| Product Manual | PM AGZ-2 |
|---|---|
| | Group: **Chiller** |
| | Effective**: May 1999** |
| | Supersedes: **PM AGZ-1** |

# Air-Cooled Scroll Compressor Chiller

**AGZ 030AS - 065AS, Packaged Chiller**
**AGZ 030AM – 050AM, Chiller with Remote Evaporator**
**60 Hertz, R-22**

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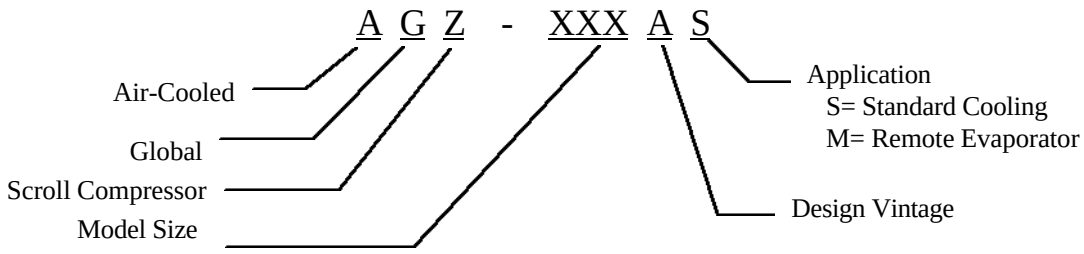
**NOTE:** The Model AGZ 030AM through AGZ 050AM chillers with remote evaporators are not included in the ARI Certification Program.

Our facility is **ISO9002 Certified**

# Introduction

**McQuay offers air-cooled chillers from 10 through 425 tons (35 – 1500 kW). This manual covers two varieties of the scroll compressor, air-cooled Global Chiller Line:**
**AGZ 030AS through AGZ 065AS, Packaged Air-Cooled Chillers**
**AGZ 030AM through AGZ 050AM, Air-Cooled with Remote Evaporator.**

### Nomenclature




## AGZ AS Models ARI 550/590-98 Certified

# Features and Benefits

**Efficiency**

- Cross-circuit compressor staging
- Copeland tandem scroll compressors
- Exceeds ASHRAE Std 90.1 for efficiency

**Reliability**

- Rugged compressor design
- Factory installed operating and safety controls
- Code and agency approval

**Flexibility**

- Complete factory assembly
- Sizes available in 5 ton increments
- All sizes available from stock
- SpeedTrol (optional)
- Small footprint

**Serviceability**

- Dual refrigerant circuits
- Easy servicing -- Electrical and refrigerant components are readily accessible
- Two control options

# Design Advantages

The McQuay AGZ Air-Cooled Global Chiller is a product of the McQuay commitment to offer quiet, reliable, energy efficient equipment. An approach incorporating high quality compressors, state-of-the-art coil design, and innovative packaging.

## Construction

Factory assembled and mounted on heavy-gauge painted phosphatized galvanized steel channel base. This base distributes the unit weight for roof loading. Varied and convenient installation is possible by virtue of the units 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 tandems provides four steps of modulation. One through four compressors can run, depending on the load of the system, resulting in excellent part-load efficiency. Each refrigerant circuit has two 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.

A fail-safe compressor by design-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. An integral subcooler circuit provides subcooling to effectively eliminate the possibility of liquid flashing. The external condenser coils are fitted with a protective wire mesh guard.

## 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 with permanently lubricated ball bearings and inherent overload protection. SpeedTrol option includes a single-phase motor with fan speed control on the lead fan for each circuit. Totally enclosed fan motors are available as an option on all sizes.

## Evaporator

The evaporator is direct expansion, shell-and-tube type with water flowing in the baffled shell side and refrigerant flowing through the tubes. Two independent refrigerant circuits within the evaporator serve the units dual refrigerant circuits.

The evaporator has a carbon steel shell and seamless high efficiency copper tubes roller expanded into a carbon steel tube sheet. Water baffles are polypropylene to resist corrosion.

Refrigerant heads are carbon steel with multi-pass baffles to ensure oil return and are removable to permit access to the tubes from either end. For water removal, 3/8" (10mm) vent and drain plugs are provided on the top and bottom of the shell.

The evaporator is wrapped with an electric resistance heater cable and insulated with 3/4" (19mm) thick vinyl nitrate polymer sheet insulation, protecting against water freeze-up at ambient air temperatures to -20°F (-29°C). An ambient air thermostat controls the heater cable.

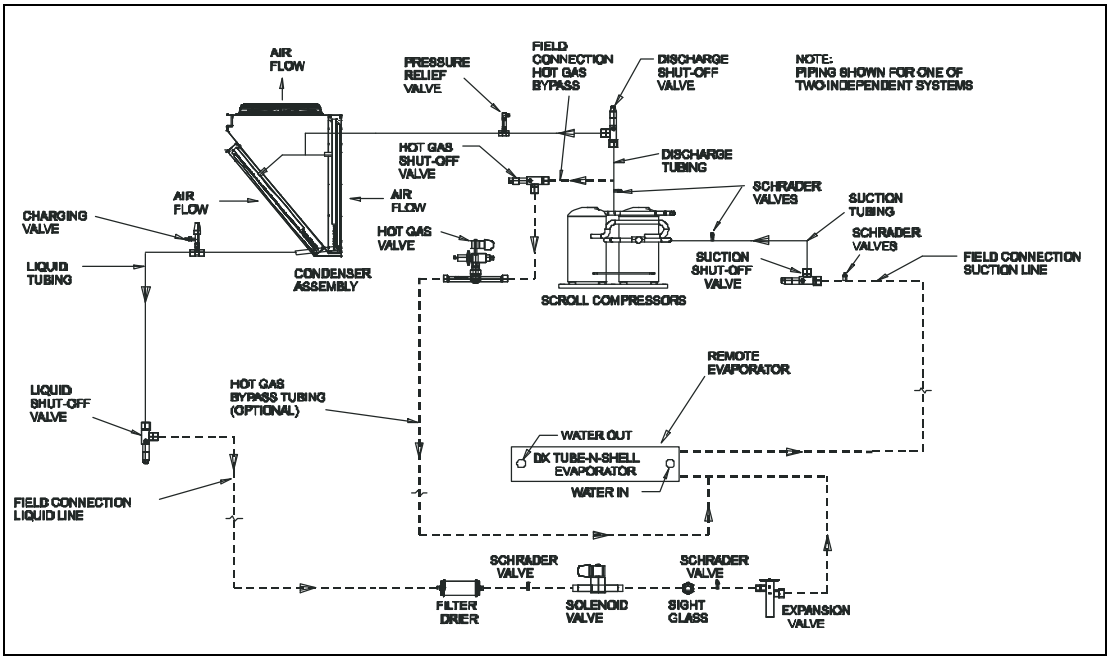
The fitted and glued in place insulation has a K factor of 0.28 at 75°F (23°C).

The refrigerant (tube) side maximum working pressure is 225 psig (1552 kPa). The water side working pressure is 175 psig (1207 kPa). Each evaporator is designed, constructed, inspected, and stamped according to the requirements of the ASME Boiler and Pressure Vessel Code. Double thickness insulation is available as an option.

On Model AGZ ---AM units the evaporator is shipped separate for field mounting and piping to the outdoor unit. The refrigeration piping specialties shown in Figure 1 are furnished and installed by the installing contractor.

**NOTE:** A water flow switch or both water flow switch and water pump starter interlock, must be field installed and wired to protect against evaporator freeze-up under low water flow conditions.

***Figure 1, AGZ ---AM Remote Evaporator Piping Schematic (one of two circuits shown)***



## Electrical Control Center

Operating and safety controls and motor starting components are separately housed in a centrally located, weatherproof control panel with hinged and key locked doors. In addition to one of the three types of control described in the next sections, the following components are housed in the panel:

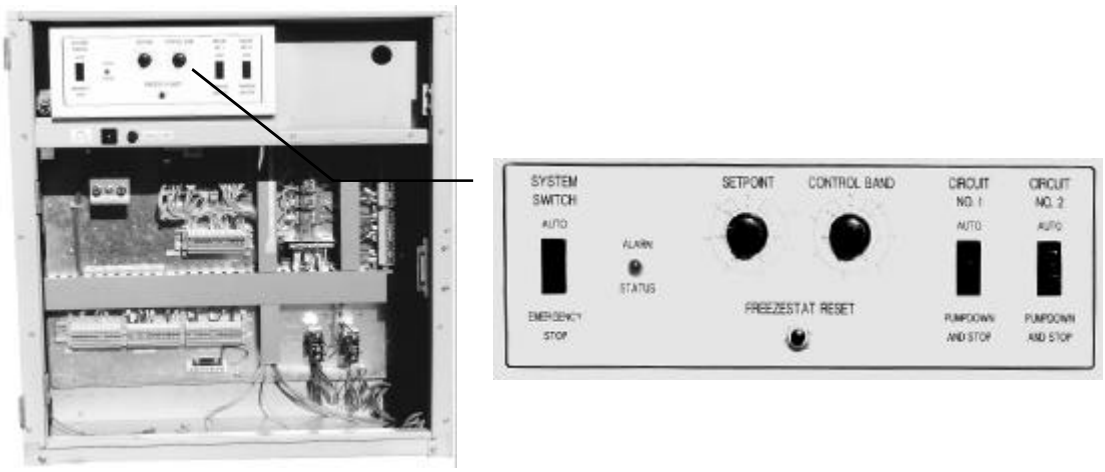
- Power terminal block, single point standard
- Control, input, and output terminal block
- Control transformer
- Optional disconnect switch with through-the-door handle
- Compressor contactors (circuit breakers are available as an option) Compressor motor inherent thermal and overload protection is standard
- Phase voltage monitor with under/over/phase reversal protection
- Fan contactors with separate fuse blocks
- Optional ground fault protection
- The standard FanTrol system controls fan staging for control of refrigerant discharge pressure. The FanTrol system cycles condenser fans based on discharge pressure and outdoor temperature and is suited for operation to 40°F (4.4°C).
- The optional SpeedTrol control uses 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

### Global UNT Control (Standard)

Microprocessor based control that accomplishes unit capacity control by 4-stage cross-circuit compressor cycling based on leaving chilled water temperature. Set point and control band are easily field adjusted. Anti-cycling and stage delay relays are included. Safety controls include low and high refrigerant pressure, low evaporator flow, sensor failures, and evaporator freeze protection. Motor protection includes phase voltage, volts ratio, and solid state compressor motor protection. Outside air reset using a 4-20ma signal is standard. Return water reset, demand limit reset and remote reset using a 4 to 20 ma signal are available options.

On remote evaporator models AGZ ---AM the leaving chilled water sensor is wired to the unit control panel and comes with 30 feet (10 m) of cable to enable placing the bulb in the thermowell of the evaporator. If the distance is greater than 30 feet (10 m), a field splice is required.

***Figure 2, Standard Global UNT Controller***

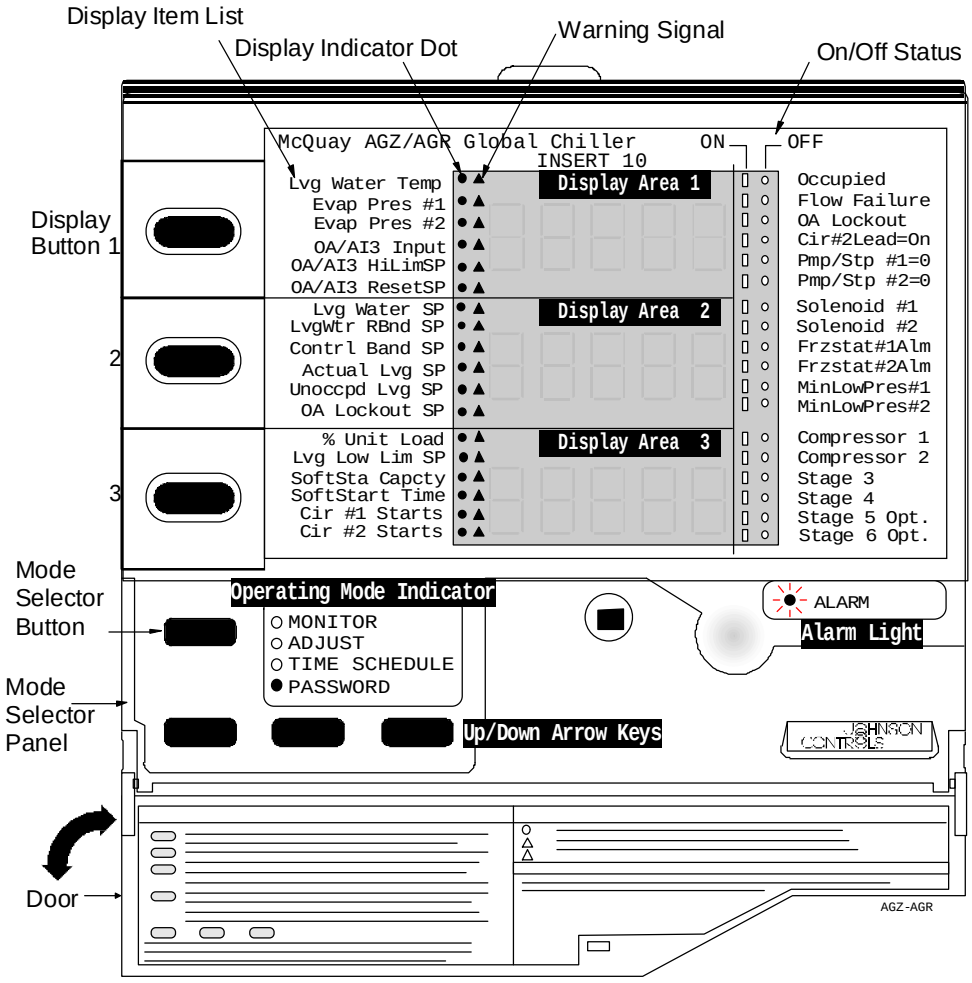



## Global UNT with Optional Zone Terminal

Provides for onboard (or remotely wired) monitoring or adjusting of certain functions.

- Monitoring
  - Monitor up to three setting or sensed values
  - Monitor 18 different on/off inputs
  - Monitor alarm status via a flashing alarm light and flashing symbol
- Adjusting, allows adjustment of any flashing set points, three at a time, typically set up so that the relationship between values can be viewed simultaneously. For example
  - Display 1 = Lvg Water temp
  - Display 2 = Lvg Water SP
  - Display 3 = % Unit Load

***Figure 3, Optional Zone Terminal Configuration***



## MicroTech Control (optional)

Exclusive microprocessor control common throughout McQuay equipment. The interface is a 12 key keypad and 2-line, 16 character backlit liquid crystal display in plain English. The MicroTech continuously performs self-diagnostic checks on all system temperatures, pressures, and safeties, and will automatically shut down a circuit or the entire unit at fault conditions, and close a set of alarm contacts. The cause, time, and date of the occurrence, as well as important operating conditions, are recorded and can be displayed by pressing the "Alarm" button.

Enhanced head pressure control logic results in increased SEER during transitional seasons.

Critical shutdown alarms such as high condenser pressure (with mechanical back up), freeze protection, and low evaporator pressure are manual reset and must be cleared at the keypad to resume operation.

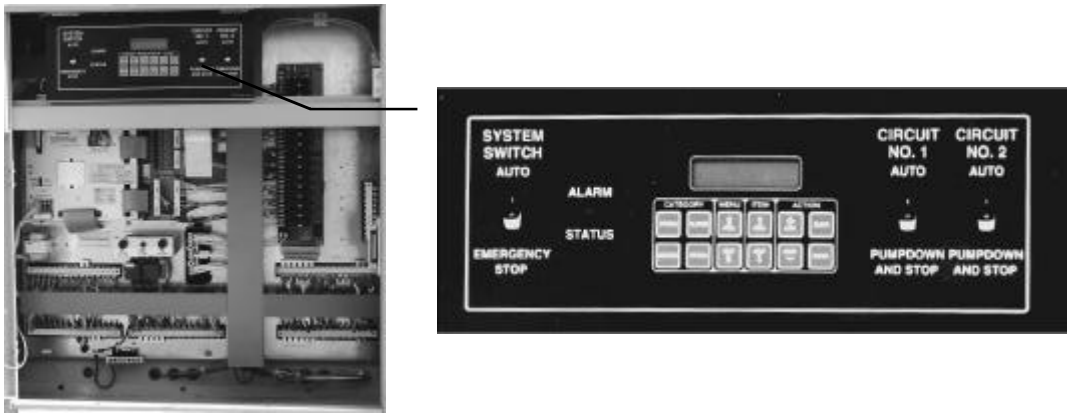
Tampering is eliminated by use of password protection against unauthorized changing of setpoints and other control parameters.

An optional modem kit and software package allows remote monitoring and control of the chiller from an off-site PC via a direct dial telephone line.

Choose the MicroTech control and Open Protocol options to interface with virtually any building management system and perform remote monitoring and control by hard wiring or modem.

On remote evaporator models AGZ---AM the leaving chilled water sensor is wired to the unit control panel and comes with 30 feet (10 m) of cable to enable placing the bulb in the thermowell of the evaporator. If the distance is greater than 30 feet (10 m), a field splice is required.

***Figure 4, Optional MicroTech Control Panel***



# Selection Procedure

## Packaged Chiller, Model AS

### Selection with Inch-Pound (I-P) units

Table 9 covers the range of leaving evaporator water temperatures and outside ambient temperatures included under ARI 550/590-98. 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 3. The minimum leaving chilled water temperature setpoint without glycol is 40°F (4°C) . For brine selections, see Table 1 for ethylene or Table 2 for propylene glycol adjustment factors. Ratings are based on a 0.0001 fouling factor in the evaporator at sea level operation. For other fouling factors, different delta-Ts, or altitude correction factors see Table 3. For applications outside the catalog ratings contact your local McQuay sales representative.

### Selection example

Given:

50 tons minimum
95°F ambient temperature
120 gpm, 54°F to 44°F chilled water
0.0001 evaporator fouling factor

1. From Performance Table 9, an AGZ 055AS at the given conditions will produce 54.0 tons with a compressor kW input of 59.0 and a unit EER of 9.9.
2. Use the following formula to calculate any unknown elements.

$$\frac{tons \times 24}{^\circ F} = \text{gpm}$$

3. Determine the evaporator pressure drop. Using Figure 8, enter at 120 gpm and follow up to the AGZ 055AS line intersect. Read horizontally to obtain an evaporator pressure drop of 14.0 feet of water.

### Selection example using ethylene glycol

Given:

45 tons minimum
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 1, select an ethylene glycol concentration of 40% to protect against freezing at 0°F.
2. At 40% ethylene glycol, the adjustment factors are: Capacity =0.961, kW = 0.976, GPM = 1.121, pressure drop = 1.263
3. Select the AGZ 050AS and correct with 40% ethylene glycol factors.
4. Correct capacity = 0.961 X 49.0 tons = 47.1 tons
5. Correct compressor kW = 0.976 X 52.6 kW = 51.3 kW
6. Calculate chilled water flow:

$$\text{Water flow (at corrected capacity)} = \frac{47.1 tons \times 24}{10^\circ F} = 113.0 \text{ gpm}$$

Glycol flow (at 40% solution) = 1.121 X 113.0 gpm = 126.2 gpm

Determine the evaporator pressure drop. Using Figure 8, enter at 112.6 gpm (water) and follow up to the AGZ 050AS line intersect. Read horizontally to obtain an evaporator pressure drop of 12.3 feet. The pressure drop for 40% solution = 1.263 X 12.3 feet = 15.5 feet for ethylene glycol.

