SUBMITTAL DATA

for

James Ave Condo chiller

Sold to

Yale Mechanical

Phone: 952-884-1661

Technical Data Sheet for WCC-1

Job Information	*Technical Data Sheet*
Job Name	James Ave Condo chiller
Date	10/27/2018
Submitted By	Gary Krebsbach
Software Version	9.80
Model Number	WGZ060D – Water Cooled Scroll Liquid Chiller
Unit Tag	WCC-1
Country of Origin	USA

Physical Data

Length (in)	136.0	**Shipping Weight (lb)**	2658.0
Width (in)	32.8	**Operating Weight (lb)**	2771.0
Height (in)	63.4	**Refrigerant**	R410a
		Refrigerant Charge (lb)	100.0

Design Performance

Capacity (ton)	Input Power (kW)	Cooling Efficiency (kW/ton)	Flow (gpm)	IPLV.IP (kW/ton)	Evaporator			Condenser		
					P.D. (ftH2O)	T In (°F)	T Out (°F)	P.D. (ftH2O)	T In (°F)	T Out (°F)
60.42	46.83	0.7750	145.0	0.5953	14.5	54.00	44.00	12.6	85.00	95.00

Evaporator Data

Design Flow (gpm) / P.D. (ftH2O)	145.0 / 14.5
Fluid Type	Water
Percentage of Fluid	100
Number of Passes	2
Fouling Factor (F.ft².h/Btu)	0.000100
Type	Brazed Plate
Tube Wall Thickness (in)	Contact factory
Water Volume (gal)	3.2
Min Flow (gpm) / P.D. (ftH2O)	90.80 / 5.90
Max Flow (gpm) / P.D. (ftH2O)	242.0 / 38.3

Condenser Data

Design Flow (gpm) / P.D. (ftH2O)	181.3 / 12.6
Fluid Type	Water
Percentage of Fluid	100
Number of Passes	2
Fouling Factor (F.ft².h/Btu)	0.000250
Tube Material	Cu
Tube Wall Thickness (in)	0.025
Water Volume (gal)	13.6
Min Flow (gpm) / P.D. (ftH2O)	113.4 / 5.20
Max Flow (gpm) / P.D. (ftH2O)	302.5 / 33.3

Part Load Performance at AHRI Standard Conditions

Load Point #	% Load Request	Capacity (ton)	Total Unit Input Power (kW)	Cooling Efficiency (kW/ton)
1	100	60.54	46.50	0.7681
2	75	45.38	29.00	0.6391
3	50	30.25	17.10	0.5653
4	25	15.13	8.500	0.5620

Sound Data

Sound Pressure (at 30 feet) – Octave Band at Center Frequency								
63Hz	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**	**8000Hz**	**Overall**
64	57	62	75	65	69	65	56	75 (without Sound Insulation)
Sound Power – Octave Band at Center Frequency								
63Hz	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**	**8000Hz**	**Overall**
72	65	70	83	73	77	74	64	83

Octave band is non 'A' weighted and overall readings are 'A' weighted. Sound data rated in accordance with AHRI Standard-575.

Technical Data Sheet for WCC-1

Unit Electrical Data (ETL / Canadian ETL Listed and Labeled) ***

Volts	208	**Hertz**	60.0

[with optional supplemental overloads]	**Single Point⁺**
MCA	187
Field Wire Gauge	3/0 AWG
Field Wire Qty	3
Conduit Qty	1
Conduit Nom Size	2.00
Rec Fuse Size	225
Max Fuse Size	225
Terminal Amps for Standard Power Block**	380
Connector Wire Range for Standard Power Block**	See below
Terminal Amps for Optional Disconnect Switch**	400
Connector Wire Range for Optional Disconnect Switch**	(2) 500 - 3/0

⁺ *Single point data are shown as this is how machine was configured.*
*** Both standard power block and optional disconnect data are shown for user convenience. This unit is configured with factory installed non-fused disconnect For all options refer to the order acknowledgement for the actual configuration*

Compressor Electrical Data

Type / Quantity	Scroll/4					
	Comp 1	**Comp 2**	**Comp 3**	**Comp 4**	**Comp 5**	**Comp 6**
RLA	44.0	44.0	44.0	44.0	N/A	N/A
LRA						
Across the Line	340.0	340.0	340.0	340.0	N/A	N/A
Reduced Inrush / Part Winding	N/A	N/A	N/A	N/A	N/A	N/A
Reduced Inrush / Solid State	N/A	N/A	N/A	N/A	N/A	N/A

AHRI 550/590 Certification

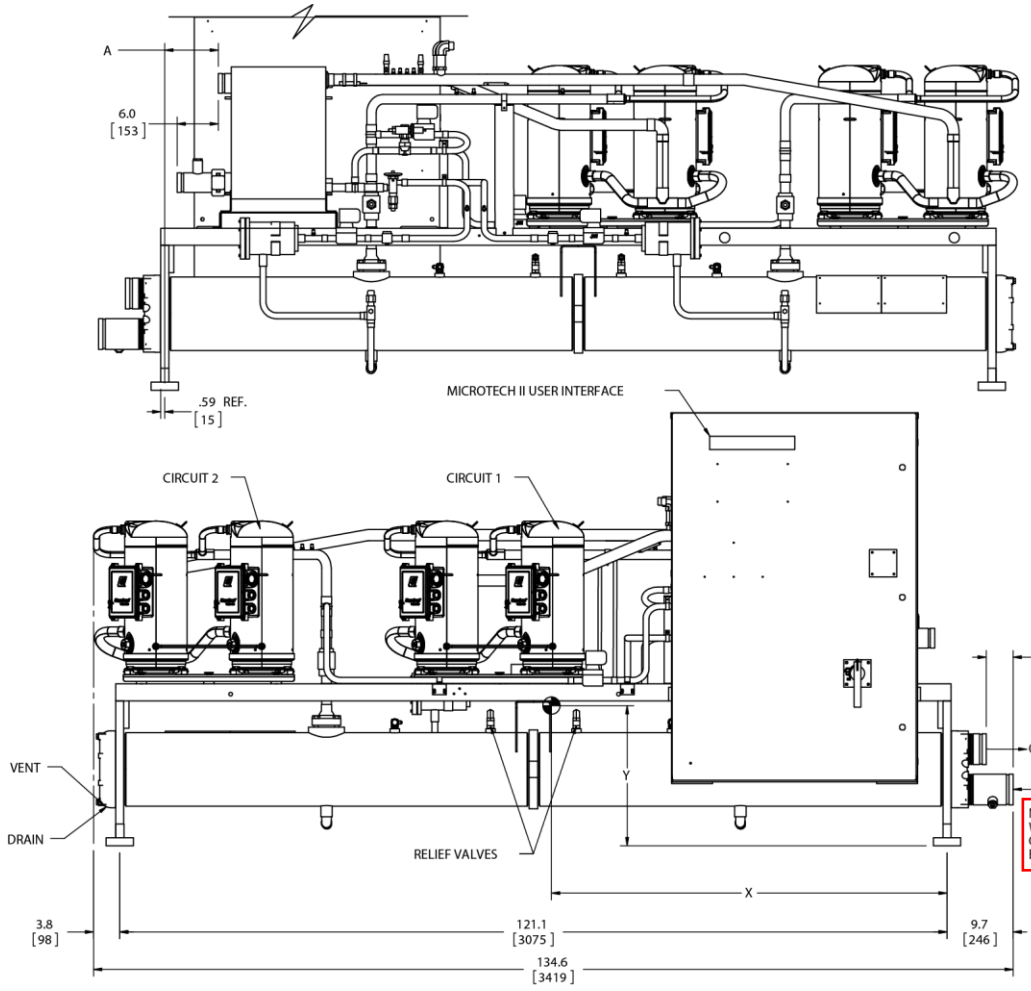
Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Using Vapor Compression Cycle Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org.

