (approximately .5 PSI per foot of vertical rise) allowing some of the refrigerant to flash to a gas. Adequate refrigerant subcooling is needed at the outdoor section to prevent large volumes of refrigerant gas at the expansion valve.

It is recommended that the piping systems always extend above the highest component in the refrigeration system before dropping down to make the final refrigerant connections to components. This practice will hinder the draining of condensed refrigerant to the lower component when normal shutdown procedures do not occur (such as a power failure).

Unit Refrigerant Valves: Models ACZ 010BS-039BS and Models AGZ 010BM-034BM Remote Evaporator must have liquid and suction shutoff valves field supplied and installed.

NOTE: Do not run refrigerant piping underground.

Chilled Water System

Water Piping

Local authorities can supply the installer with the proper building and safety codes required for proper installation.

Install piping with minimum bends and changes in elevation to minimize pressure drop. Consider the following when installing water piping:

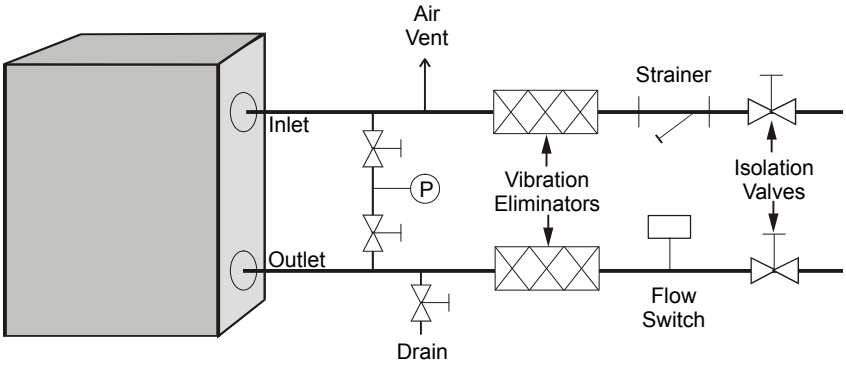
1. Vibration eliminators to reduce vibration and noise transmission to the building.
2. Shutoff valves to isolate the unit from the piping system during unit servicing.
3. Manual or automatic air vent valves at the high points of the system. Install drains at the lowest points in the system.
4. Maintaining adequate system water pressure (expansion tank or regulating valve).
5. Temperature and pressure indicators located at the unit to aid in unit servicing. Pressure gauge taps must be installed in the chilled water inlet and outlet piping or as shown in Figure 4.
6. A strainer or other means of removing foreign matter from the water before it enters the pump. Place the strainer far enough upstream to prevent cavitation at the pump inlet (consult pump manufacturer for recommendations). The use of a strainer can prolong pump life and keep system performance up.
7. A 40-mesh strainer *is required* in the water line just before the inlet of the evaporator. This will help prevent foreign material from entering and decreasing the performance of the evaporator.
8. The brazed plate evaporator has a thermostat and heating cable to prevent freeze-up down to -20°F (-29°C). The heating cable should be wired to a separate 110V supply circuit. As shipped from the factory, the heating cable is wired to the control circuit. Protect all water piping to the unit from freezing.

⚠ CAUTION

If a separate disconnect is used for the 110V supply to the evaporator heating cable, mark the disconnect clearly so the disconnect is not accidentally shut off during cold seasons. Failure to do so can cause a failure of the evaporator.

9. If the unit is used as a replacement chiller on a previously existing piping system, flush the system thoroughly before unit installation. Perform regular water analysis and chemical water treatment on the evaporator immediately at equipment start-up.
10. When glycol is added to the water system for freeze protection, the refrigerant suction pressure will be lower, cooling performance less, and water side pressure drop greater. If the percentage of glycol is high, or if propylene is used instead of ethylene glycol, the added pressure drop and loss of performance could be substantial. Reset the freezestat and low leaving water alarm temperatures. The freezestat is factory set to default at 38°F (3.3°C). Reset the freezestat setting to approximately 4 to 5 degrees F (2.3 to 2.8 degrees C) below the leaving chilled water setpoint temperature. See the section titled “Glycol Solutions” on page 11 for additional information concerning glycol.
11. Perform a preliminary leak check before insulating the piping and filling the system.
12. Include a vapor barrier on the piping insulation to prevent condensation and possible damage to the building structure.

Figure 20, Typical Field Evaporator Water Piping



NOTES:
1. Chilled water piping within the unit enclosure must be insulated in the field.
2. Support piping independently of the unit and install per local codes.

