DAIKIN

Catalog 635-1

Trailblazer®
Air-Cooled Scroll Compressor Chillers
With High Efficiency Variable Speed Fan Technology

Model AGZ-F
030 to 220 Tons (105 to 774 kW)
R-32 Refrigerant
60/50 Hz

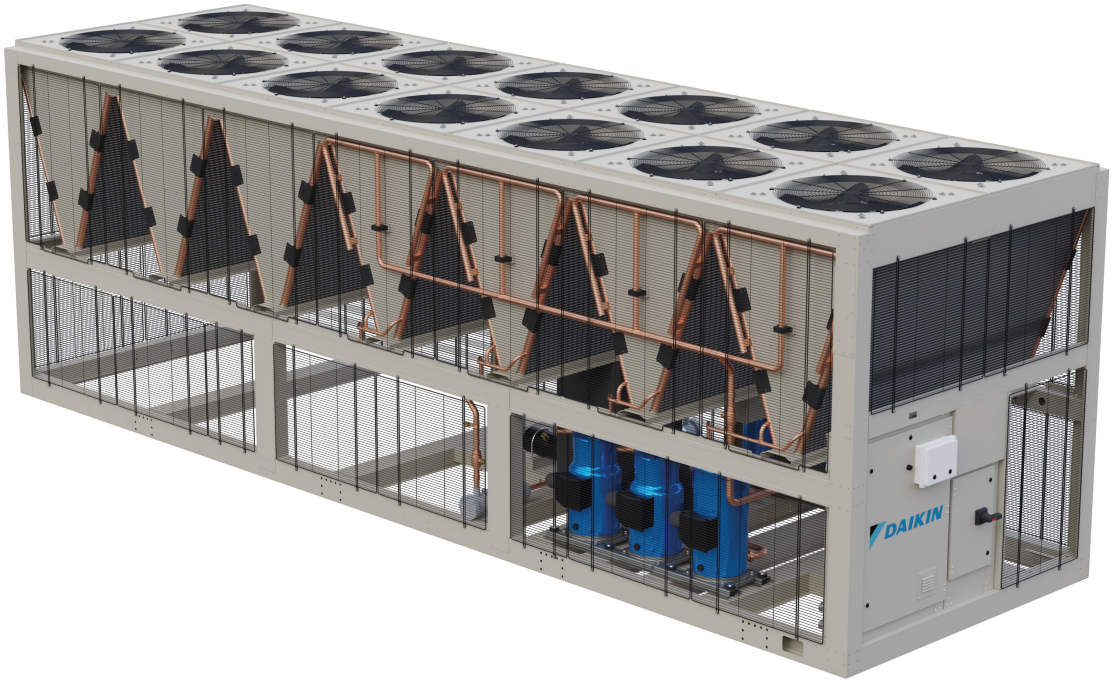

Table of Contents

Manufactured in an ISO 9001 & ISO 14001 certified facility

Air-Cooled Chiller Products

Introduction

The Trailblazer® family of air-cooled scroll chillers continues the Daikin Applied legacy of high quality, high efficiency, latest technology and quiet operation. These features make the Trailblazer® family the best overall value in air-cooled packaged chillers available today.

Efficient Operation

The Trailblazer® units utilize environmentally acceptable R-32 refrigerant and meet the performance requirements of ASHRAE Standard 90.1 for efficiency. Excellent part-load performance is achieved with four or six scroll compressors. A variable speed condenser fan option is also available to provide even higher part load efficiency. High overall efficiency = lower annual energy costs.

Quiet Operation

The Trailblazer® units live up to the Daikin Applied reputation for low operating sound levels and make these chillers “neighborhood friendly.” Full load sound pressure levels as low as 60 dB without insulation.

LEED® Points

For building owners who wish to pursue Leadership in Energy and Environmental Design (LEED®) Green Building Certification, points earned for Optimize Energy Performance (formerly EA Credit 1) are awarded based on overall building efficiency. The high efficiency of the AGZ-F will contribute to the total points earned for this credit. Trailblazer® chillers can also contribute to Enhanced Refrigerant Management (formerly EA Credit 4) qualification which is partially determined by tonnage and refrigerant quantity. Consult with your Daikin Applied sales representative for more information.