Note:
Evaporator connection always as shown.
Condenser connection shown RIGHT side (as you face control panel). LEFT side is also available.

0B

WGZ060DW Packaged Water-Cooled Scroll Chiller

Unit Dimensions



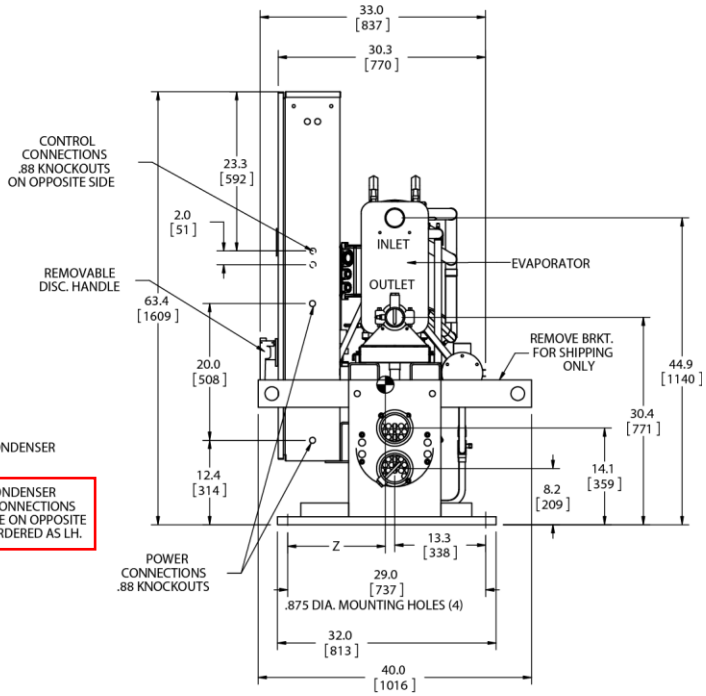
Dimensions						
Units	Chilled Water Connection Grooved		Condenser Water Connection Grooved	Center of Gravity		
	Nominal Size (OD)	A	Nominal Size (OD)	X	Y	Z
in	2.5	7.8	4	57.9	20.5	14.3
mm	64	199	102	1471	521	363

Diagram Notes

The drawings shown on sheet 1 and 2 are for the default configuration; your unit may be configured differently. Consult the Item Summary sheet for exact configuration.

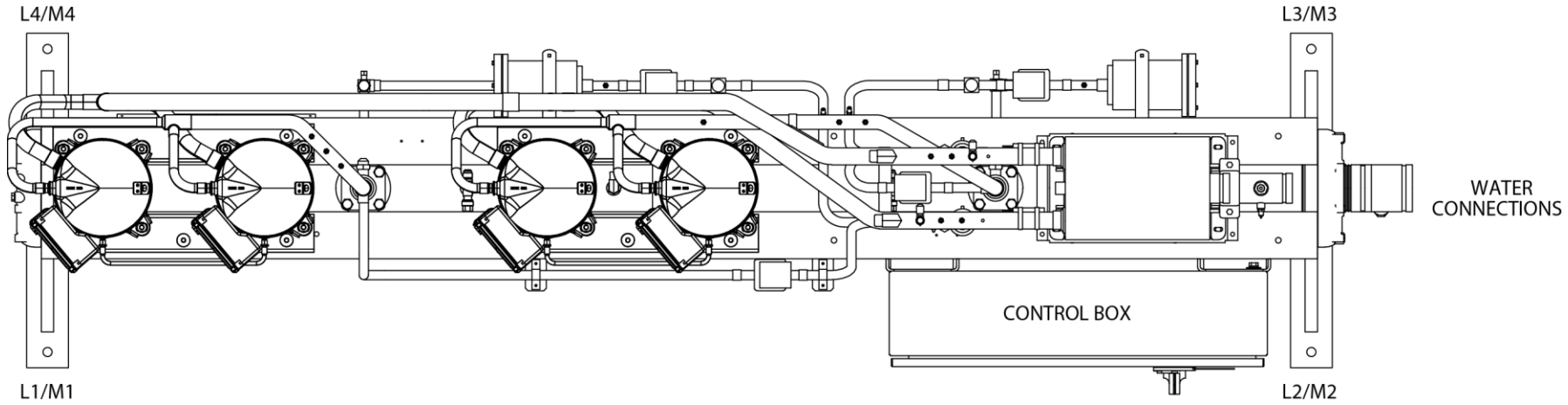
NOTE

A water strainer must be installed at the inlet of the evaporator to protect it from damage. Please refer to the IOM for additional details.