System Volume

It is important to have adequate water volume in the system to provide an opportunity for the chiller to sense a load change, adjust to the change and stabilize. As the expected load change becomes more rapid, a greater

water volume is needed. The system water volume is the total amount of water in the evaporator, air handling products and associated piping. If the water volume is too low, operational problems can occur, including rapid compressor cycling, rapid loading and unloading of compressors, erratic refrigerant flow in the chiller, improper motor cooling, shortened equipment life and other undesirable occurrences.

For normal comfort cooling applications, where the cooling load changes relatively slowly, we recommend a minimum system volume of three to four times the flow rate (GPM). For example, if the design chiller flow rate is 120 GPM, we recommend a minimum system volume of 360 to 480 gallons.

Since there are many other factors that can influence performance, systems may successfully operate below these suggestions. However, as the water volume decreases below these suggestions, the possibility of problems increases.

Variable Chilled Water flow

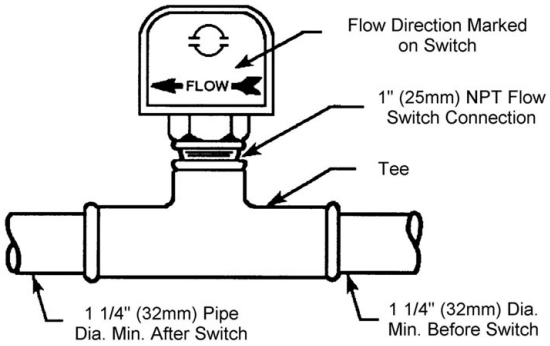
Variable chilled water flow systems are not recommended for this class of equipment due to limited unloading capability.

Flow Switch

Mount a water flow switch in the leaving water line to shut down the unit when water flow is interrupted.

A flow switch is available from McQuay (part number 017503300). It is a "paddle" type switch and adaptable to pipe sizes down to 1 1/4" (32mm) nominal. Certain minimum flow rates are required to close the switch and are listed in Table 34. Install the switch as shown in Figure 21. Connect the normally open contacts of the flow switch in the unit control center at terminals 4 and 5. There is also a set of normally closed contacts on the switch that can be used for an indicator light or an alarm to indicate when a "no-flow" condition exists. Freeze protect any flow switch that is installed outdoors. Follow installation instructions provided with the flow switch. Calibrate the flow switch to open at one-half of nominal flow rate.

Figure 21, Flow Switch Installation



NOTE: Differential pressure switches are not recommended for outdoor installation. They are subject to damage from freezing.

Table 34, Flow Switch Settings

Pipe Size (NOTE !)		inch	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8
		mm	32 (2)	38 (2)	51	63 (3)	76	102 (4)	127 (4)	153 (4)	204 (5)
Min. Adjst.	Flow	gpm	5.8	7.5	13.7	18.0	27.5	65.0	125.0	190.0	205.0
		Lpm	1.3	1.7	3.1	4.1	6.2	14.8	28.4	43.2	46.6
	No Flow	gpm	3.7	5.0	9.5	12.5	19.0	50.0	101.0	158.0	170.0
		Lpm	0.8	1.1	2.2	2.8	4.3	11.4	22.9	35.9	38.6
Max. Adjst.	Flow	gpm	13.3	19.2	29.0	34.5	53.0	128.0	245.0	375.0	415.0
		Lpm	3.0	4.4	6.6	7.8	12.0	29.1	55.6	85.2	94.3
	No Flow	gpm	12.5	18.0	27.0	32.0	50.0	122.0	235.0	360.0	400.0
		Lpm	2.8	4.1	6.1	7.3	11.4	27.7	53.4	81.8	90.8

NOTES:

1. A segmented 3-inch paddle (1, 2, and 3 inches) is furnished mounted, plus a 6-inch paddle loose.
2. Flow rates for a 2-inch paddle trimmed to fit the pipe.
3. Flow rates for a 3-inch paddle trimmed to fit the pipe.
4. Flow rates for a 3-inch paddle.
5. Flow rates for a 6-inch paddle.

Water Connections

The unit has 3-inch holes for the chilled water piping to enter the unit. The connections are made to the evaporator water connections located within the unit. Chilled water piping within the unit must be insulated.

Operating/Standby Limits

Maximum standby ambient air temperature, 130°F (54.4°C)

Maximum operating ambient air temperature, 115°F (46.1°C)

Minimum operating ambient temperature (standard), 35°F (2°C)

Minimum operating ambient temperature (with optional low-ambient control), 0°F (-18°C)

Vibration Isolators

Vibration isolators are recommended for all roof-mounted installations or wherever vibration transmission is a consideration.