## Selection with SI units

Table 10 covers a range of leaving evaporator water temperatures and outside ambient temperatures. The tables are based on a 5°C temperature drop through the evaporator. The minimum leaving chilled water temperature setpoint without glycol is 4.5°C. For brine selections, see Table 1 for ethylene or Table 2 for propylene glycol adjustment factors. Ratings are based on a 0.0176 fouling factor in the evaporator at sea level operation. For other fouling factors, derates for different Delta-Ts, or altitude correction factors see Table 3. For applications outside the catalog ratings contact your local McQuay sales representative.

## Selection example

Given:

190 kW minimum
35°C ambient air temperature
9 L/s, 12°C - 7°C chilled water
0.0176 evaporator fouling factor

1. From Table 10, an AGZ 055AS at the given conditions will produce 192.8 kW with a unit kW input of 59.4 and a COP of 3.0.
2. Use the following formula to calculate any missing elements:

   $$\frac{kW}{4.18 \times °C} = \text{L/s}$$

3. Determine the evaporator pressure drop. Using Figure 8, enter at 9.0 L/s and follow down to the AGZ 055AS line intersect. Read horizontally to obtain an evaporator pressure drop of 54.0 kPa.

## Selection example using ethylene glycol

Given: 161 kW minimum

35°C ambient air temperature
12°C - 7°C chilled water temperature
0.0176 evaporator fouling factor
Protect against freezing down to -18°C

1. From Table 1, select an ethylene glycol concentration of 40% to protect against freezing.
2. At 40% ethylene glycol, the adjustment factors are: Capacity = 0.961, kW = 0.976, GPM = 1.121, pressure drop = 1.263
3. Select the AGZ 050AS and from Table 10with 40% ethylene glycol factors.
4. Correct capacity = 0.961 X 175.1 kW = 168.3 kW
5. Correct compressor kW = 0.976 X 52.8 kW = 51.5 kW
6. Calculate chilled water flow:

   Water flow (at corrected capacity) = $\frac{168.3kW}{4.18 \times 5°C} = 8\ \text{L/s}$

   Glycol flow (at 40% solution) = 1.121 X 8 L/s = 9 L/s

7. Determine the evaporator pressure drop. Using Figure 8, enter at 9 L/s and follow up to the AGZ 050As line intersect. Read horizontally to obtain an evaporator pressure drop of 50.0 kPa.

   The pressure drop for 40% solution = 1.263 X 50.0 kPa = 63.1 kPa

# Remote Evaporator, Model AM

## Inch-Pound (I-P) Units

Since the AGZ-AM units always include a remote specific shell and tube heat exchanger, the ratings are based on leaving chilled water temperature and ambient air temperature.

Table 9 (English) and Table 10 (SI) cover performance over the normal range of leaving chilled water temperatures and outside ambient air temperatures. The tables are based on a 10°F (5.0°C) temperature drop through the evaporator. Adjustment factors for other temperature drops can be found in Table 3. The minimum leaving chilled water temperature setpoint without glycol is 40°F (4.4°C). For brine selections, see Table 1 for ethylene or Table 2 for propylene glycol adjustment factors. Ratings are based on a 0.0001 (0.0176) fouling factor in the evaporator at sea level operation. For other fouling factors, derates for different delta-Ts, or altitude, see Table 3. 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 8.

### The steps for selecting an AGZ-AM are as follows:

1. Add 3% to the required cooling capacity (to approximate correction factors) and make a preliminary unit selection from performance Table 9 through **Error! Reference source not found.**.
2. Divide the required capacity by the appropriate capacity correction factors: glycols from Table 1or Table 2, altitude, chilled water Delta T, or fouling factor from Table 3; and refrigerant piping derate from Table 8 as explained in step 3 below.
3. Determine the suction line size by first summing the equivalent feet (from Table 4) 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 then equal the total equivalent feet. (To use the equivalent feet Table 4, start with the unit suction connection size from Table 6 as the first try). Now, knowing the equivalent feet and the unit size, check the line selection in Table 6 or Table 7 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.

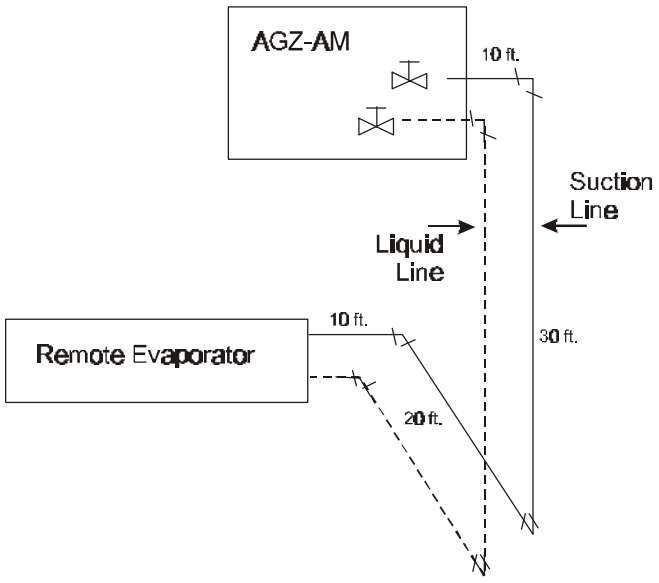
## Selection example

English Units

Given:

42 tons required capacity
95°F ambient temperature
Cool 100 gpm from 54°F to 44°F
0.0001 evaporator fouling factor
2,000 foot altitude

***Figure 5, Sample Piping Layout***



1. Add 3% to the required capacity for approximate derate: 42 x 1.03 = 43.3 tons. From Performance Table 9 an AGZ-045AM at the given conditions will produce 44.3 tons with a compressor kW input of 46.9 and a unit EER of 10.0.
2. Determine derate factors:

   Altitude correction from Table 3; 0.986 Capacity, 1.009 Power
3. Piping correction:

   Assume 1 5/8" suction line based on connection size in Table 6, from Table 4

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

   Plus actual linear feet 70 ft

   Total Equivalent Feet 82 ft

   Check Table 7 for size and find that 1 5/8" is minimum size for oil carry.

   This means that the 1 5/8 riser will be satisfactory.

   The capacity correction factor from Table 8 is 0.980.
4. The corrected capacity of the AGZ is: 44.3 tons x 0.986{altitude} x 0.98{piping} = 42.8 tons This satisfies the 42 ton requirement.
5. Correct the compressor power required: 46.9 kW x 1.009{altitude} = 47.3 kW.
6. Calculate the unit power input from corrected EER:

   W = BTU / EER W = 42.8 tons x 12 mbh / (10.1EER / 1.009) = 50.4 kW
7. Determine the evaporator pressure drop. Enter the pressure drop curves (Figure 8) at 100 gpm and read up to AGZ 045AM, read over to pressure drop of 10.2 ft.

## Selection example using ethylene glycol

Given: 40 tons minimum
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 1, select an ethylene glycol concentration of 40% to protect against freezing at 0°F.
2. At 40% ethylene glycol, the adjustment factors are: Capacity =0.961, kW = 0.976, gpm = 1.121, pressure drop = 1.263
3. Select the AGZ-045AM and correct with 40% ethylene glycol factors.
4. Correct capacity = 0.961 X 44.3 tons = 42.6 tons
5. Correct compressor kW = 0.976 X 46.9 = 45.8 kW
6. Calculate chilled water flow:

$$\text{Water flow (at corrected capacity)} = \frac{42.6 tons \times 24}{10°F} = 102.2 \text{ gpm}$$

   Glycol flow (at 40% solution) = 1.121 X 102.2 gpm = 114.6 gpm

Determine the evaporator pressure drop. Using Figure 8, enter at 102.2 gpm (water) and follow up to the AGZ-045AM line intersect. Read horizontally to obtain an evaporator pressure drop of 10.5 feet. The pressure drop for 40% solution = 1.263 X 10.5 feet = 13.3 feet for ethylene glycol.

Correct for refrigerant piping pressure drop using Table 8. Assuming 150 equivalent feet, the corrected capacity is 0.971 X 42.6 = 41.4 tons.

## 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 50°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 3.

## 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 may 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 1, Ethylene Glycol***

| % E.G. | Freeze Point °F | Freeze Point °C | Capacity | Power | Flow | PD |
|---|---|---|---|---|---|---|
| **10** | 26 | -3 | 0.991 | 0.996 | 1.013 | 1.070 |
| **20** | 18 | -8 | 0.982 | 0.992 | 1.040 | 1.129 |
| **30** | 7 | -14 | 0.972 | 0.986 | 1.074 | 1.181 |
| **40** | -7 | -22 | 0.961 | 0.976 | 1.121 | 1.263 |
| **50** | -28 | -33 | 0.946 | 0.966 | 1.178 | 1.308 |

***Table 2, Propylene Glycol***

| % P.G. | Freeze Point °F | Freeze Point °C | Capacity | Power | Flow | PD |
|---|---|---|---|---|---|---|
| **10** | 26 | -3 | 0.987 | 0.992 | 1.010 | 1.068 |
| **20** | 19 | -7 | 0.975 | 0.985 | 1.028 | 1.147 |
| **30** | 9 | -13 | 0.962 | 0.978 | 1.050 | 1.248 |
| **40** | -5 | -21 | 0.946 | 0.971 | 1.078 | 1.366 |
| **50** | -27 | -33 | 0.929 | 0.965 | 1.116 | 1.481 |

NOTE: Ethylene and propylene glycol ratings are outside the scope of ARI Standard 550/590-98 certification program

## Fouling Factor

Performance tables are based on water with a fouling factor of $0.0001\,ft^2 \times hr \times °F / BTU, or, (0.0176 m^2 \times °C / kW)$ per ARI 550/590-98. As fouling is increased, performance decreases. For performance at other than 0.0001 (0.0176) fouling factor refer to Table 3.

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. To ensure optimum unit operation, maintain proper water treatment.

### *Table 3, Capacity and Power Derates*

| ALTITUDE | Chilled Water Delta-T °F | Chilled Water Delta-T °C | Fouling Factor 0.0001 (0.0176) Cap. | 0.0001 (0.0176) Power | 0.00025 (0.044) Cap. | 0.00025 (0.044) Power | 0.00075 (0.132) Cap. | 0.00075 (0.132) Power | 0.00175 (0.308) Cap. | 0.00175 (0.308) Power |
|---|---|---|---|---|---|---|---|---|---|---|
| SEA LEVEL | 6 | 3.3 | 0.992 | 0.995 | 0.985 | 0.993 | 0.962 | 0.986 | 0.919 | 0.972 |
| | 8 | 4.4 | 0.995 | 0.997 | 0.988 | 0.995 | 0.965 | 0.988 | 0.922 | 0.974 |
| | 10 | 5.6 | 1.000 | 1.000 | 0.993 | 0.998 | 0.970 | 0.991 | 0.927 | 0.977 |
| | 12 | 6.7 | 1.005 | 1.002 | 0.998 | 1.000 | 0.975 | 0.993 | 0.932 | 0.979 |
| | 14 | 6.8 | 1.010 | 1.005 | 1.003 | 1.003 | 0.980 | 0.996 | 0.936 | 0.982 |
| | 16 | 8.9 | 1.014 | 1.007 | 1.007 | 1.005 | 0.984 | 0.998 | 0.940 | 0.984 |
| 2000 feet (610 m) | 6 | 3.3 | 0.978 | 1.005 | 0.971 | 1.003 | 0.949 | 0.996 | 0.906 | 0.982 |
| | 8 | 4.4 | 0.982 | 1.007 | 0.975 | 1.005 | 0.953 | 0.998 | 0.910 | 0.984 |
| | 10 | 5.6 | 0.986 | 1.009 | 0.979 | 1.007 | 0.956 | 1.000 | 0.914 | 0.986 |
| | 12 | 6.7 | 0.992 | 1.011 | 0.985 | 1.009 | 0.962 | 1.002 | 0.919 | 0.988 |
| | 14 | 6.8 | 0.997 | 1.014 | 0.990 | 1.012 | 0.967 | 1.005 | 0.924 | 0.991 |
| | 16 | 8.9 | 1.000 | 1.016 | 0.993 | 1.014 | 0.970 | 1.007 | 0.927 | 0.993 |
| 4000 feet (1220 m) | 6 | 3.3 | 0.966 | 1.016 | 0.959 | 1.014 | 0.937 | 1.007 | 0.895 | 0.993 |
| | 8 | 4.4 | 0.969 | 1.018 | 0.962 | 1.016 | 0.940 | 1.009 | 0.898 | 0.995 |
| | 10 | 5.6 | 0.973 | 1.021 | 0.966 | 1.019 | 0.944 | 1.012 | 0.902 | 0.998 |
| | 12 | 6.7 | 0.978 | 1.025 | 0.971 | 1.023 | 0.949 | 1.016 | 0.906 | 1.002 |
| | 14 | 6.8 | 0.982 | 1.027 | 0.975 | 1.025 | 0.953 | 1.018 | 0.910 | 1.004 |
| | 16 | 8.9 | 0.986 | 1.028 | 0.979 | 1.026 | 0.956 | 1.019 | 0.914 | 1.005 |
| 6000 feet (1830 m) | 6 | 3.3 | 0.953 | 1.025 | 0.946 | 1.023 | 0.924 | 1.016 | 0.883 | 1.002 |
| | 8 | 4.4 | 0.955 | 1.028 | 0.948 | 1.026 | 0.926 | 1.019 | 0.885 | 1.005 |
| | 10 | 5.6 | 0.959 | 1.031 | 0.952 | 1.029 | 0.930 | 1.022 | 0.889 | 1.008 |
| | 12 | 6.7 | 0.963 | 1.034 | 0.956 | 1.032 | 0.934 | 1.024 | 0.893 | 1.011 |
| | 14 | 6.8 | 0.968 | 1.036 | 0.961 | 1.034 | 0.939 | 1.026 | 0.897 | 1.013 |
| | 16 | 8.9 | 0.972 | 1.037 | 0.965 | 1.035 | 0.943 | 1.027 | 0.901 | 1.014 |

### *Table 4, 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 5, Recommended Liquid Line Size*

| 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 |
|---|---|---|---|---|---|---|
| AGZ030AM | 7/8" | 7/8 " | 7/8 " | 7/8 " | 7/8 " | 7/8 " |
| AGZ035AM | 7/8" | 7/8 " | 7/8 " | 7/8 " | 7/8 " | 7/8 " |
| AGZ040AM | 7/8" | 7/8 " | 7/8 " | 7/8 " | 7/8 " | 7/8 " |
| AGZ045AM | 7/8" | 7/8 " | 7/8 " | 7/8 " | 7/8 " | **1 1/8 "** |
| AGZ050AM | 7/8" | 7/8 " | 7/8 " | 7/8 " | **1 1/8 "** | **1 1/8 "** |

### *Table 6, Recommended Horizontal or Downflow Suction Line Size*

| 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 |
| **AGZ030AM** | 1 5/8" | **1 5/8"** | **1 5/8"** | **1 5/8"** | **1 5/8"** | 2 1/8" |
| **AGZ035AM** | 1 5/8" | **1 5/8"** | **1 5/8"** | 2 1/8" | 2 1/8" | 2 1/8" |
| **AGZ040AM** | 1 5/8" | **1 5/8"** | **1 5/8"** | 2 1/8" | 2 1/8" | 2 1/8" |
| **AGZ045AM** | 1 5/8" | **1 5/8"** | 2 1/8" | 2 1/8" | 2 1/8" | 2 1/8" |
| **AGZ050AM** | 1 5/8" | **1 5/8"** | 2 1/8" | 2 1/8" | 2 1/8" | 2 1/8" |

Note: For horizontal and vertical downflow only

### *Table 7, Minimum Line Size (R-22) For Oil Carry Up a Suction Riser*

| Unit Size OD | AGZ 030 | AGZ 035 | AGR 040 | AGZ 045 | AGZ 050 |
|---|---|---|---|---|---|
| Line Size | 1 5/8 | 1 5/8 | 1 5/8 | 1 5/8 | 1 5/8 |

### *Table 8, 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 |
| **AGZ030AM** | 1.0 | **0.984** | **0.975** | **0.966** | **0.957** | 0.987 |
| **AGZ035AM** | 1.0 | **0.973** | **0.960** | 0.987 | 0.984 | 0.981 |
| **AGZ040AM** | 1.0 | **0.971** | **0.957** | 0.984 | 0.980 | 0.976 |
| **AGZ045AM** | 1.0 | **0.957** | 0.985 | 0.980 | 0.975 | 0.971 |
| **AGZ050AM** | 1.0 | **0.957** | 0.981 | 0.975 | 0.969 | 0.962 |