Product Drawing	Unit Tag: WCC-1			Sales Office: Schwab-Vollhaber-Lubratt, Inc. (St.			DAIKIN
Product: Water-Cooled Scroll Chiller	Project Name: James Ave Condo chiller			Sales Engineer: Gary Krebsbach			13600 Industrial Park Blvd. Minneapolis, MN 55441
Model: WGZ060DW	Oct. 27, 2018	Ver/Rev:	Sheet: 1 of 2	Scale: NTS	Tolerance: +/- 1.0"	Dwg Units: in [mm]	www.DaikinApplied.com Software Version: 06.00

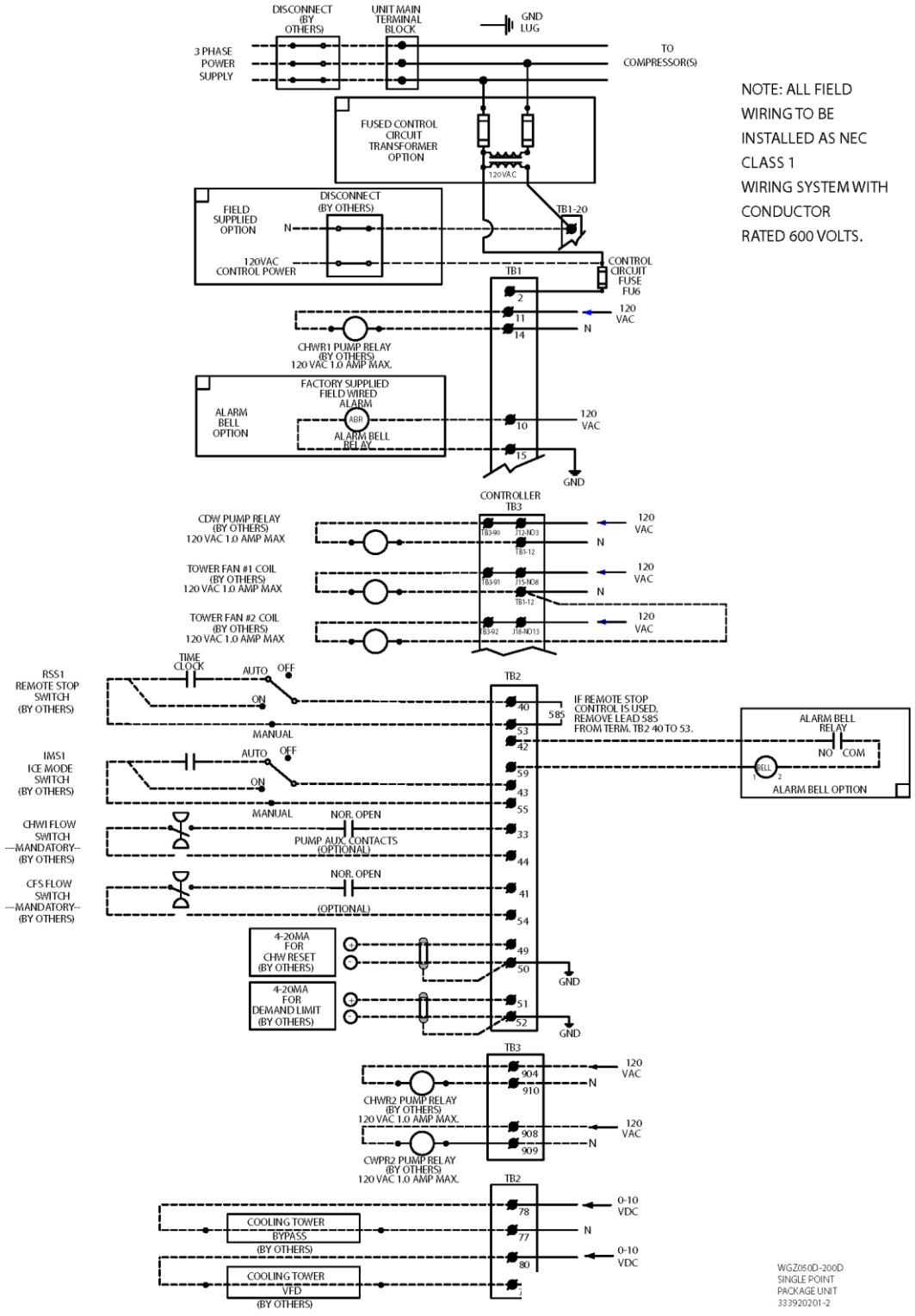
Lifting and Mounting



Unit Weight Data										
Units	Lifting Weight				Mounting Weight				Weight	
	L1	L2	L3	L4	M1	M2	M3	M4	Shipping	Operating
lb	646	706	682	624	674	736	711	651	2658	2771
kg	293	320	309	283	306	334	323	295	1206	1257

Product Drawing	Unit Tag: WCC-1			Sales Office: Schwab-Vollhaber-Lubratt, Inc. (St.			DAIKIN
Product: Water-Cooled Scroll Chiller	Project Name: James Ave Condo chiller			Sales Engineer: Gary Krebsbach			13600 Industrial Park Blvd. Minneapolis, MN 55441
Model: WGZ060DW	Oct. 27, 2018	Ver/Rev:	Sheet: 2 of 2	Scale: NTS	Tolerance: +/- 1.0"	Dwg Units: in [mm]	www.DaikinApplied.com Software Version: 06.00

WGZ030DW-200DW Packaged Condenser Field Wiring Diagram



Field Wiring Diagram	Unit Tag: WCC-1			DAIKIN		
Product: Water-Cooled Scroll	Project Name: James Ave Condo chiller			13600 Industrial Park Blvd. Minneapolis, MN 55441		
Model: WGZ030DW-200DW Packaged	Sales Office: Schwab-Vollhaber-Lubratt, Inc. (St.			www.DaikinApplied.com		Software Version: 06.00
Sales Engineer: Gary Krebsbach	Oct. 27, 2018	Ver/Rev:	Sheet 1 of 1	Scale: N/A	Tolerance: N/A	Dwg Units: N/A

Specification for WCC-1

PART 1: GENERAL

1.01 SUMMARY

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

1.02 REFERENCES

A. Comply with applicable Standards/Codes of AHRI 550/590-98, ANSI/ASHRAE 15, ASME Section VIII, NEC, and OSHA as adopted by the State.Equipment shall meet efficiency standards of ASHRAE Standard 90.1.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with contract 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, etc. Summary shall indicate quality and quantity of each required utility.
3. Single line schematic drawing of the field power hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field connection. Diagram shall fully delineate field and factory wiring.
5. Installation manual
6. Certification of factory-run test of packaged chiller unit signed by company officer.