The unit should be initially on shims or blocks at the listed free height. When all piping, wiring, flushing, charging, etc. is completed, the springs are adjusted upward to loosen the blocks or shims that are then removed.

A rubber anti-skid pad is part of the isolator. Installation of spring isolators requires flexible piping connections and at least three feet of flexible conduit to avoid straining the piping and transmitting vibration and noise.

Isolator Installation

The unit should be initially installed on shims or blocks at the listed free height. When all piping, wiring, flushing, charging, etc. is completed, adjust the springs upward to load them and to provide clearance to remove the shims or blocks.

Installation of spring isolators requires flexible piping connections and at least three feet of conduit flex tie-ins. Piping and conduit must be supported independently of the unit.

Isolator Dimensions

Isolator dimensions are on the following page.

Table 35 Corner Operating Weights

ACZ-BS (lbs)

ACZ	RF	LF	RB	LB
010	259	257	243	241
013	259	257	243	241
016	353	360	251	256
020	377	383	288	292
025	498	505	232	235
028	508	515	232	235
033	605	567	304	284
039	712	649	313	286

AGZ-BM (lbs)

AGZ	LF	RF	LB	RB
010A	257	264	236	243
013A	290	286	246	243
017A	312	309	266	263
020A	446	443	241	240
025A	453	449	245	243
029A	488	487	296	295
034A	656	703	297	318

AGZ-BS (lbs)

AGZ	RF	LF	RB	LB
010A	243	262	243	262
013A	358	390	284	310
017A	374	410	319	349
020A	525	570	253	274
025A	539	594	259	286
029A	628	647	324	334
034A	731	747	348	356

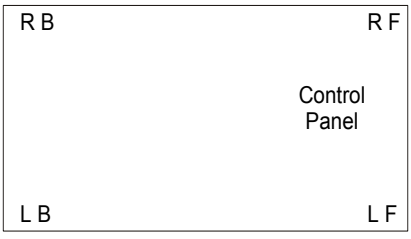
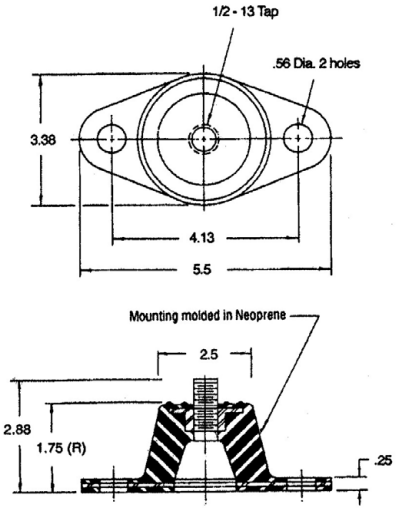
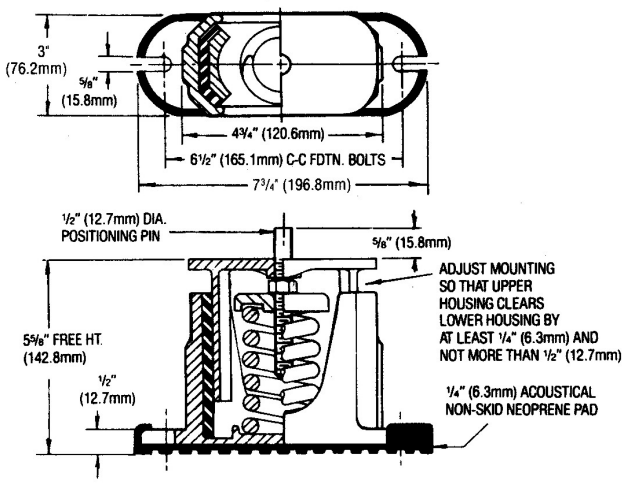


Figure 22 Isolator Dimensions

RP-3, Neoprene-in Shear Isolator



CP-1, Spring Isolator



Optional Features

Controls

Hot Gas Bypass

Hot gas bypass permits unit operation down to appromately10% of full load capacity. This option includes a factory-installed hot gas bypass valve, solenoid valve, and manual shutoff valve for each circuit. Interconnecting piping to the evaporator is field installed on Model ACZ and AGZ-BM remote evaporator chillers.

Head Pressure Control

Optional SpeedTrol head pressure allows unit operation down to 0°F (-18°C). (Not available on 380 volt, 60 Hertz units.). Fan cycling is standard.