Features and Benefits

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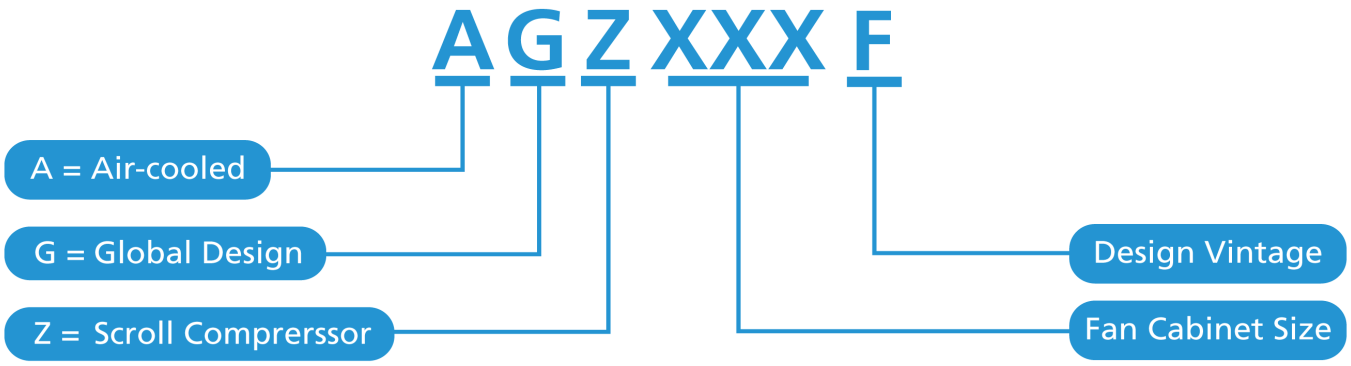


Unit Design Features

Daikin Trailblazer® air-cooled chillers are a product of our commitment to offer quiet, reliable, energy efficient equipment, incorporating high quality compressors, and innovative packaging.

Construction

Trailblazer® chillers are factory-assembled and mounted on a heavy-gauge steel base. The base distributes the unit weight for roof loading. Their small footprint allows smaller mounting pads or support structures and is a plus for retrofit or replacement applications.

Compressors

Reliable hermetic scroll compressors with cast iron scrolls and three Teflon® impregnated bearings are used on the Trailblazer® chillers to promote longevity.

Each model has the ability to modulate its capacity. Models with four compressors will have four steps of capacity modulation while models with six compressors will have six steps. Compressors stage on depending on the load of the system. This results in excellent part-load efficiency and reduced annual operating costs.

Evaporator

Trailblazer® units are designed to maximize efficiency in the smallest possible footprint. The evaporator is a compact, high efficiency, dual circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless steel plates. These heat exchangers provide excellent heat exchange efficiency in a compact footprint and are especially attractive for smaller capacity units. Evaporators are designed and constructed according to, and listed by, Underwriters Laboratories (UL).

Condenser Coils

Condenser coils are all aluminum alloy microchannel design with a series of flat tubes containing multiple, parallel flow microchannels layered between the refrigerant manifold piping. See “Condenser Coils” on page 9 for discussion of environmental factors related to material and coating options.

Figure 1: Microchannel Coil

Optional High Efficiency Variable Speed Condenser Fans

The MicroTech® chiller controller uses ECM fan technology with an integrated inverter to optimize chiller efficiency and maintain proper head pressure. This feature improves part load efficiency substantially and offers the ability to operate in low ambient conditions down to -4°F.

All High Efficiency Trailblazer® models also include a sound reduction mode to allow for reduced-sound operation.

Control System

The MicroTech® advanced chiller controller surpasses all other microprocessor-based chiller control systems available today. This powerful, user-friendly control system provides the flexibility and performance needed for either stand-alone unit operation or the controller can be easily tied into the building automation system of choice using the Daikin open protocol feature.

The open protocol platform allows you to choose from open standard protocols, such as BACnet®, Modbus® and LonWorks®, to communicate easily with the building automation system that best meets the facility requirements. These optional communications modules are available factory installed or can be easily field installed.

The MicroTech controller's design will not only permit the chiller to run more efficiently, but will also simplify troubleshooting if a system failure occurs. Every MicroTech® chiller controller is programmed and tested prior to shipment to help provide a trouble-free start-up.

Protective Base Guards

Factory-installed, vinyl-coated, welded-wire base guards provide around lower section protection on ground level installations.

Replaceable Core Filter Drier

Factory-installed filter drier with a replaceable core allows for fast replacement of filter element and easier serviceability.

Application Considerations

Operating and Standby Limits

Table 1: Operating Limits

Maximum standby ambient temperature	130°F (54°C)
Maximum operating ambient temperature	105°F (41°C)
-with optional high ambient package	125°F (52°C)
Minimum operating ambient temperature (standard control)	32°F (0°C)
-with optional low ambient control (see “Low Ambient Operation” on page 8)	-4°F (-20°C)
Leaving chilled water temperature	40°F to 70°F (4°C to 21°C)
Leaving chilled fluid temperatures (with anti-freeze) - Note that in cases of high ambient temperature, the lowest leaving water temperature settings may be outside of the chiller operating envelope; consult Daikin Tools® to ensure chiller is capable of the required lift.	15°F to 70°F (-9°C to 21°C)
Operating chilled water delta-T range	6°F to 20°F (3.3°C to -6.6°C)
Maximum evaporator operating inlet fluid temperature	81°F (27°C)
Maximum evaporator non-operating inlet fluid temperature	100°F (38°C)

Unit Placement

Trailblazer® units are for outdoor applications and can be mounted either on a roof or at ground level. For roof mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof. For ground level applications, install the unit on a substantial base that will not settle. Use a one-piece concrete slab with footings extended below the frost line. Be sure the foundation is level within 0.5” (13 mm) over its length and width. The foundation must be strong enough to support the unit weight.