1.04 QUALITY ASSURANCE

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

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

C. Chiller manufacturer must be ISO Registered.

1.05 DELIVERY AND HANDLING

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

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

1.06 WARRANTY

A. Standard Warranty (Domestic): The refrigeration equipment manufacturer's warranty shall be for a period of one (1) year from the date of equipment start up, but not more than eighteen (18) months from date of shipment. It shall cover replacement parts (labor not included) having proven defective within the above period.

B. Start-up by SVL Service Corp.

C. 1st Year Labor Warranty by Yale Mechanical

D. Extended Compressor Warranty: None.

E. Extended Unit Warranty: None.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Daikin Applied

2.02 UNIT DESCRIPTION

A. Provide and install as shown on the plans factory assembled, factory charged, water-cooled scroll compressor packaged chillers in the quantity specified. Each chiller shall consist of multiple hermetic scroll compressors, multi-circuit brazed plate or shell-and –tube evaporator, shell-and-tube water-cooled condensers, control system and all components necessary for controlled unit operation. Refrigerant shall be R-410A.Each chiller shall be factory run-tested with water to verify full load operation. Operating controls and refrigerant charge shall be verified for proper operation and optimum performance.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete scroll 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. Performance shall be in accordance with applicable AHRI Standard.

C. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with AHRI Standard 575.

2.04 CHILLER COMPONENTS

A. Compressors: 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. On units 30 tons to 130 tons, the evaporator shall be direct expansion type with stainless steel plates brazed together. It shall be insulated with 3/4 inch (19mm) closed cell polyurethane insulation and have 653 psi (4500 kPa) water side working pressure.

C. Condenser: Horizontal shell and finned tube type with steel shell and integral finned copper tubes rolled into steel tube sheets. The chiller shall be equipped with intermediate tube supports. Construct condenser in accordance with the requirements of ASME Section VIII Unfired Pressure Vessel Code and ANSI B9.1 Safety Code. It shall be designed for 232 psi (1599 kPa) water side working pressure and 450 psig (3104 kPa) refrigerant side pressure and be provided with ASME, ANSI B9.1 pressure relief valves.

D. Refrigerant Circuit: Each refrigerant circuit shall include a liquid line shutoff valve, replaceable core or sealed filter-drier, sight glass with moisture indicator, liquid line solenoid valve, thermal expansion valve, and insulated suction line.

E. Control Panel: The control panel shall contain a microprocessor controller providing operating and equipment protection controls plus motor starting equipment, factory wired, operationally tested, and ready for operation. Standard components shall include a control transformer with primary and secondary fusing, microprocessor transformers with integral fusing, compressor contactors, circuit breakers, single-point wiring arrangement and switches for each circuit pumpdown and unit control power. The control panel shall have a hinged tool-locked door. The control system shall stage the compressors based on the leaving water temperature. Equipment protection devices controlled by the microprocessor include motor protection, high pressure, loss of refrigerant, loss of water flow, freeze protection, and low refrigerant pressure. Controls shall include auto/stop switch, chilled water setpoint adjustment, anti-recycle timer, and digital display with water temperature and setpoint, operating temperatures and pressures, and diagnostic messages.

1. The following features and functions shall be included:
   a. The LCD-type display shall have a minimum of 20 characters with all messages in plain English. Coded messages are not acceptable.
   b. Critical parameters shall have their own section of control and shall be password protected.
   c. Resetting chilled water temperature by a remote 4-20mA DC signal.

d. A soft load function to prevent the system from operating at full load during the chilled water pulldown period.
e. An electronic time clock to allow programming of a yearly schedule accommodating weekends and holidays.
f. Auto restart after a power failure, not requiring external battery backup or auxiliary power for maintaining program memory.
g. Shutdowns shall be date and time stamped with system temperatures and pressures recorded. A minimum of six previous occurrences shall be kept in a revolving memory.
h. Start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection.
i. Capability of communication with a PC or remote monitoring through a twisted pair RS-232 interface.
j. Lead/lag manually or automatically by compressor number of starts.
k. Continuous diagnostic checks of unit to provide a pre-alarm signal in advance of a shutdown allowing time for remedial action to be taken.

2. The controller shall contain the following features as a minimum:
3. Unit Enable Selection - Enables unit operation from local keypad, digital input, or BAS
4. Unit Mode Selection - Selects standard cooling, ice, glycol, or test operation mode
5. Analog Inputs - Reset of leaving water temperature, 4-20 mA
6. Digital Inputs
   a. Unit off switch
   b. Remote start/stop
   c. Flow switch
   d. Ice mode, converts operation and setpoints for ice production
   e. Motor protection
7. 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
8. Limit Alarms
   a. Condenser pressure stage down, unloads unit at high discharge pressures
   b. Low ambient lockout, shuts off unit at low ambient temperatures
   c. Low evaporator pressure hold, holds stage #1 until pressure rises
   d. Low evaporator pressure unload, shuts off one compressor
9. Shutdown Alarms
   a. No evaporator water flow
   b. Low evaporator pressure
   c. High condenser pressure
   d. Motor protection system
   e. Phase voltage protection (Optional)
   f. Outside ambient temperature
   g. Evaporator freeze protection
   h. Sensor failures
10. Equipment Protection - The unit shall be protected in two ways: (1) by alarms that shut the unit down and require manual reset to restore unit operation and (2) by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms shall activate an alarm signal.

2.05 OPTIONS AND ACCESSORIES

A. The following options are to be included:
   1. Disconnect switch, single point
   2. Phase and under/over voltage protection
   3. Supplemental compressor overloads

PART 3: EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's requirements, shop drawings, and Contract Documents. Chiller manufacturer must approve the refrigerant piping design.

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.

F. FIELD PROVIDCED AND FIELD INSTALLED Wye strainer, to be installed at the evaporator inlet and sized for the design flow rate , with perforation diameter of 0.063" (for Brazed Plate evaporators) MUST be field installed.