Evaporator Water Flow Switch

Factory-mounted and wired flow switch on AGZ-BS only.

Alarm Bell

Field installed and wired to the control panel to provide remote indication of unit alarm condition.

Remote Operator Interface Panel

A remote interface panel, field-wired to the unit, providing all the data viewable on the unit's controller, including alarm clearing and setpoint change capability. See page 9 for details.

BAS Interface (Open Choices™)

A module is factory installed on the MicroTech II™ controller to provide direct interface to the following standard protocols: Also available as a field-installed kit.

BACnet MS/TP	BACnet Ethernet	BACnet IP
LONTALK (FTT-10A)	Modbus	

Unit

Vibration Isolators

Spring or neoprene-in-shear vibration isolators are available for field installation to reduce vibration transmission through the unit base.

Louvers/Hail Guard/Wind Baffles

Louvers covering the coil only, which due to the unit design, effectively encloses the entire unit.

Copper Fin Condenser Coils

Copper fin condenser coils are available as an option on all models.

Black Fin Coils

Aluminum fin stock pre-coated with a phenolic coating with 1000-hour salt spray resistance (ASTM B117-90).

Coated Fins

Copper or aluminum fins coated with *ElectroFin*® baked epoxy protective coating with 5000-hour salt spray resistance (ASTM B117-90).

Sound Reduction

Acoustical blankets are factory-installed on each compressor. They are also available for retrofit field installation.

Discharge Shut-off Valve

Factory-mounted discharge shut-off valve.

Double Evaporator Insulation

Double insulation for low temperature chilled fluid applications or extreme high humidity locations.

Electrical

Disconnect Switch with Through-the-Door Handle

A factory-installed option for service use, non-fused disconnect switch (mounted inside the power section of the control box) with a through-the-door handle.

High Interrupt Current Disconnect Switch

Factory-installed option with through-the-door handle

High Short Circuit Current Rating with Disconnect Switch

Factory-installed option with through-the-door handle

Phase Loss/Voltage Protection

(P/N 350015201) Phase loss with under/over voltage protection and multiple LED indication of fault type is available as a factory installed option to guard against compressor motor burnout.

Product Specification

Specifications are available in MSWord format. Contact the local McQuay sales office.

SECTION 15XXX

AIR-COOLED SCROLL COMPRESSOR CONDENSING UNITS
ACZ 010B-ACZ 039B

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled scroll compressor condensing units.

1.02 REFERENCES

Comply with applicable Standards/Codes of ARI 365-94, ANSI/ASHRAE 15, ETL, cETL, NEC, and OSHA as adopted by the State.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with the specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements, such as electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field interface/connection.
5. Diagram shall fully delineate field and factory wiring.
6. Installation manuals.

1.04 QUALITY ASSURANCE

A. Qualifications: Equipment manufacturer must specialize in the manufacture of the type of products specified and have five years experience with similar equipment and refrigerant offered.

B. Regulatory Requirements: Comply with the codes and standards specified.

C Manufacturer's plant must be ISO Registered.

1.05 DELIVERY AND HANDLING

A. Condensing units shall be delivered to the job site assembled and charged with a holding charge of nitrogen/helium and full oil charge by the manufacturer.

B. Comply with the manufacturer's instructions for rigging and handling equipment.

1.06. WARRANTY

The refrigeration equipment manufacturer's guarantee shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The guarantee shall provide for repair or replacement due to failure by material and workmanship that prove defective within the above period, excluding refrigerant.

1.07 MAINTENANCE

Maintenance of the units shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. McQuay International

B. (Approved Equal)

2.02 UNIT DESCRIPTION

Provide and install as shown on the plans factory-assembled, air-cooled, scroll compressor condensing units in the size and quantity specified. Each unit shall consist of a hermetic tandem scroll compressor set, air-cooled condenser section, control system and all components necessary for controlled unit operation when field piped and wired to low side equipment specified elsewhere.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete scroll-compressor condensing unit as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect.

B. Performance: Refer to the schedule of performance on the drawings. The unit shall be capable of stable operation to a minimum of 50 percent of full load without hot gas bypass. Performance shall be in accordance with ARI Standard 365-94.

C. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with ARI Standard 370.

Octave Band								
63	125	250	500	1000	2000	4000	8000	dBA
____	____	____	____	____	____	____	____	____

2.04 CONDENSING UNIT COMPONENTS

A. Compressors: The compressors shall be sealed hermetic scroll type with crankcase oil heater and suction strainer. Compressor shall have a forced-feed lubrication system with integral oil pump and oil charge. 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.