# Performance Data

***Table 9, AGZ 030AS through 065AS, Packaged, Standard Efficiency***

***AGZ 030AM through 050AM, Remote Evaporator***

***NOTE: ARI Certified only when used as an AGZ ---AS, Packaged Unit***

| AGZ SIZE | LWT (°F) | AMBIENT AIR TEMPERATURE | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 75°F | | | 85°F | | | 95°F | | | 105°F | | | 115°F | | |
| | | Cap. Tons | PWR kWi | EER | Cap. Tons | PWR kWi | EER | Cap. Tons | PWR kWi | EER | Cap. Tons | PWR kWi | EER | Cap. Tons | PWR kWi | EER |
| 030AS 030AM | 40.0 | 31.3 | 24.7 | 12.9 | 29.9 | 27.8 | 11.2 | 28.5 | 31.1 | 9.5 | 27.1 | 35.0 | 8.3 | 25.6 | 39.2 | 7.0 |
| | 42.0 | 32.3 | 24.8 | 13.2 | 31.0 | 27.8 | 11.5 | 29.6 | 31.3 | 9.8 | 28.1 | 35.0 | 8.5 | 26.6 | 39.2 | 7.2 |
| | 44.0 | 33.4 | 24.9 | 13.6 | 32.0 | 28.0 | 11.8 | **30.6** | **31.4** | **10.1** | 29.1 | 35.3 | 8.8 | 27.5 | 39.4 | 7.4 |
| | 46.0 | 34.5 | 25.1 | 14.0 | 33.1 | 28.1 | 12.2 | 31.7 | 31.6 | 10.4 | 30.1 | 35.4 | 9.0 | 28.5 | 39.7 | 7.7 |
| | 48.0 | 35.7 | 25.1 | 14.4 | 34.2 | 28.3 | 12.5 | 32.7 | 31.6 | 10.7 | 31.1 | 35.5 | 9.3 | 29.4 | 39.8 | 7.9 |
| | 50.0 | 36.9 | 25.3 | 14.8 | 35.4 | 28.3 | 12.9 | 33.8 | 31.8 | 11.0 | 32.1 | 35.7 | 9.6 | 30.4 | 40.0 | 8.1 |
| 035AS 035AM | 40.0 | 34.9 | 28.4 | 12.8 | 33.3 | 31.9 | 11.1 | 31.8 | 35.8 | 9.4 | 30.1 | 40.2 | 8.2 | 28.5 | 45.0 | 7.0 |
| | 42.0 | 36.0 | 28.5 | 13.1 | 34.5 | 32.0 | 11.4 | 33.0 | 36.0 | 9.7 | 31.3 | 40.3 | 8.4 | 29.6 | 45.1 | 7.2 |
| | 44.0 | 37.2 | 28.7 | 13.4 | 35.6 | 32.2 | 11.7 | **34.1** | **36.1** | **10.0** | 32.4 | 40.5 | 8.7 | 30.7 | 45.3 | 7.4 |
| | 46.0 | 38.5 | 28.8 | 13.8 | 36.9 | 32.3 | 12.1 | 35.3 | 36.3 | 10.3 | 33.5 | 40.7 | 8.9 | 31.7 | 45.6 | 7.6 |
| | 48.0 | 39.8 | 28.9 | 14.2 | 38.2 | 32.5 | 12.4 | 36.5 | 36.4 | 10.6 | 34.6 | 40.8 | 9.2 | 32.8 | 45.8 | 7.8 |
| | 50.0 | 41.1 | 29.1 | 14.6 | 39.4 | 32.6 | 12.8 | 37.7 | 36.6 | 10.9 | 35.8 | 41.1 | 9.5 | 33.8 | 46.0 | 8.0 |
| 040AS 040AM | 40.0 | 39.7 | 32.7 | 12.8 | 37.9 | 36.7 | 11.1 | 36.2 | 41.1 | 9.4 | 34.3 | 46.2 | 8.2 | 32.4 | 51.8 | 7.0 |
| | 42.0 | 41.0 | 32.7 | 13.1 | 39.3 | 36.8 | 11.4 | 37.5 | 41.3 | 9.7 | 35.6 | 46.3 | 8.4 | 33.7 | 51.8 | 7.2 |
| | 44.0 | 42.3 | 33.0 | 13.4 | 40.5 | 37.0 | 11.7 | **38.8** | **41.5** | **10.0** | 36.9 | 46.6 | 8.7 | 34.9 | 52.1 | 7.4 |
| | 46.0 | 43.8 | 33.1 | 13.8 | 42.0 | 37.1 | 12.1 | 40.2 | 41.7 | 10.3 | 38.1 | 46.8 | 8.9 | 36.1 | 52.4 | 7.6 |
| | 48.0 | 45.3 | 33.2 | 14.2 | 43.4 | 37.4 | 12.4 | 41.5 | 41.8 | 10.6 | 39.4 | 46.9 | 9.2 | 37.3 | 52.6 | 7.8 |
| | 50.0 | 46.8 | 33.4 | 14.6 | 44.9 | 37.4 | 12.8 | 42.9 | 42.1 | 10.9 | 40.7 | 47.2 | 9.5 | 38.5 | 52.9 | 8.0 |
| 045AS 045AM | 40.0 | 45.2 | 37.1 | 12.5 | 43.4 | 41.3 | 11.0 | 41.5 | 46.2 | 9.5 | 39.3 | 51.8 | 8.2 | 37.1 | 58.2 | 6.9 |
| | 42.0 | 46.8 | 37.4 | 12.9 | 44.9 | 41.6 | 11.3 | 42.9 | 46.5 | 9.8 | 40.7 | 52.2 | 8.4 | 38.4 | 58.6 | 7.1 |
| | 44.0 | 48.5 | 37.8 | 13.2 | 46.4 | 42.0 | 11.6 | **44.3** | **46.9** | **10.0** | 42.0 | 52.5 | 8.7 | 39.6 | 59.0 | 7.3 |
| | 46.0 | 50.1 | 38.1 | 13.6 | 48.0 | 42.3 | 11.9 | 45.9 | 47.2 | 10.3 | 43.3 | 52.9 | 8.8 | 40.8 | 59.5 | 7.4 |
| | 48.0 | 51.9 | 38.3 | 13.9 | 49.7 | 42.6 | 12.2 | 47.4 | 47.6 | 10.5 | 44.7 | 53.3 | 9.0 | 41.9 | 59.8 | 7.6 |
| | 50.0 | 53.6 | 38.7 | 14.3 | 51.1 | 43.0 | 12.6 | 48.6 | 47.9 | 10.8 | 45.9 | 53.7 | 9.3 | 43.0 | 60.3 | 7.7 |
| 050AS 050AM | 40.0 | 50.0 | 41.6 | 12.5 | 48.0 | 46.3 | 11.0 | 45.9 | 51.8 | 9.5 | 43.5 | 58.1 | 8.2 | 41.1 | 65.3 | 6.9 |
| | 42.0 | 51.8 | 42.0 | 12.9 | 49.6 | 46.7 | 11.3 | 47.5 | 52.2 | 9.8 | 45.0 | 58.5 | 8.4 | 42.4 | 65.8 | 7.1 |
| | 44.0 | 53.6 | 42.3 | 13.2 | 51.3 | 47.1 | 11.6 | **49.0** | **52.6** | **10.0** | 46.4 | 58.9 | 8.7 | 43.8 | 66.2 | 7.3 |
| | 46.0 | 55.5 | 42.7 | 13.6 | 53.1 | 47.4 | 11.9 | 50.7 | 53.0 | 10.3 | 47.9 | 59.3 | 8.8 | 45.1 | 66.7 | 7.4 |
| | 48.0 | 57.4 | 43.0 | 13.9 | 54.9 | 47.8 | 12.2 | 52.4 | 53.3 | 10.5 | 49.4 | 59.8 | 9.0 | 46.3 | 67.1 | 7.6 |
| | 50.0 | 59.2 | 43.4 | 14.3 | 56.5 | 48.2 | 12.6 | 53.8 | 53.7 | 10.8 | 50.7 | 60.2 | 9.3 | 47.6 | 67.6 | 7.7 |
| 055AS | 40.0 | 55.1 | 46.6 | 12.4 | 52.9 | 51.9 | 10.9 | 50.6 | 58.1 | 9.4 | 48.0 | 65.2 | 8.1 | 45.3 | 73.2 | 6.8 |
| | 42.0 | 57.1 | 47.1 | 12.7 | 54.7 | 52.3 | 11.2 | 52.3 | 58.5 | 9.7 | 49.6 | 65.7 | 8.4 | 46.8 | 73.8 | 7.0 |
| | 44.0 | 59.1 | 47.5 | 13.1 | 56.5 | 52.8 | 11.5 | **54.0** | **59.0** | **9.9** | 51.1 | 66.0 | 8.6 | 48.3 | 74.3 | 7.2 |
| | 46.0 | 61.1 | 47.9 | 13.4 | 58.5 | 53.2 | 11.8 | 55.9 | 59.4 | 10.1 | 52.8 | 66.5 | 8.8 | 49.7 | 74.9 | 7.4 |
| | 48.0 | 63.2 | 48.2 | 13.8 | 60.5 | 53.6 | 12.1 | 57.8 | 59.8 | 10.4 | 54.4 | 67.1 | 8.9 | 51.0 | 75.2 | 7.5 |
| | 50.0 | 65.3 | 48.7 | 14.2 | 62.3 | 54.1 | 12.4 | 59.3 | 60.3 | 10.7 | 55.9 | 67.5 | 9.2 | 52.4 | 75.8 | 7.6 |
| 060AS | 40.0 | 58.7 | 51.8 | 12.0 | 56.3 | 57.7 | 10.6 | 53.9 | 64.6 | 9.1 | 51.1 | 72.5 | 7.9 | 48.2 | 81.4 | 6.6 |
| | 42.0 | 60.8 | 52.3 | 12.3 | 58.2 | 58.2 | 10.8 | 55.7 | 65.1 | 9.4 | 52.8 | 73.0 | 8.1 | 49.8 | 82.0 | 6.8 |
| | 44.0 | 62.9 | 52.8 | 12.7 | 60.2 | 58.7 | 11.1 | **57.5** | **65.6** | **9.6** | 54.5 | 73.4 | 8.3 | 51.4 | 82.6 | 7.0 |
| | 46.0 | 65.1 | 53.3 | 13.0 | 62.3 | 59.1 | 11.4 | 59.5 | 66.1 | 9.8 | 56.2 | 73.9 | 8.5 | 52.9 | 83.2 | 7.1 |
| | 48.0 | 67.3 | 53.6 | 13.4 | 64.5 | 59.6 | 11.7 | 61.5 | 66.5 | 10.1 | 58.0 | 74.6 | 8.7 | 54.3 | 83.6 | 7.3 |
| | 50.0 | 69.5 | 54.1 | 13.7 | 66.4 | 60.2 | 12.0 | 63.1 | 67.0 | 10.4 | 59.5 | 75.0 | 8.9 | 55.8 | 84.3 | 7.4 |
| 065AS | 40.0 | 62.2 | 54.1 | 12.3 | 59.7 | 60.3 | 10.8 | 57.2 | 67.5 | 9.3 | 54.2 | 75.7 | 8.0 | 51.1 | 85.0 | 6.8 |
| | 42.0 | 64.5 | 54.7 | 12.6 | 61.8 | 60.8 | 11.1 | 59.1 | 68.0 | 9.6 | 56.0 | 76.2 | 8.3 | 52.8 | 85.6 | 7.0 |
| | 44.0 | 66.7 | 55.1 | 12.9 | 63.9 | 61.3 | 11.4 | **61.0** | **68.5** | **9.8** | 57.8 | 76.7 | 8.5 | 54.5 | 86.2 | 7.2 |
| | 46.0 | 69.1 | 55.6 | 13.3 | 66.1 | 61.7 | 11.7 | 63.1 | 69.0 | 10.0 | 59.7 | 77.2 | 8.7 | 56.1 | 86.9 | 7.3 |
| | 48.0 | 71.4 | 56.0 | 13.7 | 68.4 | 62.2 | 12.0 | 65.3 | 69.5 | 10.3 | 61.5 | 77.9 | 8.9 | 57.6 | 87.3 | 7.4 |
| | 50.0 | 73.7 | 56.5 | 14.0 | 70.4 | 62.8 | 12.3 | 67.0 | 70.0 | 10.6 | 63.1 | 78.4 | 9.1 | 59.2 | 88.0 | 7.5 |

**NOTES:**

1. "AM", remote evaporator ratings do not include line loss. See selection procedure.
2. Bold ratings certified in accordance with ARI Standard 550/590-98 for "AS" units only.
3. Ratings based on HCFC-22, evaporator fouling of 0.0001, 2.4 gpm/ton, and sea level altitude.
4. Ratings are based on circuit #1 in lead position and circuit #2 in lag position.
5. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
6. KWi input is for compressors only. EER is for the entire unit, including compressors, fan motors and control power.
7. For LWT below 40°F and below please refer to Application Data.

### *Table 10, 030AS through 065AS, Standard Efficiency, SI Units*
### *AGZ 030AM through 050AM, Remote Evaporator*

| AGZ SIZE | LWT (°C) | AMBIENT AIR TEMPERATURE | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25°C (77°F) | | | 30°C (86°F) | | | 35°C (95°F) | | | 40°C (104°F) | | | 45°C (113°F) | | |
| | | Cap. kW | PWR kWi | COP | Cap. kW | PWR kWi | COP | Cap. kW | PWR kWi | COP | Cap. kW | PWR kWi | COP | Cap. kW | PWR kWi | COP |
| 030AS 030AM | 5.0 (41.0°F) | 111.5 | 25.3 | 3.6 | 106.7 | 28.2 | 3.2 | 102.3 | 31.2 | 2.8 | 97.3 | 34.6 | 2.4 | 92.3 | 38.2 | 2.1 |
| | 6.0 (42.8°F) | 115.2 | 25.5 | 3.7 | 110.8 | 28.2 | 3.3 | 105.8 | 31.3 | 2.9 | 100.8 | 34.7 | 2.5 | 95.3 | 38.4 | 2.2 |
| | 7.0 (44.6°F) | 119.3 | 25.5 | 3.9 | 114.6 | 28.3 | 3.4 | 109.6 | 31.4 | 3.0 | 104.1 | 34.9 | 2.6 | 98.8 | 38.6 | 2.2 |
| | 8.0 (46.4°F) | 121.2 | 25.6 | 3.9 | 116.5 | 28.4 | 3.4 | 111.5 | 31.5 | 3.0 | 106.1 | 34.9 | 2.6 | 100.5 | 38.8 | 2.3 |
| | 9.0 (48.2°F) | 125.4 | 25.7 | 4.0 | 120.4 | 28.5 | 3.5 | 115.2 | 31.7 | 3.1 | 109.6 | 35.1 | 2.7 | 104.1 | 38.9 | 2.3 |
| | 10.0 (50.0°F) | 129.8 | 25.9 | 4.1 | 124.4 | 28.6 | 3.6 | 119.1 | 31.8 | 3.2 | 113.3 | 35.3 | 2.8 | 107.7 | 39.1 | 2.4 |
| 035AS 035AM | 5.0 (41.0°F) | 124.1 | 29.1 | 3.6 | 118.8 | 32.4 | 3.2 | 113.9 | 35.9 | 2.8 | 108.3 | 39.8 | 2.4 | 102.7 | 44.0 | 2.1 |
| | 6.0 (42.8°F) | 128.3 | 29.3 | 3.7 | 123.4 | 32.5 | 3.3 | 117.8 | 36.0 | 2.9 | 112.2 | 40.0 | 2.5 | 106.2 | 44.2 | 2.2 |
| | 7.0 (44.6°F) | 132.9 | 29.4 | 3.9 | 127.6 | 32.6 | 3.4 | 122.0 | 36.2 | 3.0 | 116.0 | 40.1 | 2.6 | 110.0 | 44.4 | 2.2 |
| | 8.0 (46.4°F) | 135.0 | 29.5 | 3.9 | 129.7 | 32.7 | 3.4 | 124.1 | 36.3 | 3.0 | 118.1 | 40.2 | 2.6 | 111.8 | 44.6 | 2.3 |
| | 9.0 (48.2°F) | 139.6 | 29.6 | 4.0 | 134.0 | 32.8 | 3.5 | 128.3 | 36.4 | 3.1 | 122.0 | 40.4 | 2.7 | 116.0 | 44.8 | 2.3 |
| | 10.0 (50.0°F) | 144.5 | 29.8 | 4.1 | 138.5 | 33.0 | 3.6 | 132.6 | 36.6 | 3.2 | 126.2 | 40.6 | 2.8 | 119.9 | 45.0 | 2.4 |
| 040AS 040AM | 5.0 (41.0°F) | 141.0 | 33.4 | 3.6 | 135.0 | 37.2 | 3.2 | 129.4 | 41.2 | 2.8 | 123.1 | 45.7 | 2.4 | 116.7 | 50.5 | 2.1 |
| | 6.0 (42.8°F) | 145.7 | 33.7 | 3.7 | 140.1 | 37.3 | 3.3 | 133.8 | 41.3 | 2.9 | 127.5 | 45.9 | 2.5 | 120.6 | 50.7 | 2.2 |
| | 7.0 (44.6°F) | 150.9 | 33.7 | 3.9 | 144.9 | 37.4 | 3.4 | 138.6 | 41.5 | 3.0 | 131.7 | 46.0 | 2.6 | 125.0 | 51.0 | 2.2 |
| | 8.0 (46.4°F) | 153.3 | 33.9 | 3.9 | 147.3 | 37.5 | 3.4 | 141.0 | 41.6 | 3.0 | 134.2 | 46.1 | 2.6 | 127.1 | 51.2 | 2.3 |
| | 9.0 (48.2°F) | 158.6 | 33.9 | 4.0 | 152.2 | 37.7 | 3.5 | 145.7 | 41.8 | 3.1 | 138.6 | 46.3 | 2.7 | 131.7 | 51.4 | 2.3 |
| | 10.0 (50.0°F) | 164.2 | 34.2 | 4.1 | 157.4 | 37.8 | 3.6 | 150.6 | 42.0 | 3.2 | 143.4 | 46.6 | 2.8 | 136.3 | 51.6 | 2.4 |
| 045AS 045AM | 5.0 (41.0°F) | 160.9 | 38.2 | 3.6 | 154.9 | 42.0 | 3.2 | 148.4 | 46.5 | 2.8 | 141.6 | 51.6 | 2.4 | 134.1 | 57.2 | 2.1 |
| | 6.0 (42.8°F) | 166.6 | 38.5 | 3.7 | 159.9 | 42.4 | 3.3 | 153.6 | 46.9 | 2.9 | 146.2 | 51.8 | 2.5 | 138.2 | 57.7 | 2.2 |
| | 7.0 (44.6°F) | 172.3 | 38.8 | 3.8 | 165.8 | 42.6 | 3.4 | 158.6 | 47.2 | 3.0 | 150.9 | 52.3 | 2.6 | 142.5 | 58.0 | 2.2 |
| | 8.0 (46.4°F) | 175.3 | 38.9 | 3.9 | 168.5 | 42.8 | 3.4 | 161.2 | 47.4 | 3.0 | 153.6 | 52.5 | 2.6 | 145.0 | 58.2 | 2.2 |
| | 9.0 (48.2°F) | 180.9 | 39.2 | 4.0 | 173.9 | 43.2 | 3.5 | 166.7 | 47.7 | 3.1 | 158.3 | 52.8 | 2.7 | 149.4 | 58.7 | 2.3 |
| | 10.0 (50.0°F) | 187.3 | 39.4 | 4.1 | 179.9 | 43.6 | 3.6 | 172.1 | 48.0 | 3.2 | 163.5 | 53.2 | 2.7 | 154.2 | 59.1 | 2.4 |
| 050AS 050AM | 5.0 (41.0°F) | 177.6 | 42.7 | 3.6 | 170.9 | 47.0 | 3.2 | 163.8 | 52.0 | 2.8 | 156.3 | 57.7 | 2.4 | 148.0 | 64.0 | 2.1 |
| | 6.0 (42.8°F) | 183.9 | 43.0 | 3.7 | 176.5 | 47.4 | 3.3 | 169.5 | 52.4 | 2.9 | 161.4 | 58.0 | 2.5 | 152.6 | 64.5 | 2.2 |
| | 7.0 (44.6°F) | 190.2 | 43.4 | 3.8 | 183.0 | 47.7 | 3.4 | 175.1 | 52.8 | 3.0 | 166.6 | 58.4 | 2.6 | 157.2 | 64.9 | 2.2 |
| | 8.0 (46.4°F) | 193.4 | 43.5 | 3.9 | 186.0 | 47.9 | 3.4 | 177.9 | 53.0 | 3.0 | 169.5 | 58.7 | 2.6 | 160.0 | 65.1 | 2.2 |
| | 9.0 (48.2°F) | 199.7 | 43.9 | 4.0 | 192.0 | 48.3 | 3.5 | 183.9 | 53.3 | 3.1 | 174.7 | 59.1 | 2.7 | 164.9 | 65.6 | 2.3 |
| | 10.0 (50.0°F) | 206.7 | 44.1 | 4.1 | 198.6 | 48.7 | 3.6 | 189.9 | 53.7 | 3.2 | 180.4 | 59.5 | 2.7 | 170.2 | 66.0 | 2.4 |
| 055AS | 5.0 (41.0°F) | 195.6 | 48.0 | 3.6 | 188.2 | 52.9 | 3.2 | 180.4 | 58.5 | 2.8 | 172.1 | 64.9 | 2.4 | 163.0 | 72.0 | 2.1 |
| | 6.0 (42.8°F) | 202.5 | 48.4 | 3.7 | 194.4 | 53.3 | 3.3 | 186.7 | 59.0 | 2.9 | 177.8 | 65.2 | 2.5 | 168.0 | 72.5 | 2.2 |
| | 7.0 (44.6°F) | 209.4 | 48.8 | 3.8 | 201.5 | 53.6 | 3.4 | 192.8 | 59.4 | 3.0 | 183.5 | 65.8 | 2.6 | 173.2 | 73.0 | 2.2 |
| | 8.0 (46.4°F) | 213.1 | 48.9 | 3.9 | 204.8 | 53.9 | 3.4 | 195.9 | 59.6 | 3.0 | 186.7 | 66.0 | 2.6 | 176.3 | 73.2 | 2.2 |
| | 9.0 (48.2°F) | 219.9 | 49.4 | 4.0 | 211.4 | 54.3 | 3.5 | 202.6 | 60.0 | 3.1 | 192.4 | 66.5 | 2.7 | 181.7 | 73.8 | 2.3 |
| | 10.0 (50.0°F) | 227.7 | 49.6 | 4.1 | 218.7 | 54.8 | 3.6 | 209.2 | 60.4 | 3.2 | 198.7 | 67.0 | 2.7 | 187.4 | 74.3 | 2.4 |
| 060AS | 5.0 (41.0°F) | 209.2 | 53.3 | 3.5 | 201.4 | 58.8 | 3.1 | 193.0 | 65.0 | 2.7 | 184.1 | 72.2 | 2.3 | 174.4 | 80.0 | 2.0 |
| | 6.0 (42.8°F) | 216.6 | 53.8 | 3.6 | 208.0 | 59.2 | 3.2 | 199.8 | 65.5 | 2.8 | 190.2 | 72.5 | 2.4 | 179.8 | 80.6 | 2.1 |
| | 7.0 (44.6°F) | 224.1 | 54.2 | 3.7 | 215.6 | 59.6 | 3.2 | 206.3 | 66.0 | 2.9 | 196.3 | 73.1 | 2.5 | 185.3 | 81.1 | 2.1 |
| | 8.0 (46.4°F) | 227.9 | 54.3 | 3.7 | 219.2 | 59.9 | 3.3 | 209.6 | 66.2 | 2.9 | 199.8 | 73.3 | 2.5 | 188.6 | 81.3 | 2.1 |
| | 9.0 (48.2°F) | 235.3 | 54.9 | 3.8 | 226.2 | 60.3 | 3.4 | 216.7 | 66.6 | 2.9 | 205.8 | 73.8 | 2.6 | 194.4 | 82.0 | 2.2 |
| | 10.0 (50.0°F) | 243.6 | 55.1 | 3.9 | 234.0 | 60.9 | 3.5 | 223.8 | 67.1 | 3.1 | 212.6 | 74.4 | 2.6 | 200.5 | 82.6 | 2.3 |
| 065AS | 5.0 (41.0°F) | 220.3 | 55.7 | 3.5 | 212.0 | 61.4 | 3.1 | 203.2 | 67.9 | 2.7 | 193.9 | 75.4 | 2.3 | 183.6 | 83.5 | 2.0 |
| | 6.0 (42.8°F) | 228.1 | 56.2 | 3.6 | 218.9 | 61.9 | 3.2 | 210.3 | 68.4 | 2.8 | 200.3 | 75.7 | 2.4 | 189.3 | 84.2 | 2.1 |
| | 7.0 (44.6°F) | 235.9 | 56.6 | 3.7 | 227.0 | 62.3 | 3.2 | 217.2 | 69.0 | 2.9 | 206.7 | 76.3 | 2.5 | 195.1 | 84.7 | 2.1 |
| | 8.0 (46.4°F) | 240.0 | 56.8 | 3.7 | 230.7 | 62.5 | 3.3 | 220.7 | 69.2 | 2.9 | 210.3 | 76.6 | 2.5 | 198.5 | 84.9 | 2.1 |
| | 9.0 (48.2°F) | 247.7 | 57.3 | 3.8 | 238.2 | 63.0 | 3.4 | 228.2 | 69.6 | 2.9 | 216.7 | 77.1 | 2.6 | 204.6 | 85.7 | 2.2 |
| | 10.0 (50.0°F) | 256.4 | 57.6 | 3.9 | 246.4 | 63.6 | 3.5 | 235.6 | 70.1 | 3.1 | 223.8 | 77.7 | 2.6 | 211.1 | 86.2 | 2.3 |