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.

Installation and Maintenance Manual	IM 1131-4

Water-Cooled Scroll Compressor Chiller

Group: **Chillers**
Part Number: **IM1131-4**
Date: **July 2017**

WGZ030DW - WGZ200DW, Packaged Water-Cooled Chillers
WGZ030DA - WGZ200DA, Remote Condenser Chillers
30 - 200 Tons (105 - 700 kW)
50/60 Hz
R-410A

Pre-Start Checklist – Scroll Compressor Chillers

Must be completed, signed and provided to Daikin Applied at least 2 weeks prior to requested start date.

Job Name	
Installation Location	
Customer Order Number	
Model Number(s)	
G.O. Number(s)	

Chilled Water	Yes	No	N/A	Initials
Piping Complete				
Water strainer : Shell & Tube Evaporators 0.125”(3.175mm) or smaller perforations				
Brazed Plate Evaporator 0.063” (1.6mm) or smaller perforations				
Water System filled, flushed and vented				
Pumps installed and operational (rotation checked, strainers cleaned)				
Controls operational (3-way valves, face/bypass dampers, bypass valves, etc.)				
Water system operated and tested; flow meets unit design requirements				
Flow switch installed and wired				
Vent installed on evaporator				
Glycol at design %				
Electrical	**Yes**	**No**	**N/A**	**Initials**
Building controls operational				
*Power leads connected to power block or optional disconnect				
Power leads have been checked for proper phasing and voltage				
All interlock wiring complete and compliant with Daikin specifications				
Power applied at least 24 hours before startup				
Oil heaters energized at least 24 hours before startup				
Chiller components (EXV Sensors Transducers) installed and wired properly.				
*Wiring complies with National Electrical Code and local codes (See Notes)				
Remote EXV wired with shielded cable				
Miscellaneous	**Yes**	**No**	**N/A**	**Initials**
Unit control switches all off				
Remote Evaporator /Condenser Piping factory reviewed				
All refrigerant components/piping leak tested, evacuated and charged				
Thermometers, wells, gauges, control, etc., installed				
Minimum system load of 80% capacity available for testing/adjusting controls				
Document Attached: Technical Breakdown from Selection Software				
Document Attached: Final Order Acknowledgement				
Document Attached: Remote piping approval				

Notes: The most common problems delaying start-up and affecting unit reliability are:

1. Field installed compressor motor power supply leads too small. Questions: Contact the local Daikin sales representative*. State size, number and type of conductors and conduits installed:
   a. From Power supply to chiller _____

* Refer to NEC Article 430-22 (a)

2. Remote Evaporator piping incomplete or incorrect. Provide approved piping diagrams.
3. Items on this list incorrectly acknowledged resulting in delayed start and possible extra expenses incurred by return trips.

Contractor Representative

Signed: _____

Name: _____

Company: _____

Date: _____

Phone/Email: _____

Daikin Applied Sales Representative

Signed: _____

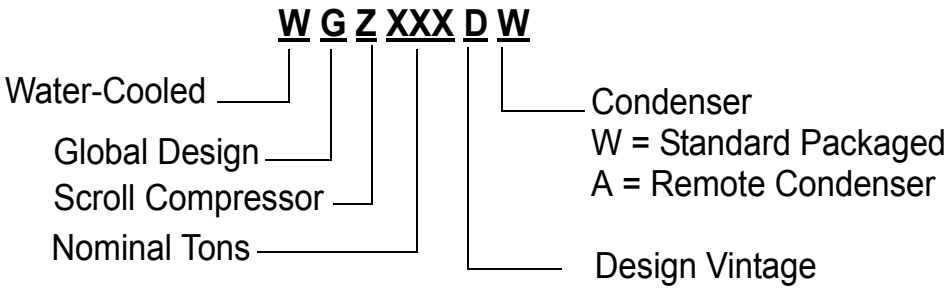
Name: _____

Company: _____

Date: _____

Phone/Email: _____

Chiller Nomenclature



General Description

Daikin Applied WGZ water chillers are designed for indoor installations and are available with water-cooled condensers (Model WGZ-DW), or arranged for use with remote, air-cooled or evaporative condensers (Model WGZ-DA). Each water-cooled unit is completely assembled and factory wired before evacuation, charging and testing. They consist of hermetic scroll compressors, brazed-plate evaporators on Models WGZ 030 to 130 or shell-and-tube on Models WGZ 150 to 200, water-cooled condenser on Model WGZ-DW, and complete refrigerant piping.

Units manufactured for use with remote condensers (Models WGZ-DA) have all refrigerant specialties factory-mounted and connection points for refrigerant discharge and liquid lines.

Liquid line components that are included are manual liquid line shutoff valves, charging valves, filter-driers, liquid line solenoid valves, sight glass/moisture indicators, and expansion valves. Other features include compressor crankcase heaters, and a MicroTech II microprocessor controller.

The electrical control center includes all equipment protection and operating controls necessary for dependable automatic operation. Optional unit-mounted disconnect switche(s) may not be present, inwhich case a field-supplied and installed, fused disconnect switch is required.

Inspection

When the equipment is received, all items should be carefully checked against the bill of lading to be sure of a complete shipment. All units must be carefully inspected for damage upon arrival. All shipping damage must be reported to the carrier and a claim must be filed with the carrier. The unit serial plate should be checked before unloading the unit to be sure that it agrees with the power supply available. Physical damage to unit after acceptance is not the responsibility of Daikin Applied.

Refrigerant Charge

Every model WGZ-DW water chiller with water-cooled condensers is shipped with a full refrigerant charge. For shipment, the charge is contained in the condenser and is isolated by the condenser liquid shutoff valve and the compressor discharge valve common to a pair of compressors.

⚠ CAUTION

If the unit is damaged, allowing the refrigerant to escape, there can be danger of suffocation in the area since the refrigerant will displace the air. Be sure to review Environmental Protection Agency (EPA) requirements if damage occurs. Avoid exposing refrigerant to an open flame.

A holding charge of nitrogen/helium is supplied in remote condenser models, WGZ-DA and must be removed prior to charging with refrigerant. The operating charge must be field supplied and charged.

Installation

Note: Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.

⚠ CAUTION

Avoid contact with sharp edges. Personal injury can result.