B. Condenser: The condenser coils shall consist of seamless copper tubes mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A subcooling coil shall be an integral part of the main condenser coil. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct-drive fan motors. They shall be equipped with a heavy-gauge fan guard. Fan motors shall be TEAO, three-phase, direct-drive, 1140 rpm. The condenser coil shall be protected by a full-area, epoxy-coated, wire mesh screen.

D. Refrigerant Circuit: Capped connections shall be provided for field connection of refrigerant piping. Refrigerant specialties shall be field supplied and installed.

E. Control System: A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Power and starting components shall include factory short circuit protection of 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 unit power connections for connection to remote disconnect switch. Hinged access doors shall be tool-lockable. Barrier panels or separate doors are required to protect against accidental contact with line voltage when accessing the control system.

F. An advanced DDC microprocessor unit controller with a 4-line by 20-character liquid crystal display provides the operating and protection functions. The controller shall be capable of receiving a 4 to 20 mA signal for demand limiting and be remotely enabled with a digital input. The controller shall take pre-emptive limiting action in case of high discharge pressure or low evaporator pressure.

The controller shall contain the following features as a minimum:

Equipment Protection

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.

Shutdown Alarms

- Low evaporator pressure
- High condenser pressure
- Motor protection system
- Phase voltage protection (Optional)
- Outside ambient temperature
- Sensor failures

Limit Alarms

- Condenser pressure stage down, unloads at high discharge pressures
- Low ambient lockout, shuts off unit at low ambient temperatures
- Low evaporator pressure hold, holds stage #1 until pressure rises
- Low evaporator pressure unload, shuts off one compressor

Unit Enable Selection

Enables unit operation from either local keypad, digital input, or BAS

Unit Mode Selection

Selects standard cooling or test operation mode

Digital Inputs

- Unit off switch
- Remote start/stop
- Motor protection

Digital Outputs

- Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared

Condenser fan control

The unit controller shall provide control of condenser fans based on compressor discharge pressure.

Building Automation System (BAS) Interface

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.

- BACnet IP
- BACnet MS/TP master (Clause 9)
- BACnet ISO 8802-3, (Ethernet)
- LONMARK FTT-10A. The unit controller shall be LONMARK® certified.
- Modbus

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.

For chillers communicating over a LONMARK network, the corresponding LONMARK eXternal Interface File (XIF) shall be provided with the chiller submittal data.

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.

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Hot gas bypass to allow unit operation to 10 percent of full load
- Low ambient head pressure control to 0°F (-17.8°C)
- Non-fused disconnect switch with through-the-door handle
- High interrupt current rated disconnect switch
- High short circuit current rating with disconnect switch
- Phase loss/voltage monitor
- Aluminum fins pre-coated with a phenolic epoxy coating with 1000 hour salt spray rating (ASTM B117-90
- Copper fin condenser coils

- *ElectroFin*™ baked epoxy coating providing 5000+ hour salt spray resistance (ASTM B117-90) and is applied to both the coil and the coil frames.
- Spring vibration isolators for field installation
- Neoprene-in-shear vibration isolators for field installation
- Louvers for the coil sides of the unit
- Remote operator interface panel
- Alarm bell for field installation
- BAS interface module for standard protocols
- Sound reduction blankets for compressors
- Discharge shut-off valve

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.

B. Adjust and level unit in alignment on supports.

C. Coordinate electrical installation with electrical contractor.

D Coordinate controls with control contractor.

E. Provide all appurtenances required for a fully operational and functional unit.

3.02 START-UP

A. Install proper charge of refrigerant and oil.

B. Provide testing and starting of machine, and instruct the Owner in its proper operation and maintenance.

Specifications are available in MSWord format. Contact the local McQuay sales office.

SECTION 15XXX
AIR-COOLED SCROLL COMPRESSOR CHILLERS
AGZ 010BS-AGZ 034BS

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled scroll compressor chillers.

1.02 REFERENCES

Comply with applicable and current Standards/Codes of ARI 550/590, ANSI/ASHRAE 15, ETL, cETL, NEC, and OSHA as adopted by the State.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with the specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements, such as electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field interface/connection.
5. Diagram shall fully delineate field and factory wiring.
6. Certification of factory-run test of chiller unit signed by company officer.
7. Installation manuals.

1.04 QUALITY ASSURANCE

A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with the type equipment and refrigerant offered.