Service Clearance

Sides

It is highly recommended to provide a minimum of 8 feet (2.4 meters) on one side to allow for coil replacement. Coils can be removed from the top, allowing a minimum of 4 feet (1.2 meters) of side clearance; however, the unit performance may be derated.

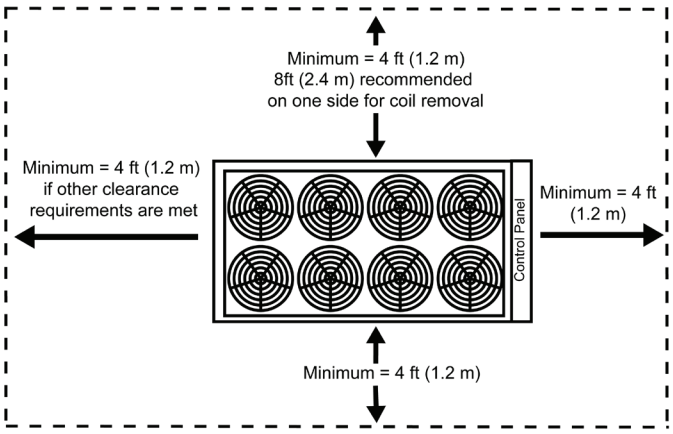
Control Panel End

Minimum of 4 feet (1.2 meters)

Opposite Control Panel End

Minimum of 4 feet (1.2 meters)

Figure 2: Service Clearance



Operational Spacing Requirements

Sufficient clearance must be maintained between the unit and adjacent walls or other units to allow the required unit air flow to reach the coils. Failure to do so will result in a capacity reduction and an increase in power consumption. No obstructions are allowed above the unit at any height. The clearance requirements shown are a general guideline and cannot account for all scenarios. Such factors as prevailing winds, additional equipment within the space, design outdoor air temperature, and numerous other factors may require more clearance than what is shown. Additional clearances may be required under certain circumstances.

Chilled Water Piping

All evaporators and condensers have OGS-type grooved water connections (adhering to Standard AWWA C606) or optional flange connections. The installing contractor must provide matching mechanical connections. PVC piping should not be used. Be sure that water inlet and outlet connections match certified drawings and nozzle markings.

Field-installed water piping to the chiller **must** include:

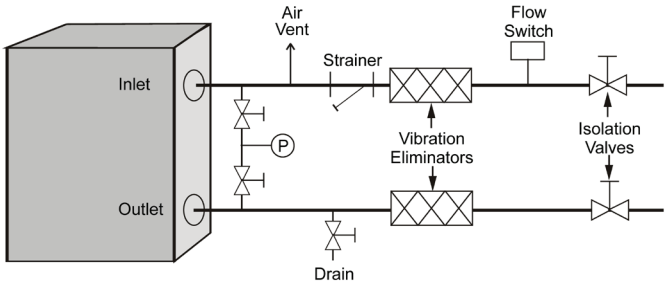
- A cleanable strainer installed at the water inlet to the evaporator to remove debris and impurities before they reach the evaporator, causing damage. See the Inlet Strainer Guidelines and the current version of the product Installation, Operation and Maintenance manual on www.DaikinApplied.com for additional details.
- Adequate piping support to eliminate weight and strain on the fittings and connections.
- A water flow switch must be installed in the horizontal piping of the supply (evaporator outlet) water line to avoid evaporator freeze-up under low or no flow conditions. The flow switch is supplied by the factory as an installed component or a field-installed kit shipped along with the unit.
- Piping for units with brazed-plate evaporators must have a drain and vent connection provided in the bottom of the lower connection pipe and to the top of the upper connection pipe respectively, see Figure 3. These evaporators do not have drain or vent connections due to

their construction.

It is **recommended** that the field-installed water piping to the chiller include:

- Thermometers at the inlet and outlet connections of the evaporator.
- Water pressure gauge connection taps and gauges at the inlet and outlet connections of the evaporator for measuring water pressure drop.
- Vibration eliminators in both the supply and return water lines. Pressure gauges must be installed in the inlet and outlet water lines to the evaporator.
- Insulated chilled water piping to reduce heat loss and prevent condensation. For information on freeze protection, see “Evaporator Freeze Protection” on page 8.

Figure 3: Typical Piping, Brazed-Plate Evaporator



NOTE: Welded pipe connections are not allowed between the strainer and evaporator due to the chance of slag entering the evaporator. Evaporator may be oriented with connections on a different side than shown.