Location

WGZ chillers are intended only for installation in an indoor or weather protected area consistent with the NEMA 1 rating on the chiller, controls, and electrical panels. Equipment room temperature for operating and standby conditions is 40°F to 122°F (4.4°C to 50°C).

Because of the electrical control devices, the units should not be exposed to the weather. A plastic cover over the control box is supplied as temporary protection during shipment. A reasonably level and sufficiently strong floor is required for the water chiller. If necessary, additional structural members should be provided to transfer the weight of the unit to the nearest beams.

Space Requirements for Connections and Servicing

For brazed plate evaporators - the chilled water and condenser water (on units with a water-cooled condenser) piping enters and leaves the unit from the right side when looking at the control panel. Left-hand condenser connections are an option. For shell and tube evaporators, the water connections are on the back side of the unit. A clearance of at least 3 feet (1219 mm), or more if codes require, should be provided beyond this piping and on all other sides and ends of the unit for general servicing or for changing the compressors, if it ever becomes necessary. Allow a minimum of 4-ft clearance in front of the control panel or as required by NEC or local codes.

On units equipped with a water-cooled condenser (Type WGZ-DW) clearance should also be provided for cleaning or removal of condenser tubes on one end of the unit. The clearance for cleaning depends on the type of apparatus used, but can be as much as the length of the condenser (10 feet, 3050 mm). Tube replacement requires the length of the condenser (as much as 12 feet) plus three feet of workspace. This space can be provided via a doorway or other opening.

Moving the Unit

Refer to Lifting/Mounting weights beginning on page 25.

The packaged unit skid option is strongly recommended for ease of handling and to help prevent damage if a crane is not available for rigging at site. Properly designed field supplied skids or dollies are acceptable. Do not push unit along a floor without them. The condenserless models (AGZ-DA) are manufactured with a base suitable for moving with rollers.

All moving and handling of packaged units (Figure 1) must be performed with skids or dollies under the unit and they should not be removed until the unit is in the final location. Never put the weight of the unit against the control box.

In moving, always apply pressure to the base on the skids only and not to the piping or other components. A long bar will help move the unit. Avoid dropping the unit at the end of the roll.

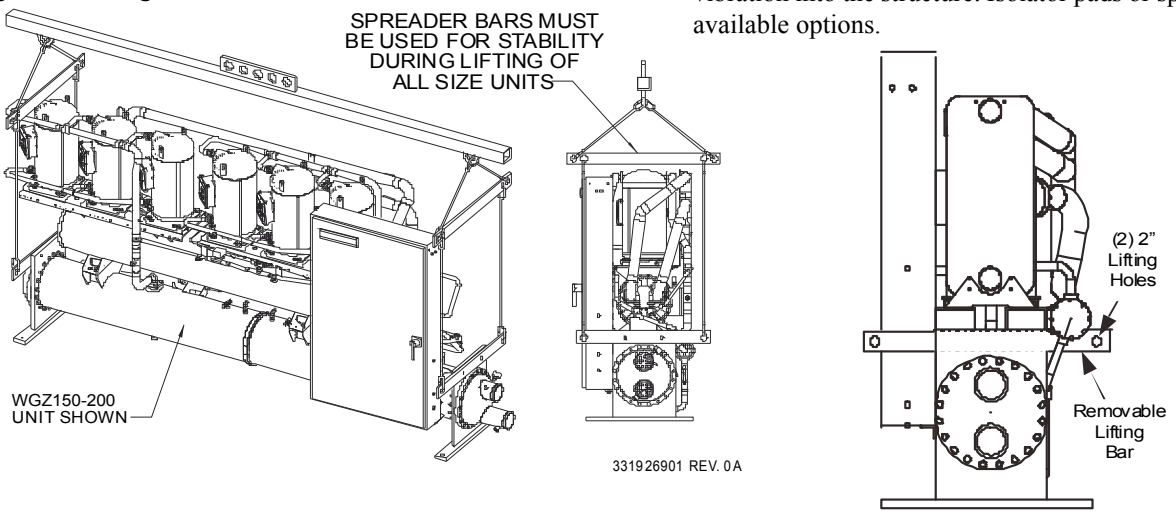
If the unit must be hoisted, lift the unit from the removable lifting arms factory-bolted to each end of the unit adjacent to the tube sheet by attaching cables or chains to the end of the arms. A spreader bar must be used to protect the piping, control panel and other areas of the chiller (Figure 1). The lifting arms should be removed after use.

Do not attach slings to piping or equipment. Do not attempt to lift the unit by lifting points mounted on the compressors. They are for lifting only the compressor should one need to be removed from the unit. Move unit in the upright horizontal position at all times. Set unit down gently when lowering from the truck or rollers. Improper rigging, lifting, or moving of a unit can result in property damage, severe personal injury or death. Follow rigging and moving instructions carefully. Do not stand beneath the unit while it is lifted or being installed.

Placing the Unit

The small amount of vibration normally encountered makes this unit particularly desirable for basement or ground floor installations where the unit can be mounted directly to the floor. The floor construction should be such that the unit will not affect the building structure, or transmit noise and vibration into the structure. Isolator pads or spring isolators are available options.

Figure 1: Lifting the Unit



Chilled Water Piping Guidelines

Due to the variety of piping practices, it is advisable to follow the recommendations of local codes for compliance. They can supply the installer with the proper building and safety guidelines required for a safe and proper installation.

The piping should be designed with a minimum number of bends and changes in elevation to keep system cost down and performance up.