B. Regulatory Requirements: Comply with the codes and standards specified.

C. Chiller manufacturer plant must be ISO9002 Registered.

1.05 DELIVERY AND HANDLING

A. Chillers shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.

B. Comply with the manufacturer's instructions for rigging and handling equipment.

1.06. WARRANTY

The refrigeration equipment manufacturer’s guarantee shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The guarantee shall provide for repair or replacement due to failure by material and workmanship that prove defective within the above period, excluding refrigerant.

1.07 MAINTENANCE

Maintenance of the chillers shall be the responsibility of the owner and performed in accordance with the manufacturer’s instructions.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. McQuay International

B. (Approved Equal)

2.02 UNIT DESCRIPTION

Provide and install as shown on the plans factory-assembled, factory-charged, and factory-tested air-cooled scroll compressor packaged chillers in the quantity specified. Each chiller shall consist of hermetic tandem scroll compressors, direct expansion evaporator, air-cooled condenser section, microprocessor-based control system and all components necessary for controlled unit operation.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete scroll compressor packaged chiller as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect.

C. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum of 50 percent of full load without hot gas bypass. Performance shall be in accordance with ARI Standard 550/590.

C. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with ARI Standard 370.

	Octave Band							
63	125	250	500	1000	2000	4000	8000	dBA
_____	_____	_____	_____	_____	_____	_____	_____	_____

2.04 CHILLER COMPONENTS

A. Compressors: The compressors shall be sealed hermetic scroll type with crankcase oil heater and suction strainer. Compressor shall have a forced-feed lubrication system with a reversible oil pump and oil charge. 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.

B. Evaporators

The evaporator shall be a compact, high efficiency, single circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless steel plates.

The evaporator shall be protected with an electric resistance heater 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.

The water-side working pressure shall be a minimum of 350 psig (2413 kPa). Vent and drain connections shall be provided in the inlet and outlet chilled water piping by the installing contractor. Evaporators shall be Underwriters Laboratories (UL) listed

C. Condenser: The condenser coils shall consist of 3/8 inch (10mm) seamless copper tubes mechanically bonded into plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A subcooling coil shall be an integral part of the main condenser coil. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct-drive fan motors. They shall be

equipped with a heavy-gauge fan guard. Fan motors shall be TEAO, three-phase, direct-drive, 1140 rpm. The condenser coil shall be protected by a full-area, epoxy-coated, wire mesh screen.

D. Refrigerant Circuit: The refrigerant circuit shall include a refrigerant filter-drier, sight glass with moisture indicator, liquid line solenoid valve (no exceptions), thermal expansion valve, and insulated suction line.

G. Control System: A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Power and starting components shall include factory circuit breaker of 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 unit power terminal blocks for connection to remote disconnect switch. Terminals shall also be provided for power supply to the evaporator heater circuit. 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.

H. An advanced DDC microprocessor unit controller with a 4-line by 20-character liquid crystal display provides the operating and protection functions. The controller shall take pre-emptive limiting action in case of high discharge pressure or low evaporator pressure.

The controller shall contain the following features as a minimum:

Equipment Protection

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.

Shutdown Alarms

No evaporator water flow	Sensor failures
Low evaporator pressure	Evaporator freeze protection
High condenser pressure	Outside ambient temperature
Motor protection system	Phase voltage protection (Optional)

Limit Alarms

Condenser pressure stage down, unloads unit at high discharge pressures
Low ambient lockout, shuts off unit at low ambient temperatures
Low evaporator pressure hold, holds stage #1 until pressure rises
Low evaporator pressure unload, shuts off one compressor

Unit Enable Selection

Enables unit operation from either local keypad, digital input, or BAS

Unit Mode Selection

Selects standard cooling, ice, glycol, or test operation mode

Analog Inputs

Reset of leaving water temperature, 4-20 mA

Digital Inputs

- Unit off switch
- Remote start/stop
- Flow switch
- Ice mode switch, converts operation and setpoints for ice production
- Motor protection

Digital Outputs

- Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
- Evaporator pump; field wired, starts pump when unit is set to start

Condenser fan control

The unit controller shall provide control of condenser fans based on discharge pressure.

Building Automation System (BAS) Interface

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.

- BACnet IP
- BACnet MS/TP master (Clause 9)
- BACnet ISO 8802-3, (Ethernet)
- LONMARK FTT-10A. The unit controller shall be LONMARK ® certified.

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.

For chillers communicating over a LONMARK network, the corresponding LONMARK eXternal Interface File (XIF) shall be provided with the chiller submittal data.

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.