Inlet Strainer Guidelines

An inlet water strainer kit **must** be installed in the chilled water piping before the evaporator inlet. Several paths are available to meet this requirement:

1. A factory installed option.
2. A field-installed kit shipped-loose with the unit that consists of:

- Y-type area strainer with 304 stainless steel perforated basket, Victaulic pipe connections and strainer cap.
- Extension pipe with two Schrader fittings that can be used for a pressure gauge and thermal dispersion flow switch. The pipe provides sufficient clearance from the evaporator for strainer basket removal.
- 0.5-inch blowdown valve
- Two grooved clamps

Both are sized and with the pressure drop shown in Figure 4.

3. A field-supplied strainer that meets specification and installation requirements of the current Installation, Operation and Maintenance Manual available at www.DaikinApplied.com.

Figure 4: Strainer Pressure Drop

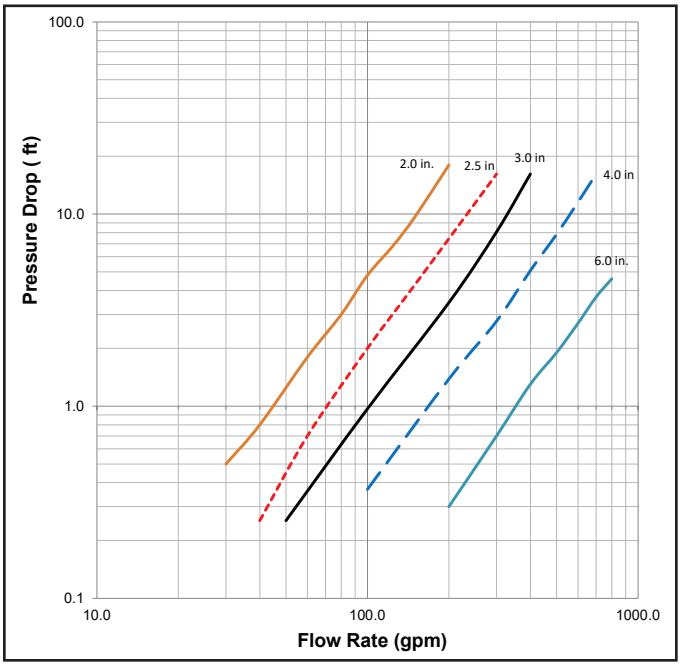
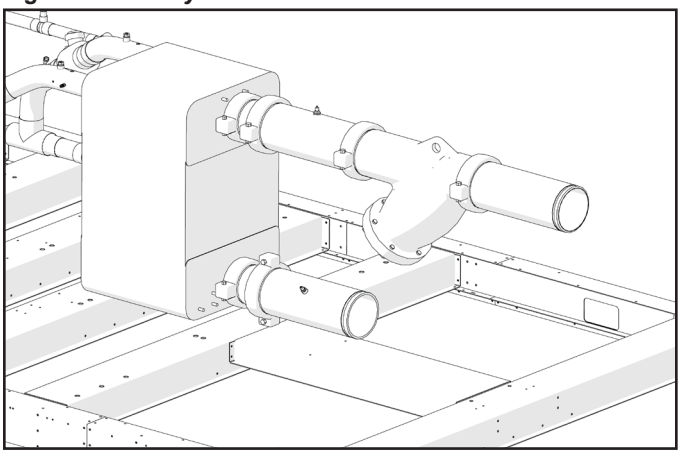


Figure 5: Factory Installed Strainer



Water Flow Limitations

Constant Flow

The evaporator flow rates and pressure drops shown in Figure 4 are for full load design purposes. The maximum flow rate and pressure drop is based on a 6°F temperature drop. Flow rates above the maximum values will result in unacceptable temperature and pressure drops and can cause excessive erosion, potentially leading to failure.

The minimum flow and pressure drop is based on a full load evaporator temperature drop of 16°F. Evaporator flow rates below the minimum values can result in laminar flow causing freeze-up problems, scaling and poor control.

Variable Flow

Reducing evaporator flow in proportion to load can reduce system power consumption. The rate of flow change should be a maximum of 10 percent of the flow per minute. For example, if the maximum design flow is 200 gpm and it will be reduced to a flow of 140 gpm, the change in flow is 60 gpm. Ten percent of 200 gpm equals 20 gpm change per minute, or a minimum of three minutes to go from maximum to desired flow. The water flow through the evaporator must remain between the minimum and maximum values. If flow drops below the minimum allowable, large reductions in heat transfer can occur. If the flow exceeds the maximum rate, excessive pressure drop and tube erosion can occur.