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

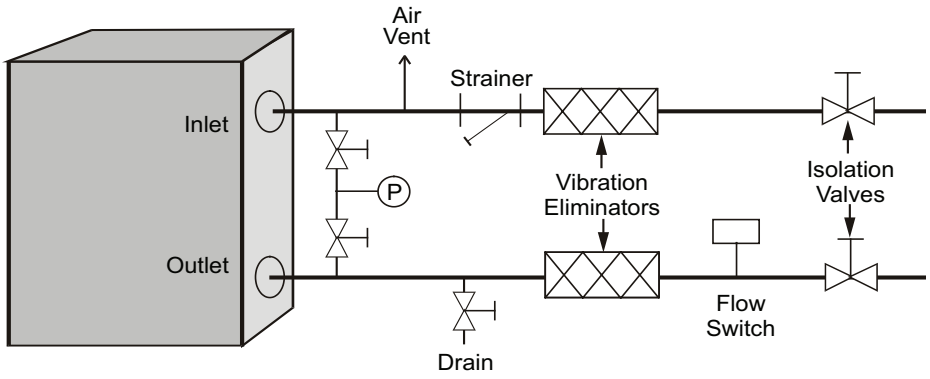
- A cleanable strainer installed at the water inlet to the evaporator to remove debris and impurities before they reach the evaporator. Install cleanable strainer within 5 feet (1500 mm) of pipe length from the evaporator inlet connection and downstreamof any welded connections (no welded connections between strainer and evaporator). WGZ-D models with braze plate evaporators require a strainer with perforations no larger than 0.063" (1.6 mm) diameter. Models with shell and tube evaporators require a strainer with perforations no larger than 0.125" (3.2 mm) diameter.
- A water flow switch must be installed in the horizontal piping of the evaporator outlet. The flow switch may be ordered as a factory-installed option, a filed-installed kit, or may be supplied and installed in the field. See page 7 for further information regarding flow switches.
- All piping should be installed and supported to prevent the chiller connections from bearing any strain or weight of the system piping.
- Manual or automatic air vent valves at the high points of the system. Drains should be placed at the lowest points in the system. Braze plate evaporators do not have vent or drain connections and provisions must be made in the entering and leaving chilled water piping for venting and draining.
- Chilled water piping must be insulated to reduce heat loss and prevent condensation per code requirements. Complete unit and system leak tests should be performed prior to insulating the water piping. Insulation with a vapor barrier would be the recommended type of insulation. The vent and drain connections must extend beyond the proposed insulation thickness for accessibility.

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

- Some means of maintaining adequate system water pressure (e.g., expansion tank or regulating valve).
- Temperature and pressure indicators located within 3 feet (0.9 meters) of the inlet and outlet of the vessels to aid in unit servicing. Pressure drop through the vessel should be measured to determine water flow from the flow pressure drop curves beginning on page 14.
- Flush the system thoroughly prior to unit installation.
- A preliminary leak check of the water piping should be made before filling the system.
- Vibration eliminators to reduce vibration and noise transmission to the building.
- Shutoff valves to isolate the unit from the piping system during unit servicing.
- Regular water analysis and chemical water treatment on the evaporator is recommended immediately upon equipment start-up.
- Chillers not run in the winter should have their water systems thoroughly drained if subject to sub-freezing temperatures. If the chiller operates year-round, or if the system is not drained for the winter, the chilled water piping exposed to sub-freezing ambient temperatures should be protected against freezing by wrapping the lines with a heater cable. In addition, an adequate percentage of glycol should be added to the system to further protect the system during low ambient temperature periods. It should be noted that water piping that has been left drained is subject to more corrosion than if filled with water. Use of a Vapor Corrosion Inhibitor (VCI) or some other protection should be considered. See the section titled "Glycol Solutions" for additional information concerning the use of glycol.

This product is equipped with a copper-brazed 304 series stainless steel evaporator plate or a shell and tube evaporator with carbon steel shell and copper tubes. The water or other fluid used in these evaporators must be clean and non-corrosive to the materials used in the evaporator. The use of non-compatible fluids can void the equipment warranty. If the compatibility of the fluid with the evaporator is in question, a professional water quality consultant should administer the proper testing and evaluate compatibility

Figure 2: Typical Evaporator Field Water Piping (WGZ030 - WGZ130)



PRESSURE LINE CONNECTIONS SHOULD NOT BE WELDED
TO AVOID SLAG ENTERING THE EVAPORATOR

System Water Volume

It is important to have adequate water volume in the system to provide an opportunity for the chiller to sense a load change, adjust to the change, and then stabilize. The system water volume is the total amount of water in the evaporator, air handling equipment, and associated piping. As the expected load change becomes more rapid, a greater water volume is needed. If the water volume is too low, operational problems can occur including rapid compressor cycling, rapid loading and unloading of compressors, erratic refrigerant flow in the chiller, improper motor cooling, shortened equipment life and other undesirable occurrences.

For normal comfort cooling applications where the cooling load changes relatively slowly, a minimum system volume of two to three minutes times the flow rate (GPM) is recommended. For example, if the design chiller flow rate is 120 gpm, we recommend a system volume of 240 to 360 gallons.

For process applications where the cooling load can change rapidly, additional system water volume is needed. A process example would be the quenching of hot metal objects. The load would be very stable until the hot metal is dipped into the water tank. Then, the load would increase drastically.

Since there are many other factors that can influence performance, systems can successfully operate below these suggestions. But as the water volume decreases below these guidelines, the possibility of system instability increases.

Variable Chilled Water Flow

Reducing chilled water flow in proportion to load can reduce total system power consumption. Certain restrictions apply to the amount and rate of flow change. The rate of flow change should be a maximum of 10 percent of the change, 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. Do not reduce flow lower than the part load minimum flows listed on page 14 or page 15.

Flow Switch

A water flow switch must be mounted in the leaving evaporator and condenser water lines to prove adequate water flow before the unit can start. This will safeguard against slugging the compressors on start-up. It also serves to shut down the unit in the event that water flow is interrupted to guard against evaporator freeze-up. There are two options for meeting this requirement.

1 A factory-mounted thermal dispersion flow switch.

2 A "paddle" type flow switch is available from Daikin Applied (part number 017503300) for field mounting and wiring. Wire from switch terminals Y and R to the unit control panel terminals shown on the field wiring diagrams, page 36 and page 37. Mount the flow switch in the leaving water line to shut down the unit when water flow is interrupted. A flow switch is an equipment protection control and should never be used to cycle a unit.

Installation should be per manufacturer's instructions included with the switch. There is also a set of normally closed contacts on the switch that can be used for an indicator light or an alarm to indicate when a "no flow" condition exists. Flow switches should be calibrated to shut off the unit when operated below the minimum listed flow rate for the unit listed on page 14. Provide freeze/condensation protection for any flow switch that is installed outdoors. Differential pressure switches are not recommended. They can freeze and fail to indicate a no-flow condition.