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Hot gas bypass to allow unit operation to 10 percent of full load
- Low ambient head pressure control to 0°F (-17.8°C)
- Non-fused disconnect switch with through-the-door handle
- High interrupt disconnect switch
- High short circuit current rating with disconnect swirch
- Phase loss/voltage protection
- Aluminum fins shall be pre-coated with a phenolic epoxy coating with 1000 hour salt spray rating (ASTM B117-90
- Copper fin condenser coils
- *ElectroFin*™ baked epoxy coating providing 5000+ hour salt spray resistance (ASTM B117-90) and is applied to both the coil and the coil frames.
- Chilled water flow switch to be field mounted in the chilled water line and field wired to terminals in the control panel.
- Spring vibration isolators for field installation
- Rubber-in-shear vibration isolators for field installation
- Double evaporator insulation
- Compressor sound reduction package
- Alarm bell for field mounting and wiring

- Remote operator interface
- BAS interface module for Modbus, BACnet w/MSTP, BACnet w/ Ethernet, LONMARK

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.

Install a field-supplied 40-mesh strainer in the chilled water return line at the evaporator inlet.

B. Adjust and level chiller in alignment on supports.

C. Coordinate electrical installation with electrical contractor.

D. Coordinate controls with control contractor.

3.02 START-UP

A. Provide testing and starting of machine, and instruct the Owner in its proper operation and maintenance.

AIR-COOLED SCROLL COMPRESSOR CHILLERS
WITH REMOTE EVAPORATOR
AGZ 010BM- AGZ 034BM

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled scroll compressor chillers.

1.02 REFERENCES

Comply with applicable Standards/Codes of ARI 550/590-2003, ANSI/ASHRAE 15, ETL, cETL, and OSHA as adopted by the State.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with the specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements such as: electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
3. Single line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field interface/connection.
5. Field installed refrigerant piping diagram with line sizes and refrigeration specialties shown.
6. Diagram shall fully delineate field and factory wiring.
7. Installation manuals.

1.04 QUALITY ASSURANCE

A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with the equipment and refrigerant offered.

B. Regulatory Requirements: Comply with the codes and standards specified.

C. Chiller manufacturer plant must be ISO9002 Registered.

1.05 DELIVERY AND HANDLING

A. The outdoor section shall be delivered to the job site with a holding charge .

B. Comply with the manufacturers instructions for rigging and handling equipment.

1.06. WARRANTY

The refrigeration equipment manufacturer's warranty shall be for a period of one year from date of equipment start up but not more than 18 months from shipment. The warranty shall cover material and workmanship that prove defective within the above period and resultant loss of refrigerant.

1.07 MAINTENANCE

Maintenance of the chillers shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. McQuay International

B. (Approved Equal)

2.02 UNIT DESCRIPTION

Provide and install as shown on the air-cooled scroll compressor chiller systems in the quantity specified. Each system shall consist of hermetic tandem scroll compressors, air-cooled condenser section, control system and all components necessary for controlled unit operation.

A single-circuit, direct expansion, insulated evaporator shall be provided for remote location and be installed and piped to the outdoor unit by the installing contractor.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete scroll compressor chiller system consisting of an outdoor compressor-condenser section and a remote indoor evaporator as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect.

B. Performance: Refer to the schedule of performance on the drawings. The chiller shall be able to operate to at least 25 percent of full load without hot gas bypass.

C. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation and be measured at 30 feet from the unit and one meter above the unit base line

	Octave Band							
63	125	250	500	1000	2000	4000	8000	dBA
_____	_____	_____	_____	_____	_____	_____	_____	_____

2.04 CHILLER COMPONENTS

A. Compressors: The compressors shall be tandem hermetic scroll type with discharge service valve, crankcase oil heater and suction strainer. Compressors shall have a forced feed lubrication system with a reversible oil pump and factory oil charge. The compressor motors 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.

B. Remote Evaporator: Units shall have a direct expansion type brazed-plate evaporator with stainless steel plates brazed together with copper. It shall be insulated with 3/4 inch (19mm) closed cell polyurethane insulation and be heated with an electric heater to provide freeze protection to -20°F (-29°C) ambient temperature. The evaporator must be UL listed.

C. Condenser: The condenser coils shall consist of 3/8 inch (10mm) seamless copper tubes mechanically bonded into plate type fins. The fins shall have full drawn collars to completely cover the tubes. A subcooling coil shall be an integral part of the main condenser coil. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct drive fan motors. Each fan shall be in its own compartment to eliminate cross flow of condenser air during fan cycling and shall be equipped with a heavy-gauge vinyl coated fan guard. Fan motors shall be weather protected, three-phase, direct-drive, 1140 rpm, TEAO type. External coils shall have wire mesh protective guards.