System Water Volume Considerations

All chilled water systems need adequate time to recognize a load change, respond to the change and stabilize to avoid undesirable short cycling of the compressors or loss of temperature control. In air conditioning systems, the potential for short cycling usually exists when the building load falls below the minimum chiller plant capacity or on close-coupled systems with very small water volumes. Some of the things the designer should consider when looking at water volume are the minimum cooling load, the minimum chiller plant capacity during the low load period and the desired cycle time for the compressors. Assuming that there are no sudden load changes and that the chiller plant has reasonable turndown, a rule of thumb of “gallons of water volume equal to two to three times the chilled water gpm flow rate” is often used. A storage tank may have to be added to the system to reach the recommended system volume.

Evaporator Freeze Protection

Evaporator freeze-up can be a concern in the application of air-cooled water chillers in areas experiencing below freezing temperatures. To protect against freeze-up, insulation and an electric heater are furnished with the evaporator. AGZ-F chillers have an external plate heater and thermostat that helps protect 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 itself if there is a power failure or heater burnout, or if the chiller does not directly control the chilled water pumps. Use one of 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.
2. Add a year-round glycol solution to the chilled water system to provide freeze protection. Freeze point should be approximately 10°F(5.6°C) below minimum design ambient temperature or 10°F below the lowest design leaving water temperature, whichever is lower. The use of glycol anti-freeze is generally considered the safest protection against freeze-up, however, it will reduce the performance of the unit, depending the concentration. Take this into consideration during initial system design and selection. On glycol applications, a minimum fluid concentration should be based on Burst Protection limits.
3. The field installation of thermostatically controlled heat tracing and insulation to exposed piping. Factory insulation will have to be removed and replaced after installation of the tracing.
4. Continuous circulation of water through the chilled water piping and evaporator. (Dependent on power availability).

The evaporator heater cable or immersion heater is factory wired to the 115 volt circuit in the control box. This power should be supplied from a separate source to maximize unit protection, but it can be supplied from the control circuit. Operation of the heaters is automatic through the ambient sensing thermostat that energizes the evaporator heaters for protection against freezing. Unless the evaporator is drained in the winter or contains an adequate concentration of anti-freeze, the disconnect switch to the evaporator heater must be closed. Conversely, do not apply heat to the evaporator if it is drained.

High Ambient Operation

Trailblazer® units for high ambient operation (104°F to 125°F, 40°C to 52°C) require the addition of the optional high ambient package.

Low Ambient Operation

Compressor staging is adaptively determined by system load, ambient air temperature, and other inputs to the MicroTech® chiller control. The standard minimum ambient temperature is 32°F (0°C). A low ambient option allows operation down to -4°F (-20°C). The minimum ambient temperature is based on still conditions where the wind is not greater than 5 mph. Greater wind velocities will result in reduced discharge pressure, increasing the minimum operating ambient temperature. Field-installed louvers are available and recommended to help allow the chiller to operate effectively down to the ambient temperature for which it was designed.

Condenser Coils

The standard coils on the Trailblazer® chiller are an all aluminum alloy microchannel design with a series of flat tubes containing multiple, parallel flow microchannels layered between the refrigerant manifolds. The microchannel coils are designed to withstand 1000+ hour acidified synthetic sea water fog (SWAAT) test (ASTM G85-02) at 120°F (49°C) with 0% fin loss and develop no leaks. The all-aluminum microchannel coils provide superior longevity and durability for non-corrosive applications.

Table 2: Coil/Coating Selection Matrix

Coil Option	Non-Corrosive[1]	Unpolluted Marine[2]	Industrial[3]	Combined Marine-Industrial[4]
Standard Microchannel	+++	-	-	-
Epoxy-coated	+++	+++	+++	++

NOTE:

1. Non-corrosive environments may be estimated by the appearance of existing equipment in the immediate area where the chiller is to be placed.
2. Marine environments should take into consideration proximity to shore as well as prevailing wind direction.
3. Industrial contaminants may be general or localized, based on the immediate source of contamination (i.e. diesel fumes due to proximity to a loading dock).
4. Combined marine-industrial are influenced by proximity to shore, prevailing winds, general and local sources of contamination.

Epoxy coil coating

Epoxy coil coating is a water-based, extremely flexible and durable epoxy polymer coating uniformly applied to all coil surfaces through a multi-step, submerged electrostatic coating process. Epoxy-coated condenser coils provide a 10,000+ hour salt spray resistance per ASTM B117-90. The epoxy-coated coils also receive a UV-resistant urethane top-coat to provide superior resistance to degradation from direct sunlight. This coil coating option provides the best overall protection against corrosive marine, industrial or combined atmospheric contamination.

Water Flow Switch

A factory-included thermal dispersion flow switch is necessary to avoid evaporator freeze-up under low or no flow conditions. A thermal dispersion flow switch will be factory-installed on package models.

Electronic Expansion Valve

An electronic expansion valve comes standard on all models.