**NOTES:**

1. Ratings based on HCFC-22, evaporator fouling of 0.0176, 0.048 L/s, and sea level altitude.
2. Ratings are based on circuit #1 in lead position and circuit #2 in lag position.
3. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. KWi input is for compressors only. COP is for the entire unit, including compressors, fan motors and control power.
5. For LWT below 4.5°C and below please refer to Application Data.

# Part Load Data

***Table 11, AGZ 030AS through 065AS***

| Unit Size | % Load | Capacity Tons | 60 Hz | | |
|---|---|---|---|---|---|
| | | | Power Unit kW | EER | IPLV |
| **030AS** | 100.00 | 30.6 | 36.4 | 10.1 | 13.5 |
| | 75.00 | 22.9 | 22.3 | 12.3 | |
| | 50.00 | 15.3 | 13.1 | 14.0 | |
| | 25.00 | 7.6 | 5.8 | 15.7 | |
| **035AS** | 100.00 | 34.1 | 41.1 | 10.0 | 13.8 |
| | 75.00 | 25.5 | 24.7 | 12.4 | |
| | 50.00 | 17.0 | 14.1 | 14.5 | |
| | 25.00 | 8.5 | 6.3 | 16.2 | |
| **040AS** | 100.00 | 38.8 | 46.5 | 10.0 | 14.2 |
| | 75.00 | 29.1 | 27.6 | 12.7 | |
| | 50.00 | 19.4 | 15.5 | 15.0 | |
| | 25.00 | 9.7 | 6.9 | 16.9 | |
| **045AS** | 100.00 | 44.3 | 53.1 | 10.0 | 13.8 |
| | 75.00 | 33.2 | 31.7 | 12.6 | |
| | 50.00 | 22.1 | 18.4 | 14.4 | |
| | 25.00 | 11.0 | 8.2 | 16.1 | |
| **050AS** | 100.00 | 49.0 | 58.8 | 10.0 | 14.0 |
| | 75.00 | 36.7 | 35.3 | 12.5 | |
| | 50.00 | 24.5 | 19.9 | 14.8 | |
| | 25.00 | 12.2 | 8.9 | 16.4 | |
| **055AS** | 100.00 | 54.0 | 65.2 | 9.9 | 14.1 |
| | 75.00 | 40.4 | 37.9 | 12.8 | |
| | 50.00 | 26.9 | 21.7 | 14.9 | |
| | 25.00 | 13.4 | 10.0 | 16.1 | |
| **060AS** | 100.00 | 57.5 | 71.9 | 9.6 | 14.1 |
| | 75.00 | 43.2 | 41.5 | 12.5 | |
| | 50.00 | 28.8 | 22.6 | 15.3 | |
| | 25.00 | 14.4 | 11.0 | 15.7 | |
| **065AS** | 100.00 | 61.0 | 74.7 | 9.8 | 14.5 |
| | 75.00 | 45.7 | 43.0 | 12.8 | |
| | 50.00 | 30.4 | 23.3 | 15.7 | |
| | 25.00 | 15.0 | 11.0 | 16.4 | |

Certified according to ARI Standard 550/590-98

# Sound Data

***Table 12, AGZ 030-065 Sound Pressure***

| Unit | .Octave Band at Center Frequency | | | | | | | | Overall |
|---|---|---|---|---|---|---|---|---|---|
| Model | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A-Weighted |
| **AGZ030AS** | 65 | 64 | 63 | 61 | 56 | 51 | 46 | 41 | 61 |
| **AGZ035AS** | 65 | 64 | 63 | 61 | 56 | 51 | 46 | 41 | 61 |
| **AGZ040AS** | 65 | 64 | 63 | 62 | 57 | 52 | 47 | 42 | 62 |
| **AGZ045AS** | 66 | 66 | 64 | 62 | 58 | 52 | 47 | 42 | 63 |
| **AGZ050AS** | 67 | 67 | 66 | 62 | 58 | 53 | 48 | 43 | 63 |
| **AGZ055AS** | 67 | 67 | 67 | 63 | 59 | 54 | 49 | 44 | 64 |
| **AGZ060AS** | 68 | 68 | 67 | 64 | 60 | 54 | 49 | 44 | 65 |
| **AGZ065AS** | 68 | 68 | 67 | 64 | 61 | 55 | 50 | 45 | 65 |
| **AGZ030AM** | 65 | 64 | 63 | 61 | 56 | 51 | 46 | 41 | 61 |
| **AGZ035AM** | 65 | 64 | 63 | 61 | 56 | 51 | 46 | 41 | 61 |
| **AGZ040AM** | 65 | 64 | 63 | 62 | 57 | 52 | 47 | 42 | 62 |
| **AGZ045AM** | 66 | 66 | 64 | 62 | 58 | 52 | 47 | 42 | 63 |
| **AGZ050AM** | 67 | 67 | 66 | 62 | 58 | 53 | 48 | 43 | 63 |

Note: Data at 30 feet (9m) from side of unit.

***Table 13, AGZ 030-065 Sound Power***

| Unit | Octave Band at Center Frequency. | | | | | | | | Overall |
|---|---|---|---|---|---|---|---|---|---|
| Model | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A-Weighted |
| **AGZ030AS** | 92 | 91 | 90 | 88 | 83 | 78 | 73 | 68 | 88 |
| **AGZ035AS** | 92 | 91 | 90 | 88 | 83 | 78 | 73 | 68 | 88 |
| **AGZ040AS** | 92 | 91 | 90 | 89 | 84 | 79 | 74 | 69 | 89 |
| **AGZ045AS** | 93 | 93 | 91 | 89 | 85 | 79 | 74 | 69 | 90 |
| **AGZ050AS** | 94 | 94 | 93 | 89 | 85 | 80 | 75 | 70 | 90 |
| **AGZ055AS** | 94 | 94 | 94 | 90 | 86 | 81 | 76 | 71 | 91 |
| **AGZ060AS** | 95 | 95 | 94 | 91 | 87 | 81 | 76 | 71 | 92 |
| **AGZ065AS** | 95 | 95 | 94 | 91 | 88 | 82 | 77 | 72 | 92 |
| **AGZ030AM** | 92 | 91 | 90 | 88 | 83 | 78 | 73 | 68 | 88 |
| **AGZ035AM** | 92 | 91 | 90 | 88 | 83 | 78 | 73 | 68 | 88 |
| **AGZ040AM** | 92 | 91 | 90 | 89 | 84 | 79 | 74 | 69 | 89 |
| **AGZ045AM** | 93 | 93 | 91 | 89 | 85 | 79 | 74 | 69 | 90 |
| **AGZ050AM** | 94 | 94 | 93 | 89 | 85 | 80 | 75 | 70 | 90 |

Note: Sound power octave band data per ARI Standard 370

Sound levels are as important as unit cost and efficiency, and must be addressed before to the start of any development program. Efforts by McQuay Design Engineers to design chillers 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 may 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 54/44°F (12/7°C) evaporator water temperatures for air-cooled units.

## Sound Power Levels

Acoustical consultants may 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 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.

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

Lw = sound power

r = distance from unit in feet

Q = directionality factor

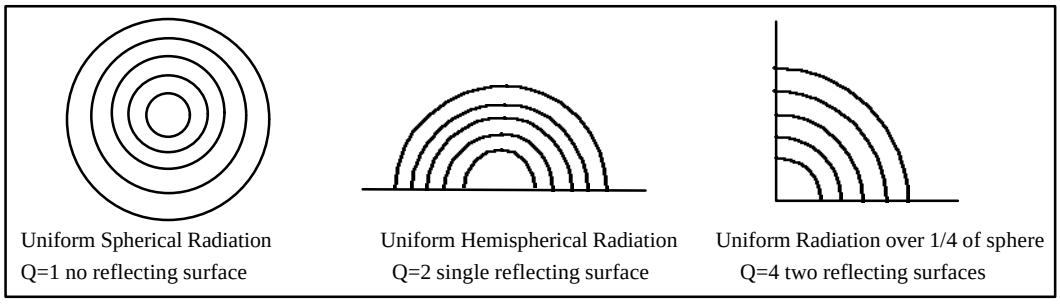
The directionality factor is a dimensionless number that compensates for the type of sound radiation from the source. Figure 6 shows the typical Q values of different reflecting surfaces.

For a unit sitting on a flat roof with no other reflective surfaces or attenuation due to grass, snow, etc., between source and receiver: Q=2.

With Q=2, the equation simplifies to:

$$Lp = Lw - (20)(\log r) + 2.5$$

***Figure 6, "Q" Values***

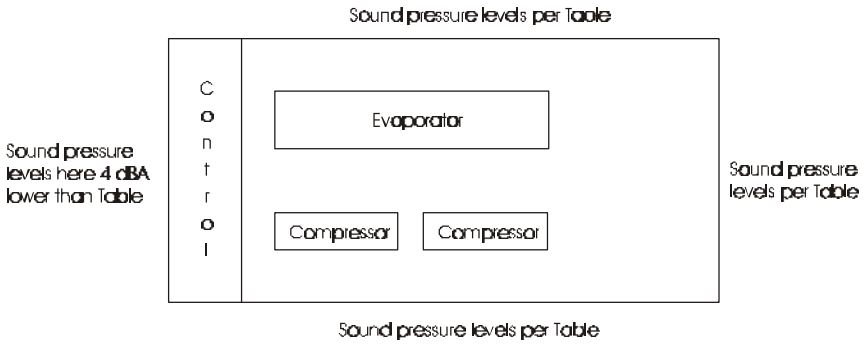


## Unit Orientation to Minimize Sound

The chiller's sound is directional in nature allowing the contractor/engineer to position the unit to minimize potential noise problems. Because the sound pressure levels are lower at both ends of the unit than at the sides, the chiller should be oriented such that the control box end or end opposite the control box faces the direction where the lowest sound level is required.

The control box end provides an excellent acoustic barrier to the compressor sound as it covers one full end of the unit. The sound pressure levels at the control box end will be 4 dBA less than on the sides.

***Figure 7, Sound Directionality***

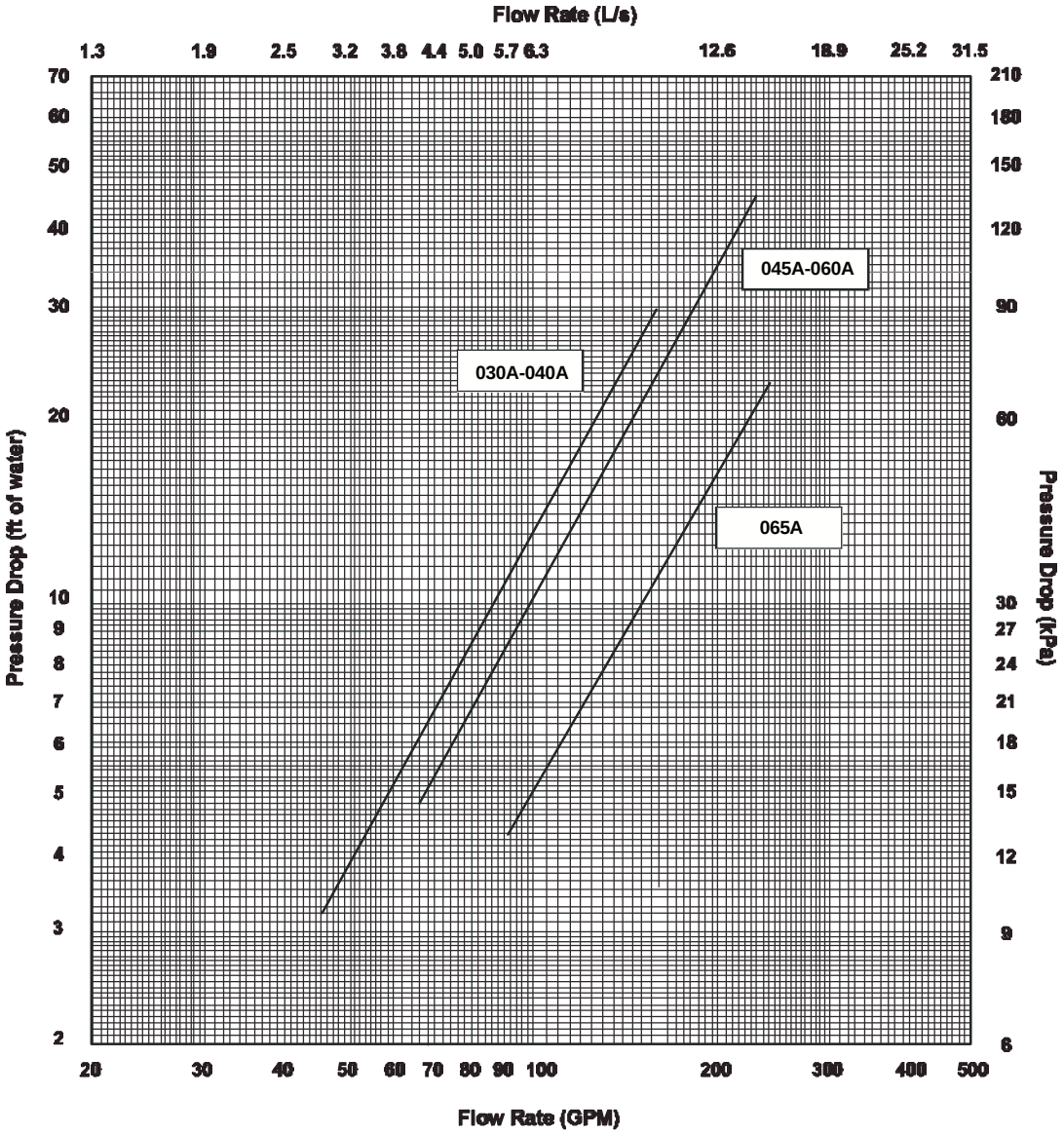



## Sound Pressure Levels - Low Ambient Operation

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).