D. Refrigerant Circuit: The refrigerant specialties shall be supplied by the unit manufacturer and include a liquid line shutoff valve, refrigerant filter-drier, sight glass with moisture indicator, liquid line solenoid

valve, thermal expansion valve, and insulated suction line. The factory specialties, along with piping and insulation furnished by the installing contractor shall be field installed by the contractor.

E. Control System: A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Power and starting components shall include factory fusing of fan motors and control circuit; individual contactors for each fan motor, solid-state three-phase motor overload protection, inherent fan motor overload protection and unit power terminal blocks for connection to remote disconnect switch. Terminals shall also be provided for power supply to the evaporator heater circuit. Hinged access doors shall be lockable. Barrier panels are required to protect against accidental contact with line voltage when accessing the control system. The operating and equipment protection controls shall be:

F. An advanced DDC microprocessor unit controller with a 4-line by 20-character liquid crystal display provides the operating and protection functions. The controller shall take pre-emptive limiting action in case of high discharge pressure or low evaporator pressure.

The controller shall contain the following features as a minimum:

Equipment Protection

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.

Shutdown Alarms

No evaporator water flow	Sensor failures
Low evaporator pressure	Evaporator freeze protection
High condenser pressure	Outside ambient temperature
Motor protection system	Phase voltage protection (Optional)

Limit Alarms

Condenser pressure stage down, unloads unit at high discharge pressures

Low ambient lockout, shuts off unit at low ambient temperatures

Low evaporator pressure hold, holds stage #1 until pressure rises

Low evaporator pressure unload, shuts off one compressor

Unit Enable Selection

Enables unit operation from either local keypad, digital input, or BAS

Unit Mode Selection

Selects standard cooling, ice, glycol, or test operation mode

Analog Inputs

Reset of leaving water temperature, 4-20 mA

Digital Inputs

Unit off switch	Motor protection
Remote start/stop	Flow switch

Ice mode switch, converts operation and setpoints for ice production

Digital Outputs

- Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
- Evaporator pump; field wired, starts pump when unit is set to start

Condenser fan control

The unit controller shall provide control of condenser fans based on compressor discharge pressure.

Building Automation System (BAS) Interface

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.

- BACnet MS/TP master (Clause 9)
- BACnet IP, (Annex J)
- BACnet ISO 8802-3, (Ethernet)
- LONMARK FTT-10A. The unit controller shall be LONMARK® certified.

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.

For chillers communicating over a LONMARK network, the corresponding LONMARK eXternal Interface File (XIF) shall be provided with the chiller submittal data.

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.

G. The unit base and coil supports shall be fabricated from heavy gauge steel and painted with powder coat paint. Incidental supports can be galvanized.

2.05 OPTIONS AND ACCESSORIES

- Hot gas bypass to allow unit operation to 10 percent of full load
- Low ambient head pressure control to 0°F (-17.8°C)
- Non-fused disconnect switch with through-the-door handle
- High interrupt disconnect switch
- High short circuit current rating with disconnect swirch
- Phase loss/voltage protection
- Aluminum fins shall be pre-coated with a phenolic epoxy coating with 1000 hour salt spray rating (ASTM B117-90
- Copper fin condenser coils
- *ElectroFin*™ baked epoxy coating providing 5000+ hour salt spray resistance (ASTM B117-90) and is applied to both the coil and the coil frames.
- Chilled water flow switch to be field mounted in the chilled water line and field wired to terminals in the control panel.
- Spring vibration isolators for field installation
- Rubber-in-shear vibration isolators for field installation
- Double evaporator insulation
- Compressor sound reduction package
- Alarm bell for field mounting and wiring
- Remote operator interface
- BAS interface module for Modbus, BACnet w/MSTP, BACnet w/ Ethernet, LONMARK

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.

Install a field-supplied 40-mesh strainer in the chilled water return line at the evaporator inlet.

B. Adjust and level chiller in alignment on supports.

C. Coordinate electrical installation with electrical contractor.

D Coordinate controls with control contractor.

E. Provide all appurtenances required to provide a fully operational and functional chiller.

3.02 START-UP

A. Provide proper charge of refrigerant and oil.

B. Provide testing, and starting of machine, and instruct the Owner in its proper operation and maintenance.

All McQuay equipment is sold pursuant to McQuay's Standard Terms and Conditions of Sale and Limited Product Warranty.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to **www.mcquay.com**