Options and Accessories

Controls Options & Accessories

High Efficiency Fans

As part of the fully configurable Trailblazer® model AGZ-F chiller architecture, condenser fan motors can further enhance unit performance by adding three different options for variable speed control:

- Standard: All AC fans, Fixed speed on/off
- Lead fan ECM on each circuit (Required for ambient lower than 32° F)
- All ECM 2hp fans (Required for ambient lower than 32° F)

Units with ECM/DC fan motors also include a sound reduction mode to allow for lower sound operation.

Low Ambient Control (Factory Installed)

Optional fan ECM fans allows unit operation down to -4°F (-20°C). Not available on 380 volt (60 Hz) units.

High Ambient Control Panel

Includes an exhaust fan with rain hood, two inlet screens with filters, necessary controls and wiring. Required for operation from 104°F to 125°F (40°C to 52°C) ambient temperature. This panel is included on units with Low Ambient Control, regardless of ambient temperature, to dissipate additional heat.

Power Factor Correction Capacitors

Option to add power factor correction capacitors to improve the chiller's power factor. Compressor power factor is corrected to approximately 0.95 at standard conditions.

Alarm Bell (Field Installed)

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

BAS Interface (Field Installed)

The preferred module is shipped loose for field installation on the Microtech® chiller controller to provide the interface to the following standard protocols:

- BACnet®/IP
- Modbus®
- BACnet® Ethernet
- LonMark®

Electrical Options and Accessories

Single-Point Electrical Connection

Provides a single power connection to the unit power block with compressor circuit breakers or to a disconnect switch with compressor circuit breakers. Either option also available without circuit breakers.

Multi-Point with Disconnect Switch

Provides a disconnect switch mounted inside the power section of the control box with a through-the-door handle for each circuit and no compressor circuit breakers. Requires field-installed circuit protection.

Convenience Outlet

10.0 amp, 115 volt Ground Fault Circuit Interruption (GFCI) outlet in control panel for servicing unit.

Ground Fault Protection

Protects equipment from damage from line-to-ground fault currents less than those required for conductor protection.

High Short Circuit Current Rating (HSCCR)

Provides control panel with high short circuit current rating with a single-point disconnect breaker switch.

Table 3: Standard and HSCCR Panel Ratings

Disconnect Switch Size	Field Wiring Configuration	SCCR	HSCCR
100	(1) 4-2 AWG	10kA	65kA
200	(1) 2 AWG to 3/0	10kA	65kA
400	(1) 3/0 to 500 MCM	10kA	65kA
600	(1) 4/0 to (2) 300 MCM	65kA @ 240V	65kA @ 240V
		35kA @ 480V	65kA @ 480V
		18kA @ 600V	35kA @ 600V
800	(2) 300 MCM to (2) 400 MCM	N/A	65kA @ 240V
		65kA @ 240V	65kA @ 480V
		35kA @ 480V	35kA @ 600V
1200	(4) 250 MCM to (4) 400 MCM	N/A	65kA @ 240V
		50kA @ 480V	65kA @ 480V
		25kA @ 600V	35kA @ 600V

Unit Options and Accessories

Louvers (Base and/or Coil)

Available for the upper portion or both the upper and lower portions of unit. Selecting both will completely enclose the unit with louvers. The louvers protect the coils from hail damage. All AGZ-F models come equipped with base and coil grills as standard.

Epoxy Coated Fins

Microchannel coils coated with baked epoxy protective coating with 10,000+ hour salt spray resistance (ASTM B117-90).

Evaporator Insulation

Double insulation thickness (total of 1.5 inches) for high humidity areas or low fluid temperatures.

Sound Reduction

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

Shut-off Valves

Suction valves (one per circuit), liquid line shutoff valves, and discharge shutoff valves can be factory mounted.

Evaporator Inlet Strainer

Field-installed evaporator water strainer kit consisting of Y-type strainer, blowdown valve, pipe extension with two Schrader fittings and two grooved couplings.

Hot Gas Bypass

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

Engineering Specifications

TRAILBLAZER® AIR-COOLED SCROLL COMPRESSOR CHILLERS

PART 1--GENERAL

1.01 SUMMARY

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

1.02 REFERENCES

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

B. Units shall meet the efficiency standards of the current version of ASHRAE Standard 90.1, and FEMP standard 2012.

1.03 SUBMITTALS

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

B. Submittals shall include the following:

a. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections

b. Summary of all auxiliary utility requirements such as electricity, water, etc. Summary shall indicate quality and quantity of each required utility.

c. Single line schematic drawing of the field power hookup requirements, indicating all items that are furnished.

d. Schematic diagram of control system indicating points for field interface/ connection.

e. Diagram shall fully delineate field and factory wiring.

f. Installation and operating manuals.