# Pressure Drop Curves

***Figure 8, Pressure Drops***




| AGZ Unit Size | NOMINAL | | | MAXIMUM | | | MINIMUM | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pressure Drop | Flow | | Pressure Drop | Flow | | Pressure Drop | Flow | |
| | (ft) of Water | (gpm) | (lps) | (ft) of Water | (gpm) | (lps) | (ft) of Water | (gpm) | (lps) |
| **030AS/AM** | 7.4 | 73 | 4.61 | 18.7 | 122 | 7.68 | 3.2 | 46 | 2.88 |
| **035AS/AM** | 9.2 | 82 | 5.17 | 23.1 | 137 | 8.62 | 3.9 | 51 | 3.23 |
| **040AS/AM** | 11.5 | 93 | 5.87 | 28.8 | 155 | 9.78 | 4.9 | 58 | 3.67 |
| **045AS/AM** | 11.2 | 106 | 6.69 | 28.2 | 177 | 11.15 | 4.8 | 66 | 4.18 |
| **050AS** | 13.4 | 117 | 7.38 | 33.6 | 195 | 12.30 | 5.7 | 73 | 4.61 |
| **050AM** | 13.6 | 118 | 7.44 | 34.1 | 197 | 12.41 | 5.8 | 74 | 4.65 |
| **055AS** | 16.2 | 129 | 8.14 | 40.0 | 215 | 13.56 | 7.0 | 81 | 5.09 |
| **060AS** | 18.0 | 138 | 8.71 | 45.0 | 230 | 14.51 | 7.7 | 86 | 5.44 |
| **065AS** | 10.0 | 146 | 9.21 | 25.1 | 243 | 15.35 | 4.3 | 91 | 5.76 |

# Electrical Data

***Table 14, AGZ 030A - 065A, 60 Hz, Single Point Power Electrical Data***

| AGZ Unit Size | Volts | Minimum Circuit Ampacity (MCA) | POWER SUPPLY | | | | Max. Fuse Or HACR Breaker Size |
|---|---|---|---|---|---|---|---|
| | | | Field Wire | | Hub | | |
| | | | Quantity | Wire Gauge | Quantity | Nominal Size | |
| **030AS 030AM** | 208 | 131 | 3 | 1/0 | 1 | 1.50 (38) | 150 |
| | 230 | 131 | 3 | 1/0 | 1 | 1.50 (38) | 150 |
| | 380 | 86 | 3 | 3 | 1 | 1.25 (32) | 100 |
| | 460 | 68 | 3 | 4 | 1 | 1.00 (25) | 80 |
| | 575 | 53 | 3 | 6 | 1 | 1.00 (25) | 60 |
| **030AS 035AM** | 208 | 143 | 3 | 1/0 | 1 | 1.50 (38) | 150 |
| | 230 | 143 | 3 | 1/0 | 1 | 1.50 (38) | 150 |
| | 380 | 93 | 3 | 3 | 1 | 1.25 (32) | 110 |
| | 460 | 73 | 3 | 4 | 1 | 1.00 (25) | 80 |
| | 575 | 58 | 3 | 6 | 1 | 1.00 (25) | 70 |
| **040AS 040AM** | 208 | 159 | 3 | 2/0 | 1 | 1.50 (38) | 175 |
| | 230 | 159 | 3 | 2/0 | 1 | 1.50 (38) | 175 |
| | 380 | 111 | 3 | 2 | 1 | 1.25 (32) | 125 |
| | 460 | 78 | 3 | 4 | 1 | 1.00 (25) | 90 |
| | 575 | 67 | 3 | 4 | 1 | 1.00 (25) | 80 |
| **045AS 045AM** | 208 | 183 | 3 | 3/0 | 1 | 2.00 (51) | 200 |
| | 230 | 183 | 3 | 3/0 | 1 | 2.00 (51) | 200 |
| | 380 | 116 | 3 | 1 | 1 | 1.25 (32) | 125 |
| | 460 | 94 | 3 | 3 | 1 | 1.25 (32) | 110 |
| | 575 | 76 | 3 | 4 | 1 | 1.00 (25) | 90 |
| **050AS 050AM** | 208 | 198 | 3 | 3/0 | 1 | 2.00 (51) | 225 |
| | 230 | 198 | 3 | 3/0 | 1 | 2.00 (51) | 225 |
| | 380 | 120 | 3 | 1 | 1 | 1.25 (32) | 125 |
| | 460 | 104 | 3 | 2 | 1 | 1.25 (32) | 125 |
| | 575 | 83 | 3 | 4 | 1 | 1.00 (25) | 100 |
| **055As** | 208 | 214 | 3 | 4/0 | 1 | 2.00 (51) | 250 |
| | 230 | 214 | 3 | 4/0 | 1 | 2.00 (51) | 250 |
| | 380 | 138 | 3 | 1/0 | 1 | 1.50 (38) | 150 |
| | 460 | 109 | 3 | 2 | 1 | 1.25 (32) | 125 |
| | 575 | 92 | 3 | 3 | 1 | 1.25 (32) | 110 |
| **060AS** | 208 | 228 | 3 | 4/0 | 1 | 2.50 (64) | 300 |
| | 230 | 228 | 3 | 4/0 | 1 | 2.50 (64) | 300 |
| | 380 | 153 | 3 | 2/0 | 1 | 1.50 (38) | 175 |
| | 460 | 112 | 3 | 2 | 1 | 1.25 (32) | 125 |
| | 575 | 100 | 3 | 3 | 1 | 1.25 (32) | 110 |
| **065AS** | 208 | 228 | 3 | 4/0 | 1 | 2.50 (64) | 300 |
| | 230 | 228 | 3 | 4/0 | 1 | 2.50 (64) | 300 |
| | 380 | 153 | 3 | 2/0 | 1 | 1.50 (38) | 175 |
| | 460 | 112 | 3 | 2 | 1 | 1.25 (32) | 125 |
| | 575 | 100 | 3 | 3 | 1 | 1.25 (32) | 110 |

All Electrical Data notes are on page 27

### *Table 15, AGZ 030A - 065A, 60 Hz, Compressor And Condenser Fan Motor Amp Draw*

| AGZ Unit Size | Volts | Rated Load Amps | | | No. Of Fan Motors | Locked Rotor Amps | | |
|---|---|---|---|---|---|---|---|---|
| | | Compressors | | Fan Motors (Each) | | Fan Motors (Each) | Compressors | |
| | | | | | | | Across-The-Line | |
| | | No. 1 & 3 (Each) | No. 2 & 4 (Each) | | | | No.1 & 3 (Each) | No.2 & 4 (Each) |
| **030AS** **030AM** | 208 | 23.7 | 29.9 | 4.0 | 4 | 17.0 | 189 | 232 |
| | 230 | 23.7 | 29.9 | 4.0 | 4 | 17.0 | 189 | 232 |
| | 380 | 14.9 | 18.6 | 3.4 | 4 | 14.4 | 112 | 144 |
| | 460 | 12.5 | 15.3 | 2.0 | 4 | 8.5 | 94 | 125 |
| | 575 | 9.1 | 11.6 | 2.2 | 4 | 10.3 | 74 | 100 |
| **035AS** **035AM** | 208 | 29.9 | 29.9 | 4.0 | 4 | 17.0 | 232 | 232 |
| | 230 | 29.9 | 29.9 | 4.0 | 4 | 17.0 | 232 | 232 |
| | 380 | 18.6 | 18.6 | 3.4 | 4 | 14.4 | 144 | 144 |
| | 460 | 15.3 | 15.3 | 2.0 | 4 | 8.5 | 125 | 125 |
| | 575 | 11.6 | 11.6 | 2.2 | 4 | 10.3 | 100 | 100 |
| **040AS** **040AM** | 208 | 33.6 | 33.6 | 4.0 | 4 | 17.0 | 278 | 278 |
| | 230 | 33.6 | 33.6 | 4.0 | 4 | 17.0 | 278 | 278 |
| | 380 | 22.8 | 22.8 | 3.4 | 4 | 14.4 | 151 | 151 |
| | 460 | 16.5 | 16.5 | 2.0 | 4 | 8.5 | 127 | 127 |
| | 575 | 13.7 | 13.7 | 2.2 | 4 | 10.3 | 100 | 100 |
| **045AS** **045AM** | 208 | 33.6 | 41.0 | 5.8 | 4 | 23.7 | 278 | 350 |
| | 230 | 33.6 | 41.0 | 5.8 | 4 | 23.7 | 278 | 350 |
| | 380 | 22.8 | 25.0 | 3.4 | 4 | 14.4 | 151 | 195 |
| | 460 | 16.5 | 21.8 | 2.8 | 4 | 10.7 | 127 | 158 |
| | 575 | 13.7 | 17.3 | 2.3 | 4 | 11.5 | 100 | 125 |
| **050AS** **050AM** | 208 | 41.0 | 41.0 | 5.8 | 4 | 23.7 | 350 | 350 |
| | 230 | 41.0 | 41.0 | 5.8 | 4 | 23.7 | 350 | 350 |
| | 380 | 25.0 | 25.0 | 3.4 | 4 | 14.4 | 195 | 195 |
| | 460 | 21.8 | 21.8 | 2.8 | 4 | 10.7 | 158 | 158 |
| | 575 | 17.3 | 17.3 | 2.3 | 4 | 11.5 | 125 | 125 |
| **055AS** | 208 | 41.0 | 48.1 | 5.8 | 4 | 23.7 | 350 | 425 |
| | 230 | 41.0 | 48.1 | 5.8 | 4 | 23.7 | 350 | 425 |
| | 380 | 25.0 | 32.7 | 3.4 | 4 | 14.4 | 195 | 239 |
| | 460 | 21.8 | 23.7 | 2.8 | 4 | 10.7 | 158 | 187 |
| | 575 | 17.3 | 21.2 | 2.3 | 4 | 11.5 | 125 | 148 |
| **060AS** | 208 | 48.1 | 48.1 | 5.8 | 4 | 23.7 | 425 | 425 |
| | 230 | 48.1 | 48.1 | 5.8 | 4 | 23.7 | 425 | 425 |
| | 380 | 32.7 | 32.7 | 3.4 | 4 | 14.4 | 239 | 239 |
| | 460 | 23.7 | 23.7 | 2.8 | 4 | 10.7 | 187 | 187 |
| | 575 | 21.2 | 21.2 | 2.3 | 4 | 11.5 | 148 | 148 |
| **065AS** | 208 | 48.1 | 48.1 | 5.8 | 4 | 23.7 | 425 | 425 |
| | 230 | 48.1 | 48.1 | 5.8 | 4 | 23.7 | 425 | 425 |
| | 380 | 32.7 | 32.7 | 3.4 | 4 | 14.4 | 239 | 239 |
| | 460 | 23.7 | 23.7 | 2.8 | 4 | 10.7 | 187 | 187 |
| | 575 | 21.2 | 21.2 | 2.3 | 4 | 11.5 | 148 | 148 |

All Electrical Data notes are on page 27

### *Table 16, AGZ 030A - 065A, 60 Hz Single Point Power, Field Wiring Data*

| AGZ Unit Size | Volts | Wiring to Standard Power Block | | Wiring to Optional Non-Fused Disconnect Switch | |
|---|---|---|---|---|---|
| | | Terminal Amps | Connector Wire Range (Copper Wire Only) | Terminal Amps | Connector Wire Range (Copper Wire Only) |
| **030AS** **030AM** | 208 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 230 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 380 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| | 460 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| | 575 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| **035AS** **035AM** | 208 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 230 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 380 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| | 460 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| | 575 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| **040AS** **040AM** | 208 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 230 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 380 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| | 460 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| | 575 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| **045AS** **045AM** | 208 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 230 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 380 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| | 460 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| | 575 | 175 | #12 - 2/0 | 100 | #14 - 1/0 |
| **050AS** **050AM** | 208 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 230 | 335 | # 4 - 400 MCM | 225 | # 3 - 300 MCM |
| | 380 | 335 | # 4 - 400 MCM | 150 | #4 - 4/0 |
| | 460 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| | 575 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| **055AS** | 208 | 335 | # 4 - 400 MCM | 400 | 250 - 500 MCM |
| | 230 | 335 | # 4 - 400 MCM | 400 | 250 - 500 MCM |
| | 380 | 335 | # 4 - 400 MCM | 250 | #4 - 350 MCM |
| | 460 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| | 575 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| **060AS** | 208 | 335 | # 4 - 400 MCM | 400 | 250 - 500 MCM |
| | 230 | 335 | # 4 - 400 MCM | 400 | 250 - 500 MCM |
| | 380 | 335 | # 4 - 400 MCM | 250 | #4 - 350 MCM |
| | 460 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| | 575 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| **065AS** | 208 | 335 | # 4 - 400 MCM | 400 | 250 - 500 MCM |
| | 230 | 335 | # 4 - 400 MCM | 400 | 250 - 500 MCM |
| | 380 | 335 | # 4 - 400 MCM | 250 | #4 - 350 MCM |
| | 460 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |
| | 575 | 175 | #12 - 2/0 | 150 | #4 - 4/0 |

All Electrical Data notes are on page 27

## Notes for "Electrical Data Single Point" Power:

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 including the control transformer.
2. If the control transformer option is furnished, no separate 115V power is required.
3. If a separate 115V power supply is used for the control circuit, then the wire sizing amps is 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 (type THW) wire.
5. "Recommended Fuse Sizes" are selected at approximately 150% to 175% of the largest compressor RLA, plus 100% of all other loads in the circuit.
6. "Maximum Fuse or HACR 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. Must be electrically grounded according to national and local electrical codes.
9. MCA may vary slightly due to fan motor options such as SpeedTrol, TEFC.

## Voltage Limitations:

Within ± 10 percent of nameplate rating

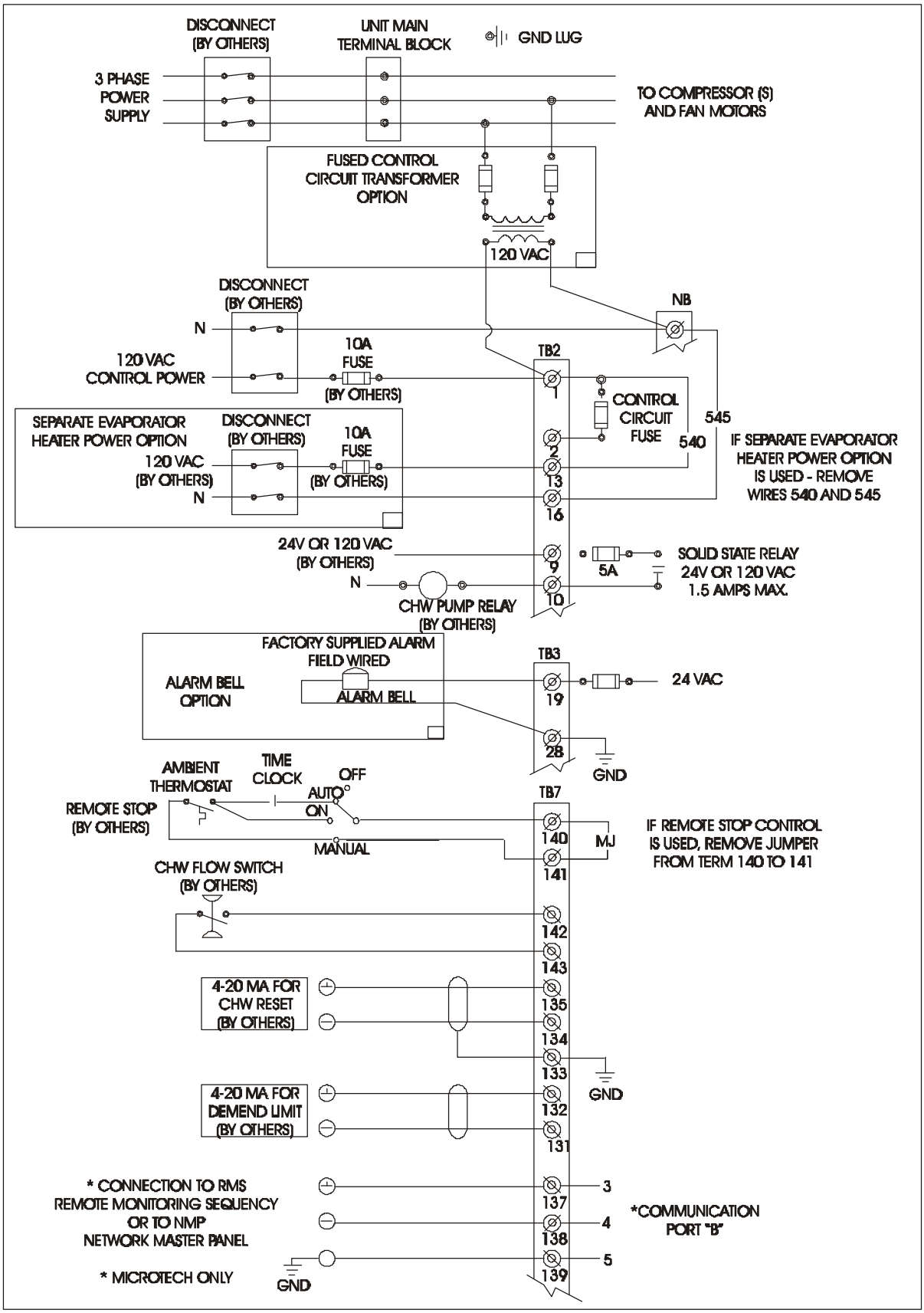
## Notes for "Compressor and Condenser Fan Amp Draw":

1. Compressor RLA values are for wiring sizing purposes only but do not reflect normal operating current draw at rated capacity. If unit is equipped with SpeedTrol condenser fan motors, the first motor on each refrigerant circuit is a single phase, 1hp motor, with a FLA of 2.8 amps at 460 volts, 5.6 amps at 208, 230, and 575 volts.
2. Compressor LRA for reduced inrush start are for the first winding only. If the unit is equipped with SpeedTrol motors, the first motor is a single phase, 1 hp motor, with a LRA of 7.3 amps at 460 volts, 14.5 amps at 208, 230, and 575 volts.