1.04 QUALITY ASSURANCE

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

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

C. Chiller manufacturer's plant must be ISO registered.

1.05 DELIVERY AND HANDLING

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

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

1.06 WARRANTY

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

B. 1st Year Labor Warranty: None included

C. Extended Compressor Warranty: None

D. Extended Unit Warranty: None.

E. Refrigerant Warranty: None.

F. Delay Warranty Start: None.

1.07 MAINTENANCE

A. 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. Daikin Applied

B. (Approved Equal)

2.02 UNIT DESCRIPTION

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

B. Chiller shall be functionally tested at the factory to ensure trouble free field operation

2.03 DESIGN REQUIREMENTS

A. Flow Range: The chiller shall have the ability to support variable flow range down to 40% of nominal design (based on AHRI conditions).

B. Operating Range: The chiller shall have the ability to control leaving chilled fluid temperature

from 15F to 65F.

C. 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.

D. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum percentage of full load of 17%. Performance shall be in accordance with AHRI Standard 550/590.

E. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. All manufacturers shall provide the necessary sound treatment (parts and labor) to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with AHRI Standard 370.

Sound Pressure (at 30 feet)											
63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	**Overall dBA**	75% Load dBA	50% Load dBA	25% Load dBA
Sound Power											
63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	**Overall dBA**	75% Load dBA	50% Load dBA	25% Load dBA

2.04 CHILLER COMPONENTS

A. Compressor

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

B. Evaporator

1. The evaporator shall be a compact, high efficiency, dual circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless steel plates. Vent and drain connections shall be provided in the inlet and outlet chilled water piping by the installing contractor.
2. The evaporator shall be protected with an external, electric resistance heater plate. The evaporator and suction piping to the compressors shall be insulated with 3/4" (19 mm) thick CFC and HCFC-free closed-cell flexible elastomeric foam insulation material with 100% adhesive coverage. The insulation shall have an additional outer protective layer of 3mm thick PE embossed film to provide superior damage resistance. Insulation without the protective outer film shall not be acceptable. UV resistance level shall meet or exceed a rating of 'Good' in accordance with the UNI ISO 4892 - 2/94 testing method. This combination of a heater plate and insulation shall provide freeze protection down to -20°F (-29°C) ambient air temperature.
3. The water-side maximum design pressure shall be rated at a minimum of 469 psig (3235 kPa). Evaporators shall be designed and constructed according to, and listed by, Underwriters Laboratories (UL).

C. Condenser

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

D. Refrigerant Circuit

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

E. Construction

1. Unit formed sheet metal components shall be painted using a corrosion resistant paint system, for aesthetics and long-term durability. Paint system will include a base primer with a high-quality polyester resin topcoat. Painted galvanized parts shall be G60 or greater and finished, unabraded panel surfaces shall be capable to be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment.

F. Control System

1. A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Box shall be designed in accordance with NEMA 3R rating. Power and starting components shall include factory circuit breaker for fan motors and control circuit, individual contactors for each fan motor, solid-state compressor three-phase motor overload protection, inherent fan motor

overload protection and two power blocks (one per circuit) for connection to remote, contractor supplied disconnect switches. Hinged access doors shall be lockable. Barrier panels or separate enclosures are required to protect against accidental contact with line voltage when accessing the control system.

2. Shall include optional single-point connection to a non-fused disconnect switch with through-the-door handle and compressor circuit breakers.

G. Unit Controller

1. An advanced DDC microprocessor unit controller with a 7" resistive touch screen HMI provides the operating and protection functions. The controller shall take preemptive limiting action in case of high discharge pressure or low evaporator pressure. The controller shall contain the following features as a minimum:
2. The unit shall be protected in two ways: (1) by alarms that shut the unit down and require manual reset to restore unit operation and (2) by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms shall activate an alarm signal.
3. Shutdown Alarms:
    a. No evaporator water flow
    b. Sensor failures
    c. Low evaporator pressure
    d. Evaporator freeze protection
    e. High condenser pressure
    f. Motor protection system
    g. Phase voltage protection (Optional)
4. Limit Alarms
    a. Condenser pressure stage down, unloads unit at high discharge pressure.
    b. Low ambient lockout, shuts off unit at low ambient temperatures
    c. Low evaporator pressure hold, holds stage #1 until pressure rises
    d. Low evaporator pressure unload, shuts off one compressor
5. Unit Enable Selection
    a. Enables unit operation from either local keypad, digital input, or BAS
6. Unit Mode Selection
    a. Selects standard cooling, Ice, Glycol, or test operation mode.
7. Analog Inputs:
    a. Reset of leaving water temperature, 4-20 mA
    b. Current Limit
8. Digital Inputs
    a. Unit off switch
    b. Remote start/stop
    c. Flow switch
    d. Ice mode switch, converts operation and setpoints for ice production
    e. Motor protection
9. Digital Outputs
    a. Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
    b. Evaporator pump; field wired, starts pump when unit is set to start
10. Condenser fan control - The unit controller shall provide control of condenser fans based on compressor discharge pressure.
11. Building Automation System (BAS) Interface
    a. Factory mounted DDC controller(s) shall support operation on a BACnet®, Modbus® or LONMARK ® network via one of the data link / physical layers listed below as specified by the successful Building Automation System (BAS) supplier.
    b. BACnet MS/TP master (Clause 9)
    c. BACnet IP, (Annex J)
    d. BACnet ISO 8802-3, (Ethernet)
    e. LONMARK FTT-10A. The unit controller shall be LONMARK® certified.
    f. The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list.
    g. For chillers communicating over a LONMARK network, the corresponding LONMARK eXternal Interface File (XIF) shall be provided with the chiller submittal data.
    h. All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided along with the unit submittal.