## Notes for "Field Wiring Data"

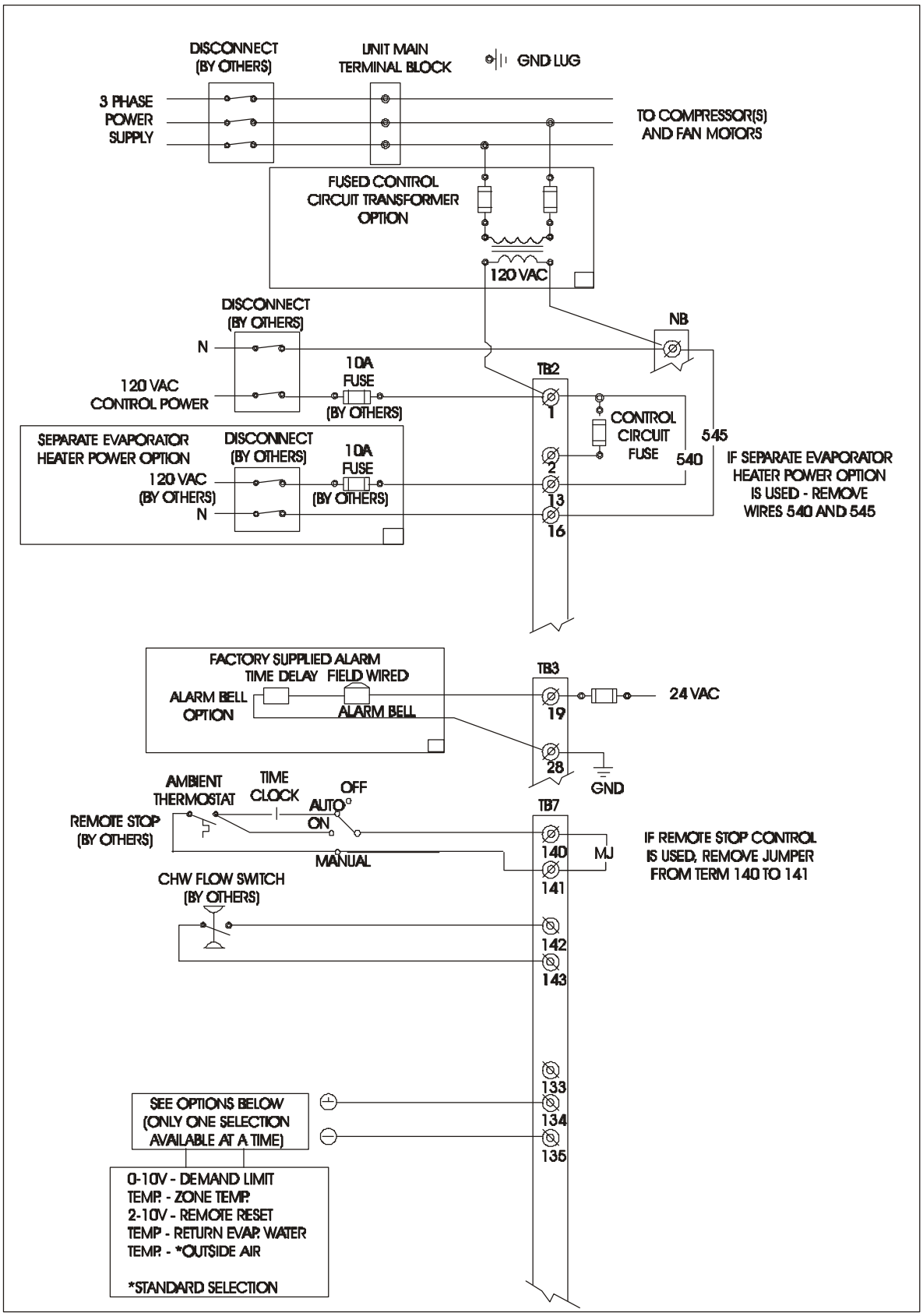
1. Requires a single disconnect to supply electrical power to the unit. This power supply must either be fused or use an HACR type circuit breaker.
2. All field wiring to unit power block or optional non-fused disconnect switch must be copper.
3. All field wire size values given in table apply to 75°C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

***Figure 9, Typical Field Wiring with MicroTech Controller***




See Note 3 for “Electrical Data Single Point Power” on page 27

***Figure 10, Typical Field Wiring Diagram with UNT Controller***




See note 3 for “Electrical Data Single Point Power” on page 27

# Physical Data

## AGZ-AS

***Table 17, AGZ 030AS Through 045AS***

| PHYSICAL DATA | AGZ MODEL NUMBER | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **STANDARD EFFICIENCY** | **030AS** | | **035AS** | | **040AS** | | **045AS** | |
| **BASIC DATA** | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 |
| Unit Capacity @ ARI Conditions (1), Tons (kW) | 30.8 (108.4) | | 34.1 (120.0) | | 38.8 (136.6) | | 44.3 (156.0) | |
| Number Of Refrigerant Circuits | 2 | | 2 | | 2 | | 2 | |
| Unit Operating Charge, R-22, Lbs. | 34 | 34 | 36 | 36 | 40 | 40 | 42 | 42 |
| Unit Operating Charge, R-22, (kg) | (15.4) | (15.4) | (16.3) | (16.3) | (18.1) | (18.1) | (19.0) | (19.0) |
| Cabinet Dimensions, LxWxH, In. | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | |
| Cabinet Dimensions, LxWxH, (mm) | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | |
| Unit Operating Weight, Lb (kg) | 3425 (1555) | | 3480 (1580) | | 3535 (1605) | | 3800 (1725) | |
| Unit Shipping Weight, Lb (kg) | 3350 (1520) | | 3405 (1545) | | 3460 (1570) | | 3695 (1675) | |
| Add'l Weight If Copper Finned Coils, Lb (kg) | 445 (200) | | 445 (200) | | 445 (200) | | 445 (200) | |
| **COMPRESSORS** | | | | | | | | |
| Type | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | |
| Nominal tonnage of each Compressor | 7.5 | 9.0 | 9.0 | 9.0 | 10.0 | 10.0 | 10.0 | 13.0 |
| Number Of Compressors per Circuit | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Oil Charge Per Compressor, Oz. | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| Oil Charge Per Compressor, (g) | (496) | (496) | (496) | (496) | (496) | (496) | (496) | (496) |
| **CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT** | | | | | | | | |
| Standard Staging - Circuit #1 in Lead Standard 4 Stages | 0-23-50-73-100 | | 0-25-50-75-100 | | 0-25-50-75-100 | | 0-22-50-72-100 | |
| Standard Staging - Circuit #2 in Lead Standard 4 Stages | 0-27-50-77-100 | | 0-25-50-75-100 | | 0-25-50-75-100 | | 0-28-50-78-100 | |
| **CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING** | | | | | | | | |
| Coil Face Area,Sq. Ft. | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 |
| Coil Face Area, ($M^2$) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) |
| Finned Height x Finned Length, In. | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 |
| Finned Height x Finned Length, (mm) | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 |
| Fins Per Inch x Rows Deep | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 |
| Pumpdown Capacity, 90% Full Lbs. (kg) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) |
| Maximum Relief Valve Pressure Setting, psig (kPa) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) |
| **CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE** | | | | | | | | |
| Number Of Fans - Fan Diameter, In. (mm) | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28 (712) | |
| Number Of Motors - HP (kW) (2) | 4 - 1.0 (0.7) | | 4 - 1.0 (0.7) | | 4 - 1.0 (0.7) | | 4 - 1.5 (1.1) | |
| Fan And Motor RPM, 60Hz | 1140 | | 1140 | | 1140 | | 1140 | |
| 60 Hz Fan Tip Speed, FPM (M/Sec) | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | |
| 60 Hz Total Unit Airflow, CFM ($M^3$/sec) | 34400 (16.2) | | 34400 (16.2) | | 34400 (16.2) | | 38000 (17.9) | |
| **DIRECT EXPANSION EVAPORATOR - BAFFLED SHELL AND THRU-TUBE** | | | | | | | | |
| Diameter, in. - Length, Ft. | 10 - 04 | | 10 - 04 | | 10 - 04 | | 12 - 04 | |
| Diameter, (mm) - Length, (mm) | (254) - (1220) | | (254) - (1220) | | (254) - (1220) | | (305) - (1220) | |
| Water Volume, Gallons, (L) | 9.1 (34.5) | | 9.1 (34.5) | | 9.1 (34.5) | | 12.8 (48.5) | |
| Maximum Water Pressure, psig (kPa) | 175 (1207) | | 175 (1207) | | 175 (1207) | | 175 (1207) | |
| Maximum Refrigerant Working Pressure, psig (kPa) | 225 (1552) | | 225 (1552) | | 225 (1552) | | 225 (1552) | |
| Water Inlet / Outlet Victaulic Connections, In. (mm) | 4 (101.6) | | 4 (101.6) | | 4 (101.6) | | 4 (101.6) | |
| Drain - NPT int, In. (mm) | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | |
| Vent - NPT int, In. (mm) | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | |

**NOTES:**

1. Nominal capacity based on 95°F ambient air and 54°F/44°F water range.
2. Units with 1.0 Hp Fan Motors, Uses 1.5 Hp Fan Motors when unit is 380V / 60 Hz and 575V / 60Hz.

### *Table 18, AGZ050AS Through 065AS*

| PHYSICAL DATA<br>STANDARD EFFICIENCY | AGZ MODEL NUMBER | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 050AS | | 055AS | | 060AS | | 065AS | |
| **BASIC DATA** | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 |
| Unit Capacity @ ARI Conditions (1), Tons (kW) | 49.0 (172.5) | | 54.0 (190.1) | | 57.5 (202.2) | | 61.0 (214.7) | |
| Number Of Refrigerant Circuits | 2 | | 2 | | 2 | | 2 | |
| Unit Operating Charge, R-22, Lbs. | 44 | 44 | 54 | 54 | 56 | 56 | 62 | 62 |
| Unit Operating Charge, R-22, (kg) | (19.9) | (19.9) | (24.4) | (24.4) | (25.4) | (25.4) | (28.1) | (28.1) |
| Cabinet Dimensions, LxWxH, In. | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 96.2 | |
| Cabinet Dimensions, LxWxH, (mm) | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2444 | |
| Unit Operating Weight, Lbs. (kg) | 3850 (1745) | | 4055 (1840) | | 4115 (1865) | | 4295 (1950) | |
| Unit Shipping Weight, Lbs. (kg) | 3745 (1700) | | 3950 (1790) | | 4010 (1820) | | 4190 (1900) | |
| Add'l Weight If Copper Finned Coils, Lbs. (kg) | 445 (200) | | 665 (300) | | 665 (300) | | 830 (375) | |
| **COMPRESSORS** | | | | | | | | |
| Type | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | |
| Nominal tonnage of each Compressor | 13.0 | 13.0 | 13.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 |
| Number Of Compressors per Circuit | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Oil Charge Per Compressor, Oz. | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| Oil Charge Per Compressor, (g) | (496) | (496) | (496) | (496) | (496) | (496) | (496) | (496) |
| **CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT** | | | | | | | | |
| Standard Staging - Circuit #1 in Lead<br>Standard 4 Stages | 0-25-50-75-100 | | 0-23-50-73-100 | | 0-25-50-75-100 | | 0-25-50-75-100 | |
| Standard Staging - Circuit #2 in Lead<br>Standard 4 Stages | 0-25-50-75-100 | | 0-27-50-77-100 | | 0-25-50-75-100 | | 0-25-50-75-100 | |
| **CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING** | | | | | | | | |
| Coil Face Area,Sq. Ft. | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 58.0 | 58.0 |
| Coil Face Area, ($M^2$) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (5.4) | (5.4) |
| Finned Height x Finned Length, In. | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 100x 83.5 | 100x 83.5 |
| Finned Height x Finned Length, (mm) | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2540 x 2121 | 2540 x 2121 |
| Fins Per Inch x Rows Deep | 16 x 2 | 16 x 2 | 16 x 3 | 16 x 3 | 16 x 3 | 16 x 3 | 16 x 3 | 16 x 3 |
| Pumpdown Capacity, 90% Full Lbs. (kg) | 63 (28.6) | 63 (28.6) | 86 (39) | 86 (39) | 86 (39) | 86 (39) | 108 (49) | 108 (49) |
| Maximum Relief Valve Pressure Setting, psig (kPa) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) |
| **CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE** | | | | | | | | |
| Number Of Fans - Fan Diameter, In. (mm) | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28(712) | |
| Number Of Motors - HP (kW) | 4 - 1.5 (1.1) | | 4 - 1.5 (1.1) | | 4 - 1.5 (1.1) | | 4 - 1.5 (1.1) | |
| Fan And Motor RPM, 60Hz | 1140 | | 1140 | | 1140 | | 1140 | |
| 60 Hz Fan Tip Speed, FPM (M/Sec) | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | |
| 60 Hz Total Unit Airflow, CFM ($M^3$/sec) | 38000 (17.9) | | 36800 (17.4) | | 36800 (17.4) | | 38400 (18.1) | |
| **DIRECT EXPANSION EVAPORATOR - BAFFLED SHELL AND THRU-TUBE** | | | | | | | | |
| Diameter, in. - Length, Ft. | 12 - 04 | | 12 - 04 | | 12 - 04 | | 12 - 04 | |
| Diameter, (mm) - Length, (mm) | (305) - (1220) | | (305) - (1220) | | (305) - (1220) | | (305) - (1220) | |
| Water Volume, Gallons, (L) | 12.8 (48.5) | | 12.8 (48.5) | | 2.8 (48.5) | | 12.8 (48.5) | |
| Maximum Water Pressure, psig (kPa) | 175 (1207) | | 175 (1207) | | 175 (1207) | | 175 (1207) | |
| Maximum Refrigerant Working Pressure, psig (kPa) | 225 (1552) | | 225 (1552) | | 225 (1552) | | 225 (1552) | |
| Water Inlet / Outlet Victaulic Connections, In. (mm) | 4 (101.6) | | 4 (101.6) | | 4 (101.6) | | 5 (127.0) | |
| Drain - NPT int, In. (mm) | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | |
| Vent - NPT int, In. (mm) | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | |

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

# AGZ-AM

***Table 19, AGZ-030AM - 050AM***

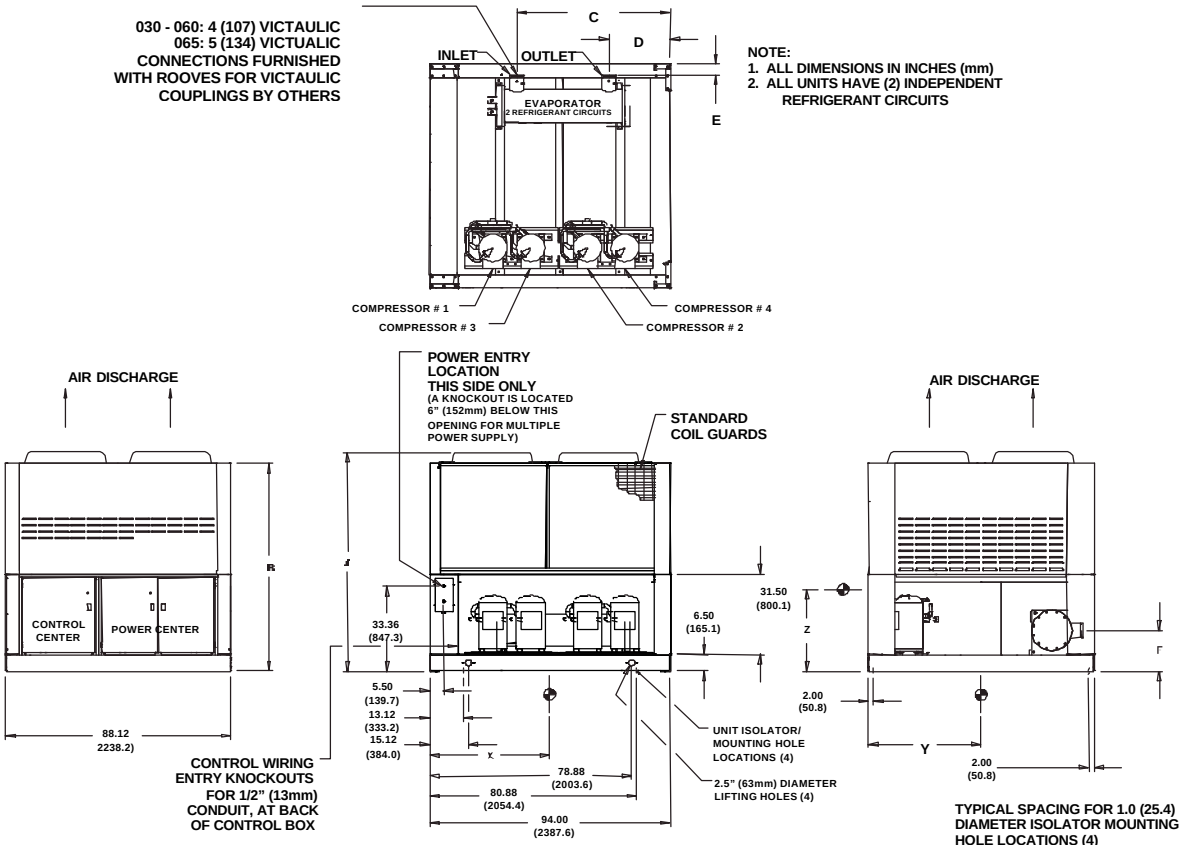
| PHYSICAL DATA | AGZ-AM MODEL NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **STANDARD EFFICIENCY** | **030AM** | | **035AM** | | **040AM** | | **045AM** | | **050AM** | |
| **CAPACITY** @ ARI Conditions (1), Tons (kW) | 30.8 (108.4) | | 34.1 (120.0) | | 38.8 (136.6) | | 44.3 (156.0) | | 49.0 (172.5) | |
| **OUTDOOR UNIT BASIC DATA** | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 | Ckt.1 | Ckt.2 |
| Number Of Refrigerant Circuits | 2 | | 2 | | 2 | | 2 | | 2 | |
| Unit Operating Charge, R-22, Lbs.(2) | 34 | 34 | 36 | 36 | 40 | 40 | 42 | 42 | 44 | 44 |
| Unit Operating Charge, R-22, (kg) (2) | (15.4) | (15.4) | (16.3) | (16.3) | (18.1) | (18.1) | (19.0) | (19.0) | (19.9) | (19.9) |
| Cabinet Dimensions, LxWxH, In. | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | | 94.0 x 88.2 x 86.2 | |
| Cabinet Dimensions, LxWxH, (mm) | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | | 2388 x 2241 x 2190 | |
| Unit Operating Weight, Lb (kg) | 2870 (1300) | | 2925 (1330) | | 2980 (1355) | | 3025 (1375) | | 3075 (1395) | |
| Unit Shipping Weight, Lb (kg) | 2810 (1275) | | 2865 (1300) | | 2920 (1325) | | 2950 (1340) | | 3000 (1360) | |
| Add'l Weight If Copper Finned Coils, Lb (kg) | 445 (200) | | 445 (200) | | 445 (200) | | 445 (200) | | 445 (200) | |
| **COMPRESSORS** | | | | | | | | | | |
| Type | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | | Tandem Scrolls | |
| Nominal tonnage of each Compressor | 7.5 | 9.0 | 9.0 | 9.0 | 10.0 | 10.0 | 10.0 | 13.0 | 13.0 | 13.0 |
| Number Of Compressors per Circuit | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Oil Charge Per Compressor, oz. | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| Oil Charge Per Compressor, (g) | (496) | (496) | (496) | (496) | (496) | (496) | (496) | (496) | (496) | (496) |
| **CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT** | | | | | | | | | | |
| Standard Staging - Circuit #1 in Lead Standard 4 Stages | 0-23-50-73-100 | | 0-25-50-75-100 | | 0-25-50-75-100 | | 0-22-50-72-100 | | 0-25-50-75-100 | |
| Standard Staging - Circuit #2 in Lead Standard 4 Stages | 0-27-50-77-100 | | 0-25-50-75-100 | | 0-25-50-75-100 | | 0-28-50-78-100 | | 0-25-50-75-100 | |
| **CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING** | | | | | | | | | | |
| Coil Face Area,Sq. Ft. | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 | 46.4 |
| Coil Face Area, ($m^2$) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) | (4.3) |
| Finned Height x Finned Length, In. | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 | 80 x 83.5 |
| Finned Height x Finned Length, (mm) | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 | 2032 x 2121 |
| Fins Per Inch x Rows Deep | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 | 16 x 2 |
| Pumpdown Capacity, 90% Full Lbs. (kg) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) | 63 (28.6) |
| Maximum Relief Valve Pressure Setting, psig (kPa) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) | 450 (3103) |
| **CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE** | | | | | | | | | | |
| Number Of Fans - Fan Diameter, In. (mm) | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28 (712) | | 4 - 28 (712) | |
| Number Of Motors - HP (kW) (3) | 4 - 1.0 (0.7) | | 4 - 1.0 (0.7) | | 4 - 1.0 (0.7) | | 4 - 1.5 (1.1) | | 4 - 1.5 (1.1) | |
| Fan And Motor RPM, 60Hz | 1140 | | 1140 | | 1140 | | 1140 | | 1140 | |
| 60 Hz Fan Tip Speed, FPM (m/Sec) | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | | 8357 (35.4) | |
| 60 Hz Total Unit Airflow, CFM ($m^3$/sec) | 34400 (16.2) | | 34400 (16.2) | | 34400 (16.2) | | 388000 (17.9) | | 388000 (17.9) | |
| **REMOTE DIRECT EXPANSION EVAPORATOR - BAFFLED SHELL AND THRU-TUBE** | | | | | | | | | | |
| Model Number | 1004-1 | | 1004-1 | | 1004-1 | | 1204-3 | | 1204-3 | |
| Diameter, in. - Length, Ft. | 10 - 04 | | 10 - 04 | | 10 - 04 | | 12 - 04 | | 12 - 04 | |
| Diameter, (mm) - Length, (mm) | (254) - (1220) | | (254) - (1220) | | (254) - (1220) | | (305) - (1220) | | (305) - (1220) | |
| Unit Operating Weight, Lb (kg) | 555 (250) | | 555 (250) | | 555 (250) | | 777 (350) | | 777 (350) | |
| Unit Shipping Weight, Lb (kg) | 540 (245) | | 540 (245) | | 540 (245) | | 745 (340) | | 745 (340) | |
| Water Volume, Gallons, (L) | 9.1 (34.5) | | 9.1 (34.5) | | 9.1 (34.5) | | 12.8 (48.5) | | 12.8 (48.5) | |
| Maximum Water Pressure, psig (kPa) | 175 (1207) | | 175 (1207) | | 175 (1207) | | 175 (1207) | | 175 (1207) | |
| Maximum Refrigerant Working Pressure, psig (kPa) | 225 (1552) | | 225 (1552) | | 225 (1552) | | 225 (1552) | | 225 (1552) | |
| Water Inlet / Outlet Victaulic Connections, In. (mm) | 4 (101.6) | | 4 (101.6) | | 4 (101.6) | | 4 (101.6) | | 4 (101.6) | |
| Drain - NPT int, In. (mm) | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | |
| Vent - NPT int, In. (mm) | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | | .375 (9.5) | |

**NOTES:**

1. Nominal capacity based on 95°F ambient air and 54°F/44°F water range, no refrigerant line loss.
2. Includes evaporator. Does not include suction and liquid line charge. Outdoor unit and evaporator are shipped with R-22 holding charge.
3. Units with 1.0 Hp Fan Motors, use 1.5 Hp Fan motors when unit is 380V / 60 Hz and 575V / 60Hz.

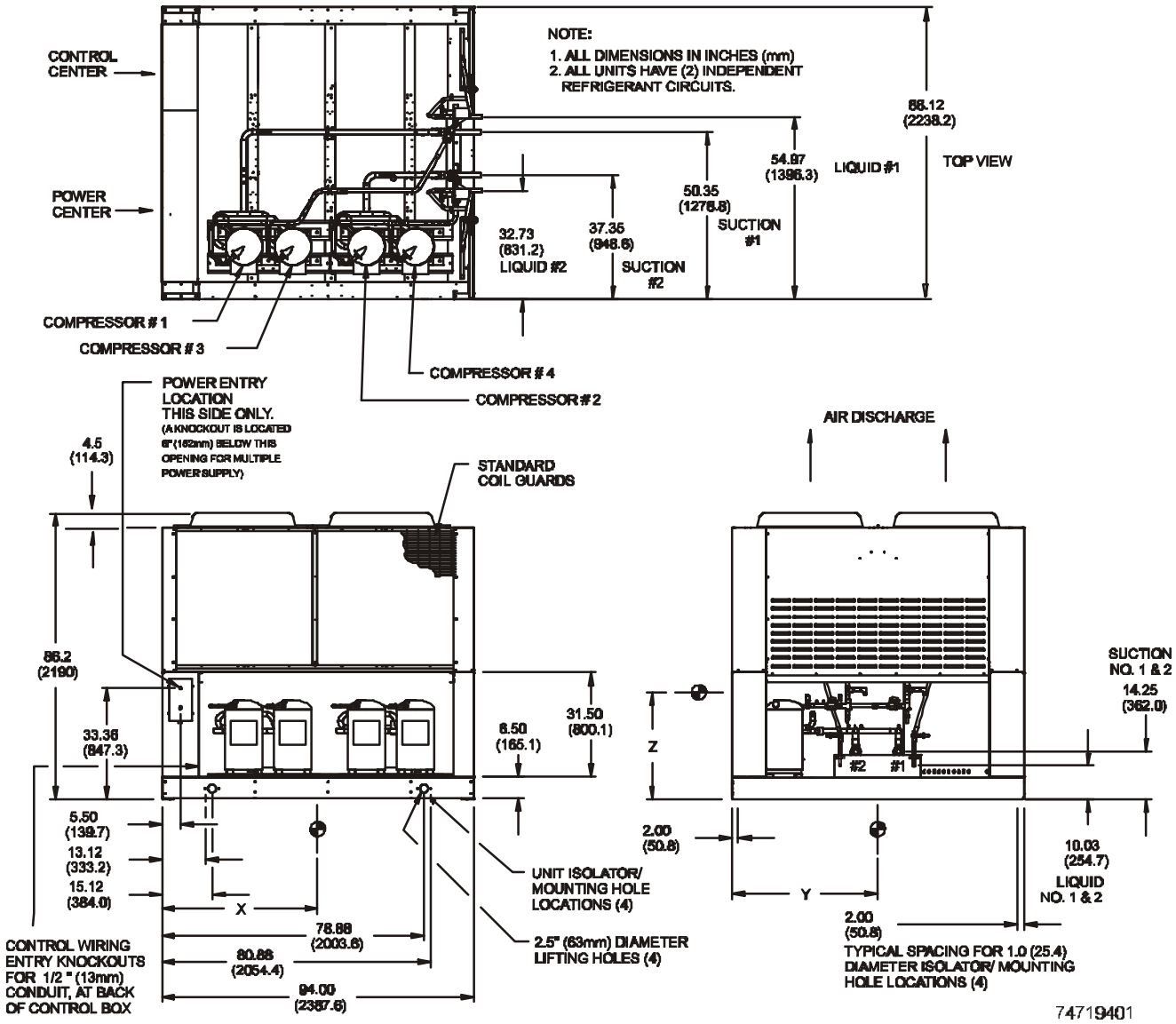
# Dimensional Data

***Figure 11, Dimensions AGZ 030AS through 065AS***



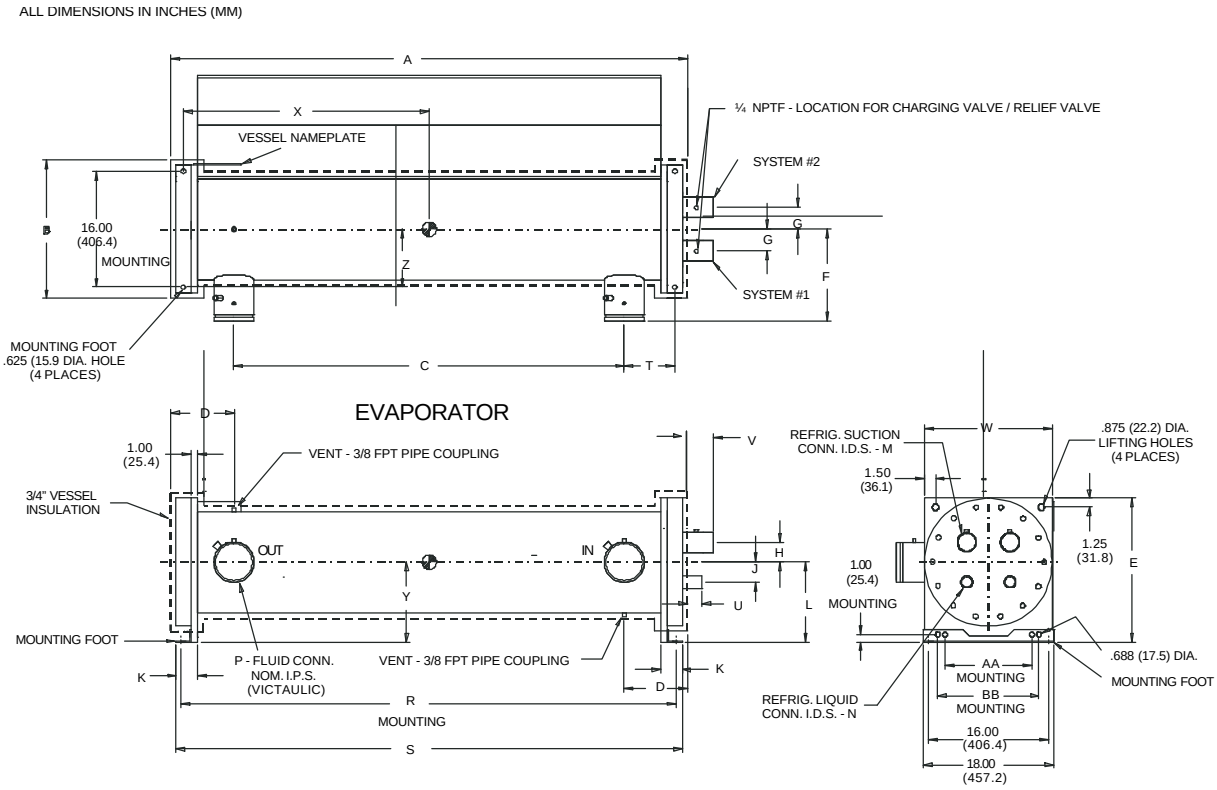

| AGZ Model Number | Dimensions inches/mm | | | | | | Center Of Gravity inches (mm) | | | Unit Weights lbs (kgs) | | Additional Weight For Units with Copper Fin Coils lbs (kgs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | X | Y | Z | Operating | Shipping | |
| **030AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 5.3 (134) | 15.0 (381) | 43.9 (1115) | 40.2 (1021) | 35.9 (912) | 3425 (1555) | 3350 (1520) | 445 (200) |
| **035AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 5.3 (134) | 15.0 (381) | 43.9 (1115) | 40.2 (1021) | 36.2 (920) | 3480 (1580) | 3405 (1545) | 445 (200) |
| **040AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 5.3 (134) | 15.0 (381) | 43.9 (1115) | 40.2 (1021) | 36.2 (920) | 3535 (1605) | 3460 (1570) | 445 (200) |
| **045AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 4.3 (108) | 16.0 (406) | 44.2 (1123) | 40.8 (1036) | 35.6 (904) | 3800 (1725) | 3695 (1675) | 445 (200) |
| **050AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 4.3 (108) | 16.0 (406) | 44.2 (1123) | 40.8 (1036) | 35.6 (904) | 3850 (1745) | 3745 (1700) | 445 (200) |
| **055AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 4.3 (108) | 16.0 (406) | 44.6 (1133) | 41.2 (1046) | 36.4 (925) | 4055 (1840) | 3950 (1790) | 665 (300) |
| **060AS** | 86.2 (2190) | 81.7 (2075) | 61.6 (1565) | 22.3 (566) | 4.3 (108) | 16.0 (406) | 44.6 (1133) | 41.2 (1046) | 36.4 (925) | 4115 (1865) | 4010 (1820) | 665 (300) |
| **065AS** | 96.2 (2444) | 91.7 (2329) | 61.6 (1565) | 22.3 (566) | 4.3 (108) | 16.0 (406) | 45.0 (1143) | 41.8 (1062) | 38.8 (966) | 4295 (1950) | 4190 (1900) | 830 (375) |

***Figure 12, Dimensions, AGZ 030AM - 050AM***




| AGZ MODEL | REFRIGERANT CONN. AT UNIT (in.) | | CENTER OF GRAVITY inches (mm) | | | UNIT WEIGHTS lbs (kgs) | | ADDTL. WEIGHT FOR COPPER | SUCTION CONN. | LIQUID CONN |
|---|---|---|---|---|---|---|---|---|---|---|
| NUMBER | LIQUID | SUCTION | X | Y | Z | OPERATING | SHIPPING | FINS lbs (kgs) | In. | In. |
| **030AM** | 7/8 | 1 5/8 | 42.8 (1087) | 35.8 (909) | 39.7 (1008) | 2945 (1336) | 2885 (1309) | 445 (200) | 1 5/8 | 7/8 |
| **035AM** | 7/8 | 1 5/8 | 42.8 (1087) | 35.9 (911) | 40.0 (1016) | 3000 (1361) | 2940 (1334) | 445 (200) | 1 5/8 | 7/8 |
| **040AM** | 7/8 | 1 5/8 | 42.8 (1087) | 36.0 (914) | 39.9 (1013) | 3055 (1386) | 2995 (1359) | 445 (200) | 1 5/8 | 7/8 |
| **045AM** | 7/8 | 1 5/8 | 42.8 (1087) | 35.2 (894) | 40.3 (1024) | 3095 (1404) | 3025 (1372) | 445 (200) | 1 5/8 | 7/8 |
| **050AM** | 7/8 | 1 5/8 | 42.8 (1087) | 35.3 (897) | 40.3 (1024) | 3145 (1427) | 3075 (1395) | 445 (200) | 1 5/8 | 7/8 |

***Figure 13, CDE 1004-1 - 1204-3***




| CDE MODEL NUMBER | REMOTE WITH AGZ-AM MODEL | WATER CONNECTIONS inches (mm) | | | | REFRIGERANT CONNECTIONS inches (mm) | |
|---|---|---|---|---|---|---|---|
| | | C | L | P | T | M | N |
| CDE-1004-1 | 030, 035, 040 | 39.3 (998) | 8.5 (216) | 4.0 (102) | 5.4 (137) | 1 5/8 (41) | 1 3/8 (35) |
| CDE-1204-3 | 045, 050 | 39.3 (998) | 9.5 (241) | 4.0 (102) | 5.4 (137) | 1 5/8 (41) | 1 3/8 (35) |

| CDE MODEL NUMBER | DIMENSIONAL DATA inches (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | D | E | F | G | H | J |
| CDE-1004-1 | 52.5 (1334) | 15.5 (394) | 6.6 (168) | 16.3 (414) | 11.1 (282) | 2.0 (51) | 2.0 (51) | 2.0 (51) |
| CDE-1204-3 | 53.5 (1359) | 17.5 (445) | 7.1 (180) | 17.5 (445) | 12.1 (307) | 2.3 (58) | 2.0 (51) | 2.0 ((51) |

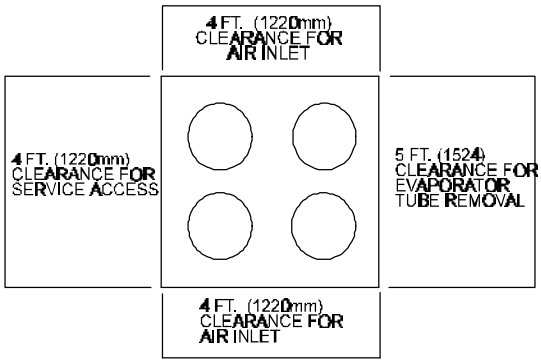
| CDE MODEL NUMBER | DIMENSIONAL DATA inches (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | K | R | S | U | V | W | AA | BB |
| CDE-1004-1 | 3.0 (76) | 50.0 (1270) | 52.0 (1321) | 1.8 (45) | 2.8 (71) | 14.0 (356) | 12.0 (305) | ---- |
| CDE-1204-3 | 3.0 (76) | 50.0 (1270) | 52.0 (1321) | 1.8 (45) | 2.8 (71) | 16.0 (406) | ---- | 14.0 (356) |

# Application Data

## Unit Placement

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. A one-piece concrete slab with footings extended below the frost line is recommended. 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 Table 17 - Table 19.

***Figure 14, Clearances***

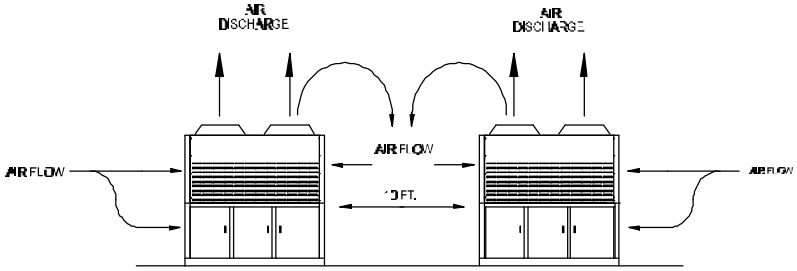



## Clearances

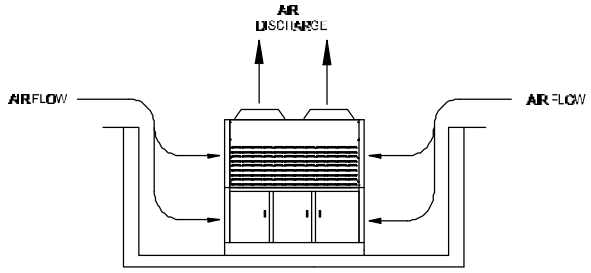
Do not block the flow of air to and from the condenser coil. Restricting airflow or allowing air recirculation will result in a decrease in unit performance and efficiency because discharge pressures are increased. There must be no obstruction above the unit that would deflect discharge air downward 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.

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.

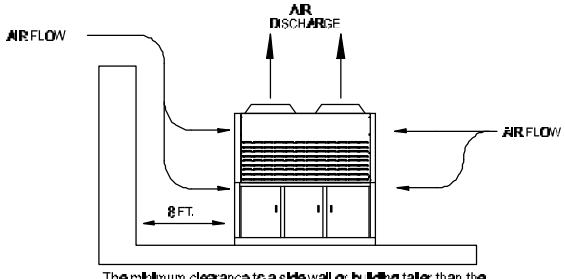
Do not allow debris to accumulate near the unit where it could be drawn into the condenser coil. Keep condenser coils and fan discharge free of snow or other obstructions to permit adequate airflow for proper unit operation.




The recommended minimum side clearance between two units is 10 feet (3048mm). Distance less than 10 feet (3048mm) can result in air recirculation.