2.05 OPTIONS AND ACCESSORIES

A. The following options are to be included:

1. Low Ambient Control: Provide fan cycling control to allow unit operation down to 32°F
2. The following accessories, if selected, are to be included:

    a. Spring vibration isolators for field installation

    b. Rubber-in-shear vibration isolators for field installation

    c. Factory-mounted thermal dispersion type flow switch

    d. Field-mounted, paddle type, chilled water flow switch field wired to the control panel

    e. Strainer to be installed at the evaporator inlet and sized for the design flow rate , with perforation diameter of 0.063” with blowdown valve and Victaulic couplings (factory mounted or field installed)

    f. 115V GFI convenience outlet

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. Install a required cleanable, field-supplied strainer in the chilled water return line at the evaporator inlet per the guidelines in the installation manual.

3.02 START-UP

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

DAIKIN APPLIED AMERICAS INC.
LIMITED PRODUCT WARRANTY
(North America)

Daikin Applied Americas Inc. dba Daikin Applied ("Company") warrants to contractor, purchaser and any owner of the product (collectively "Owner") that Company, at it's option, will repair or replace defective parts in the event any product manufactured by Company, including products sold under the brand name Daikin and used in the United States or Canada, proves defective in material or workmanship within twelve (12) months from initial startup or eighteen (18) months from the date shipped by Company, whichever occurs first. Authorized replaced parts are warranted for the duration of the original warranty. All shipments of such parts will be made FOB factory, freight prepaid and allowed. Company reserves the right to select carrier and method of shipment.

In addition, labor to repair or replace warranty parts is provided during Company normal working hours on products with rotary screw compressors and centrifugal compressors. Warranty labor is not provided for any other products.

Company's liability to Owner under this warranty shall not exceed the lesser of the cost of correcting defects in the products sold or the original purchase price of the products.

PRODUCT STARTUP ON CENTRIFUGAL AND SCREW COMPRESSOR PRODUCTS IS MANDATORY and must be performed by a Daikin Applied or a Company authorized service representative.

It is Owner's responsibility to complete and return the Registration and Startup Forms accompanying the product to Company within ten (10) days of original startup. If this is not done, the ship date and the startup date will be deemed the same for warranty period determination, and this warranty shall expire twelve (12) months from that date.

EXCEPTIONS

1. If free warranty labor is available as set forth above, such free labor does not include diagnostic visits, inspections, travel time and related expenses, or unusual access time or costs required by product location.
2. Refrigerants, fluids, oils and expendable items such as filters are not covered by this warranty.
3. This warranty shall not apply to products or parts which (a) have been opened, disassembled, repaired, or altered by anyone other than Company or its authorized service representative; or (b) have been subjected to misuse, negligence, accidents, damage, or abnormal use or service; or (c) have been operated, installed, or startup has been provided in a manner contrary to Company's printed instructions, or (d) were manufactured or furnished by others and which are not an integral part of a product manufactured by Company; (e) have been exposed to contaminates, or corrosive agents, chemicals, or minerals, from the water supply source, or (f) have not been fully paid for by Owner.

ASSISTANCE

To obtain assistance or information regarding this warranty, please contact your local sales representative or a Daikin Applied office.

SOLE REMEDY

THIS WARRANTY CONSTITUTES THE OWNER'S SOLE REMEDY. IT IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT AND UNDER NO CIRCUMSTANCE SHALL COMPANY BE LIABLE FOR INCIDENTAL, INDIRECT, SPECIAL, CONTINGENT OR CONSEQUENTIAL DAMAGES, WHETHER THE THEORY BE BREACH OF THIS OR ANY OTHER WARRANTY, NEGLIGENCE OR STRICT LIABILITY IN TORT.

No person (including any agent, sales representative, dealer or distributor) has the authority to expand the Company's obligation beyond the terms of this express warranty or to state that the performance of the product is other than that published by Company.

For additional consideration, Company will provide an extended warranty(ies) on certain products or components thereof. The terms of the extended warranty(ies) are shown on a separate extended warranty statement.

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin Applied equipment, its care should be a high priority. For training information on all Daikin Applied HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin Applied equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

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

Products manufactured in an ISO Certified Facility.