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 (consult factory); the minimum clearance on each side of the unit is 8 feet (2438mm) when installed in a pit.




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 (1830mm) tall is closer than 8 feet (2438mm) to the opposite Side of the unit. (consult factory for special situations.)

## Sound Isolation

The ultra-low sound levels for the AGZ chiller is sufficient for most applications. However, there will be applications where sound generation may be an issue. The most effective isolation method is to locate the unit away from sound sensitive areas. Avoid locations beneath windows or between structures where normal operating sounds may be objectionable. Reduce structurally transmitted sound by isolating water lines, electrical conduit and the unit itself. Use wall sleeves and rubber isolated piping hangers to reduce transmission of water or pump noise into occupied spaces. Use flexible electrical conduit to isolate sound through electrical conduit. Spring isolators are effective in reducing the low amplitude sound generated by scroll compressors and for unit isolation in sound sensitive areas.

## Typical Chilled Water Piping

Flush the system water piping thoroughly before making connections to the unit evaporator. Install a strainer of 40 mesh in the return water line before the inlet to the chiller. Design the water piping so the chilled water circulating pump discharges into the evaporator inlet.

Connect the return water line to the evaporator inlet connection (the connection closest to the compressors). Connect the supply water line to the evaporator outlet connection.

Install a flow switch in the horizontal piping of the supply (evaporator outlet) water line.

Provide drain connections at low points in the system to permit complete drainage of the system. Locate air vents at the high points in the system to purge air out of the system. A vent connection on top of the evaporator vessel allows air to be purged out of the evaporator. Purge air from the water system before unit start-up to ensure adequate flow through the evaporator.

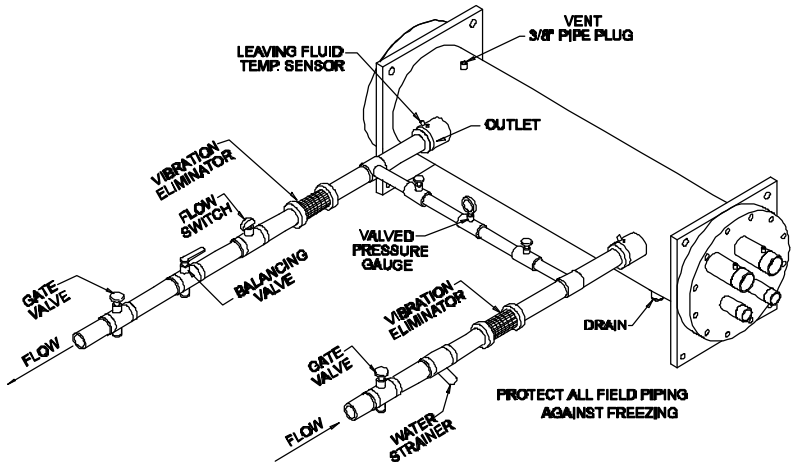
Install pressure gauges in the inlet and outlet water lines to the evaporator. Measure pressure drop through the evaporator and compare to flow as shown in Figure 15. Vibration eliminators are recommended in both the supply and return water lines.

Insulate chilled water piping to reduce heat loss and prevent condensation. Chillers not running in the winter should have their water systems thoroughly drained to protect against freezing. If the chiller operates year round, or if the system is not drained for the winter, protect the chilled water piping exposed to outdoor temperature against freezing. Wrap the lines with a heater cable and add proper amount of glycol to the system to further protect the system.

The total water volume in the system should be sufficient to prevent frequent “on-off” cycling. Turnover rate should not be less than 15 minutes for normal variable cooling loads. Turnover rate for process cooling or a constant load, should not be less than 6 minutes.

The thermostat sensor is factory mounted in the leaving water well. If an optional high return water sensor is provided, install sensor bulb in a field supplied tee or strap to the outside of the water line.

***Figure 15, Typical chilled water piping***



## Series Compared to Parallel Operation

Consider system pressure drop when designing the water piping. Parallel piped systems have half of the total system flow going through the evaporator of each chiller, reducing the individual unit and total system pressure drop.

Series piped evaporators require that the total system water flows through both evaporators. Not only is the pressure drop through each evaporator increased but the pressure drops must be added together to obtain the total evaporator pressure drop. Series piped evaporators normally require larger circulating pumps for the chilled water system.

## Temperature and Water Flow Limitations

AGZ units are designed to operate in temperatures from 40°F (4.5°C) to 115°F (46°C). A low ambient option with SpeedTrol allows operation down to 0°F (-18°C). The minimum ambient temperature is based on still conditions where the wind is not greater than five mph. Greater wind velocities will result in reduced discharge pressure, increasing the minimum operating ambient temperature. Field installed hail/wind guards are available. They allow the chiller to operate effectively down to the ambient temperature for which the unit was designed.

Evaporator flow rates below the minimum values may result in laminar flow causing freeze-up problems, scaling and poor control. Flow rates above the maximum values will result in unacceptable pressure drops and may cause excessive nozzle and tube erosion, potentially leading to failure.

## Evaporator Freeze Protection

Evaporator freeze-up can be a concern in the application of air-cooled water chillers. To protect against freeze-up, insulation and an electric heater cable are furnished with the unit. This protects the evaporator down to -20°F (-29°C) ambient air temperature. Although the evaporator is equipped with freeze protection, it does not protect water piping external to the unit or the evaporator if there is a power failure or heater cable burnout. Consider the following recommendations for additional protection.

1. If the unit will not be operated during the winter, drain evaporator and chilled water piping and flush with glycol. Drain and vent connections are provided on the evaporator to ease draining.
2. Add a glycol solution to the chilled water system to provide freeze protection. Freeze point should be approximately ten degrees below minimum design ambient temperature.
3. The addition of thermostatically controlled heat and insulation to exposed piping.
4. Continuous circulation of water through the chilled water piping and evaporator.

The evaporator heater cable is wired to the 115 volt circuit in the control box. This power should be supplied from a separate source, but it may be supplied from the control circuit. Operation of the heater cable is automatic through the ambient sensing thermostat that energizes the evaporator heater cable for protection against freeze-up. Unless the evaporator is drained in the winter, the disconnect switch to the evaporator heater must not be open.

# Optional Features

## Hot Gas Bypass

Hot gas bypass permits unit operation down to 10% of full load capacity. This option includes a hot gas bypass valve, solenoid valve, and manual shutoff valve for each circuit.

## Gauges

Optional factory mounted gauges include high side and low side refrigerant gauges for each refrigerant circuit. (Included on the MicroTech display.)

## High Return Water Staging Thermostat

Optional factor installed high return temperature unloader thermostat senses high return water temperatures at startup and unloads the refrigerant circuit to avoid unit shutdown due to compressor motor overload. Field location of the thermostat bulb is required. (Included with MicroTech.)

## High Ambient Staging Pressurestat

Optional factory installed high ambient unloader pressurestat senses head pressure exceeding 375 psig (2586 kPa) and unloads the refrigerant circuit to keep head pressure below maximum limits. This feature allows unit to run part loaded instead of shutting unit down due to high head pressure. (Included with MicroTech.)

## SpeedTrol Head Pressure Control

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

## Protective Base Guards

Optional factory installed vinyl-coated welded wire base guards provide all-around lower unit protection on ground level installations. Coil guards are standard.

## Copper Fin Condenser Coils

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

## Coated Fins

Copper or aluminum fins can be coated with *ElectroFin*® baked epoxy coating for additional protection.

## Disconnect Switch with Through-the-Door Handle

A factory or field installed service use, nonfused disconnect switch (mounted inside the power section of control box) with a through-the-door handle is available with single point power supply.

## Totally Enclosed Fan Motors

Available on all fan motors. If the SpeedTrol option is also selected, the variable speed motor on each circuit will not be totally enclosed.

## Circuit Breakers

Factory installed circuit breakers are available on unit with single or multiple point power supply. This option provides unit installed compressor short circuit protection and makes servicing easier.

## Phase Loss/Voltage Protection

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.

## Water Flow Switch

A water flow switch is available for field installation in the chilled water piping to prevent evaporator freeze-up under low or no flow conditions. Terminals are provided in the unit control center for field hook-up of the water flow safety switch. If this option is not ordered with the unit, then a field supplied water flow switch is required.

## Vibration Isolators

Spring vibration isolators are available for field installation to reduce vibration transmission through the unit base. The spring flex isolators are white type CP2-32, McQuay part number 047792932. A total of four per unit is required.

## Zone Terminal Display

An accessory to the standard Global UNT controller that provides:

- Chilled water reset
- Low ambient lockout
- Outside air reset
- Demand Limit
- Ability to monitor and/or adjust 32 points

See page 7 for a complete description. (Not available on MicroTech option.)

# MicroTech

The control panel contains a Model 250-6 microprocessor based controller. The operator can review and change operating parameters from the interface keypad. The interface keypad has twelve input keys and a two line by sixteen character display. The system is protected by a simple password scheme allowing access to authorized personnel. A valid password must be entered before any setpoints can be changed.

MicroTech continuously performs self-diagnostic checks and will automatically shutdown a compressor, a refrigerant circuit, or the entire unit should a fault occur. The cause of the shutdown will be retained in memory and can easily be displayed for operator review. The MicroTech controller will also retain and display the time the fault occurred and the operating conditions that were present at the time of the fault. In addition to alarm diagnostics, the controller also provides the operator with a warning of pre-alarm conditions.

## Personal Computer Monitoring

MicroTech Monitor software may be used on the customer's personal computer to communicate with the MicroTech controller. The controller connects directly or remotely over phone lines with an optional modem.

## Dual Setpoint Control

### (Ice Storage Applications)

Factory supplied with microprocessor based dual setpoint control. A field supplied time clock will determine whether the chiller operates in normal or ice mode.

## Cycle Counter and Run Hour Meter

Factory installed keypad selectable cycle counters and hour meters are available for each compressor.

# Product Specification

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

**SECTION 15XXX**

**AIR-COOLED SCROLL COMPRESSOR CHILLERS**
**AGZ 030A - AGZ 065A**

## 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 590, ANSI/ASHRAE 15, ETL, cETL, ASME Section VIII, NEC, ASHRAE Standard 90.1, 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 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. Chillers shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.

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, 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 run tested air-cooled scroll compressor packaged chillers in the quantity specified. Each chiller shall consist of hermetic tandem scroll compressors, multi-circuit direct expansion evaporator, air-cooled condenser section, control system and all components necessary for safe and 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.

B. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum of 30 percent of full load without hot gas bypass. Performance shall be in accordance with ARI Standard 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 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 two sets of 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. Evaporator: The evaporator shall be direct expansion, shell and tube with carbon steel shell and high efficiency copper tubes rolled into steel tube sheets. Internal baffles shall be polypropylene. The refrigerant heads shall have multi-pass baffles to insure oil return and be removable to permit access to the tubes from either end. The shall be insulated with 3/4 inch (19mm) closed cell polymer insulation with a minimum K factor of 0.28 at 75°F (23°C) and be heated with an electric heater to provide freeze protection to -20°F (-29°C) ambient temperature. The refrigerant side working pressure shall be at least 225 psig (1552 kPa). The water side working pressure shall be at least 175 psig (1207 kPa) The evaporator must be designed, constructed, inspected, and stamped according to the ASME Code.

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, open drip-proof type. External coils shall have wire mesh protective guards.

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

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 start timer, 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 safety controls shall be:

Global UNT microprocessor based control that accomplishes unit capacity control by 4-stage cross-circuit compressor cycling based on leaving chilled water temperature. Set point and control band shall easily field adjusted and anti-cycling and stage delay relays are to be included. Safety controls shall include low and high refrigerant pressure safeties, low evaporator flow, sensor failures, and evaporator freeze protection. Motor protection shall include phase voltage, volts ratio, and solid state compressor motor protection. The controller shall be equipped with a Zone Terminal option that provides an onboard, hand-held, or remote mounted LCD display of unit operating parameters and adjustment of any optional controls.

**- OR -**

MicroTech microprocessor control with a 12 key keypad and 2-line, 16 character backlit liquid crystal display operator interface. The controller shall continuously perform self diagnostic checks on all system temperatures, pressures, and safeties, and automatically shut down a circuit or the entire unit at fault conditions. The cause, time, and date of the occurrence shall be recorded and displayed along with availability to view the seven previous incidents.

The controller shall take proactive measures to stay on-line for non-critical abnormalities; staging down capacity, activating a pre-alarm signal and automatically switching to the alarm menu on the display. These pre-alarms shall be self-clearing when the off-condition is corrected.

Critical shutdown alarms such as high condenser pressure freeze protection, and low evaporator pressure shall be manual reset and cleared at the keypad to resume operation.

F The refrigerant discharge pressure shall be controlled by a FanTrol system that cycles condenser fans based on discharge pressure and shall be operational 40°F (4.4°C).

**- OR -**

The refrigerant discharge pressure shall be controlled by a SpeedTrol control employing both fan cycling and fan speed control and allow operation to 0°F (-18°C).

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

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Hot gas bypass on all circuits
- Low ambient, variable speed, head pressure control to 0°F (-17.8°C)
- Copper fin condenser coils
- Wire mesh guards for lower portion of the unit
- 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
- Factory mounted refrigerant pressure gauges for each circuit
- High return water staging thermostat to prevent compressor overload due to warm water starts
- High ambient staging thermostat to prevent compressor overload due to unusually high ambient temperatures
- Dual setpoint control switched by a remote signal from the building control system.
- Factory installed nonfused disconnect switch, with through-the-door handle, mounted in the unit control panel
- Factory installed circuit breaker to provide unit short circuit protection
- Phase loss with under/over voltage protection and with LED indication of the fault type.

## PART 3 - EXECUTION

3.01 INSTALLATION

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

B. Adjust and level chiller in alignment on supports.

C. Coordinate electrical installation with electrical contractor.

D Coordinate controls with control contractor.

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

3.02 START-UP

A. Ensure proper charge of refrigerant and oil.

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

**END OF SECTION**

## SECTION 15XXX

## AIR-COOLED SCROLL COMPRESSOR CHILLER WITH REMOTE EVAPORATOR AGZ 030AM - AGZ 050AM

# 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 ANSI/ASHRAE 15, ETL, cETL, ASME Section VIII, NEC, ASHRAE Standard 90.1, 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. Refrigerant piping diagram with line sizes and 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 type of products specified and have three 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 unit and remote evaporator shall be delivered to the job site with a holding charge of refrigerant and oil by the manufacturer.

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, 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 a factory assembled air-cooled scroll compressor condensing unit, a remote direct-expansion water chiller, interconnecting wiring and refrigerant piping, and all other components necessary for safe and controlled unit operation. The outdoor unit shall be factory run tested with an evaporator connected.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete scroll compressor chiller system 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 system shall be capable of stable operation to a minimum of 30 percent of full load without hot gas bypass. Performance shall be in accordance with ARI Standard 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 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 UNIT COMPONENTS

A. The unit base and coil supports shall be fabricated from heavy gauge steel and painted with weatherproof paint. Incidental supports may be galvanized.

B. Compressors: The compressors shall be two sets of 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.

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, open drip-proof type. A vinyl coated wire mesh coil guard shall protect coils.

D. 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 start timer, solid-state three-phase motor overload protection, inherent fan motor overload protection and unit power terminal blocks. 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 safety controls shall be:

Global UNT microprocessor based control that accomplishes unit capacity control by 4-stage cross-circuit compressor cycling based on leaving chilled water temperature. Set point and control band shall easily field adjusted and anti-cycling and stage delay relays are to be included. Safety controls shall include low and high refrigerant pressure safeties , low evaporator flow, sensor failures, and evaporator freeze protection. Motor protection shall include phase voltage, volts ratio, and solid state compressor motor protection. The controller shall be equipped with a Zone Terminal option that provides an onboard, hand-held, or remote mounted LCD display of unit operating parameters and adjustment of any optional controls. The leaving water sensor shall be field installed in the remote evaporator and cable spliced if necessary.

**- OR -**

MicroTech microprocessor control with a 12 key keypad and 2-line, 16 character backlit liquid crystal display operator interface. The controller shall continuously perform self-diagnostic checks on all system temperatures, pressures, and safeties, and automatically shut down a circuit or the entire unit at fault conditions. The cause, time, and date of the occurrence shall be recorded and displayed along with availability to view the seven previous incidents.

The controller shall take proactive measures to stay on-line for non-critical abnormalities; staging down capacity, activating a pre-alarm signal and automatically switching to the alarm menu on the display. These pre-alarms shall be self-clearing when the off-condition is corrected.

Critical shutdown alarms such as high condenser pressure, freeze protection, and low evaporator pressure shall be manual reset and cleared at the keypad to resume operation. The leaving water sensor shsall be field install in the evaporator nozzle and the cable field spliced if necessary.

E. The refrigerant discharge pressure shall be controlled by a FanTrol system that cycles condenser fans based on discharge pressure and shall be operational 40°F (4.4°C).

**- OR -**

The refrigerant discharge pressure shall be controlled by a SpeedTrol control employing both fan cycling and fan speed control and allow operation to 0°F (-18°C).

F. Remote Evaporator: The evaporator shall be direct expansion, shell and tube with carbon steel shell and high efficiency copper tubes rolled into steel tube sheets. Internal baffles shall be polypropylene. The refrigerant heads shall have multi-pass baffles to insure oil return and be removable to permit access to the tubes from either end. The shall be insulated with 3/4 inch (19mm) closed cell polymer insulation with a minimum K factor of 0.28 at 75°F (23°C) and be heated (if located in below freezing temperature area) with an electric heater to provide freeze protection to -20°F (-29°C) ambient temperature. The refrigerant side working pressure shall be at least 225 psig (1552 kPa). The water side working pressure shall be at least 175 psig (1207 kPa) The evaporator must be designed, constructed, inspected, and stamped according to the ASME Code.

G. Refrigerant Circuit: The condensing unit shall be furnished with factory mounted liquid and suction shutoff valves. The field piped 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. The contractor shall submit the piping design for approval. The piping shall be designed, installed, evacuated, and charged according to accepted practice.

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Hot gas bypass on all circuits
- Low ambient, variable speed, head pressure control to 0°F (-17.8°C)
- Copper fin condenser coils
- Wire base guards to provide protection to the unit.
- 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
- Factory mounted refrigerant pressure gauges for each circuit
- High return water staging thermostat to prevent compressor overload due to warm water starts
- High ambient staging thermostat to prevent compressor overload due to unusually high ambient temperatures
- Dual setpoint control switched by a remote signal from the building control system.
- Factory installed nonfused disconnect switch, with through-the-door handle, mounted in the unit control panel
- Factory installed circuit breaker to provide unit short circuit protection
- Phase loss with under/over voltage protection and with LED indication of the fault type.

## PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.
B. Adjust and level chiller in alignment on supports.
C. Coordinate electrical installation with electrical contractor.
D Coordinate controls with control contractor.
E. Provide all appurtenances required to ensure a fully operational and functional chiller.

3.02 START-UP

A. Ensure proper charge of refrigerant and oil.
B. Provide testing, and starting of machine, and instruct the Owner in its proper operation and maintenance.

**END OF SECTION**

McQuay International

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