On units with factory-mounted flow switches and where flange connections (grooved-to-flange adaptors or weld-on flanges) are to be used, relocating the flow switch is required to allow for possible future replacement since the flange will interfere with unscrewing the switch. The following is recommended, before installing a flange, to avoid interference 1) Remove the flow switch before and plug the switch opening in the nozzle. 2) Install the grooved-to-flange adaptor or weld on flange. 3)Relocate the flow switch in the water piping outside the flange, close enough to it that the wire leads will reach and the switch can still be unscrewed.

Note: A water flow switch must be mounted in the evaporator outlet water line to signal that there is water flow before unit will start.

Glycol Solutions

⚠ CAUTION

Do not use automotive antifreeze. Industrial glycols must be used. Automotive antifreeze contains inhibitors that causes plating on copper tubes. The type and handling of glycol used must be consistent with local codes.

WGZ units are designed to operate with a leaving chilled fluid temperature from 15°F (-9.4°C) to 60°F (16°C). Leaving chilled fluid temperatures below 40°F (4.6°C) result in suction temperatures at or below the freezing point of water and a glycol anti-freeze solution is required. When glycol is added to the chilled water system for freeze protection, recognize that the refrigerant suction pressure will be lower, cooling performance less, and water side pressure drop will be higher. The reduction in performance depends upon the glycol concentration and temperature. This should be taken into consideration during initial system design.

Daikin Applied recommends a minimum concentration of 25% be provided on all glycol applications. Glycol concentrations below 25% are too diluted for long-term corrosion protection of ferrous metals and corrosion inhibitors need to be recalculated and possibly added to the system.Glycol concentrations greater than 35% are not recommended due to the higher pressure drops and losses of capacity and efficiency. Glycol concentrations higher than 35% do not offer any additional burst protection.

When glycol is required in the chilled water system, reset the freezestat and low leaving water alarm temperatures. The freezestat is factory set to default at 36°F (2.2°C). Reset the freezestat setting to approximately 4° to 5°F (2.3° to 2.8°C) below the leaving chilled water setpoint temperature.

Glycol in the condenser will have a negligible effect on performance because glycol at these higher temperatures will perform with characteristics similar to water.

Chiller capacity, flow rate, evaporator pressure drop, and power input for glycol solutions can be calculated using the following formulas and reference to Table 1 for ethylene glycol and Table 2 for propylene glycol. Test coolant with a clean, accurate, glycol solution hydrometer (similar to that found in service stations) to determine the freezing point.

Note: Ethylene and propylene glycol ratings are outside the scope of AHRI Standard 550/590 certification program.

Capacity is reduced compared to that with plain water. To find the reduced value, multiply the chiller's capacity when using water by the capacity correction factor C to find the chiller's capacity when using glycol.

Flow -To determine evaporator gpm (or T) knowing T (or gpm) and capacity:

$$Glycol\ GPM = \frac{24\ x\ Glycol\ Capacity}{\Delta T}\ x\ Flow\ Correction\ G\ From\ Tables$$

For Metric Applications -- Determine evaporator lps (or T) knowing T (or lps) and kW:

$$Glycol\ Lps = \frac{kW}{4.18\ x\ \Delta T}\ x\ Flow\ Correction\ G\ \ from\ Tables$$

Pressure Drop - To determine glycol pressure drop through the cooler, enter the water pressure drop graph on page 14 at the actual glycol flow. Multiply the water pressure drop found there by P to obtain corrected glycol pressure drop.

Power -To determine glycol system kW, multiply the water system kW by factor K.

Table 1: Ethylene Glycol Correction Factors

% E.G.	Freeze Point		Capacity	Power	Flow	PD
	° F	° C	"C"	"K"	"G"	"P"
10%	25.0	-3.9	0.997	0.999	1.030	1.113
20%	18.0	-7.8	0.993	0.997	1.060	1.226
30%	7.0	-14.0	0.987	0.995	1.092	1.369
40%	-7.0	-22.0	0.980	0.992	1.132	1.557
50%	-28.0		0.973	0.991	1.182	1.791

Table 2: Propylene Glycol Correction Factors

% P.G.	Freeze Point		Capacity	Power	Flow	PD
	° F	° C	"C"	"K"	"G"	"P"
10%	25.0	-3.9	0.994	0.998	1.016	1.106
20%	19.0	-7.2	0.987	0.995	1.032	1.211
30%	9.0	-13.0	0.978	0.992	1.057	1.380
40%	-5.0	-21.0	0.964	0.987	1.092	1.703
50%	-27.0	-32.8	0.952	0.983	1.140	2.250

Condenser Water Piping

Arrange the condenser water so the water enters the bottom connection of the condenser. The condenser water will discharge from the top connection. Failing to arrange the condenser water as stated above will negatively affect the capacity and efficiency.

Water flow through the condenser should only be during compressor operation. Pumps may be enabled by the chiller or BAS.

Field installed water piping to the condenser **must** include:

- Install a cleanable strainer with perforations no larger than 0.125” (3.2 mm) diameter in the inlet piping .
- Install pressure gauges in the inlet and outlet water lines to the condenser. Pressure drop through the condenser should be measured to determine flow on the pressure drop/flow curves beginning on page 14.

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

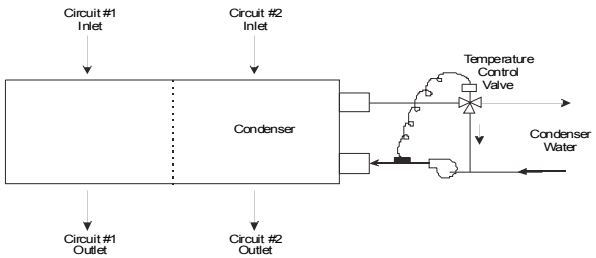
- Vibration eliminators are recommended in both the supply and return water lines to reduce vibration and noise transmissions to the building.
- A preliminary leak check of the water piping should be made before filling the system.
- Shutoff valves to isolate the unit from the piping system during unit servicing.
- Regular water analysis and chemical water treatment on the condenser is recommended immediately upon equipment start-up.

Condensers are drained of water in the factory and are shipped with the condenser drain plugs in the heads removed and stored in a bag in the control panel. Be sure to replace plugs prior to filling the vessel with fluid.

Water-cooled condensers can be piped for use with cooling towers, well water, or heat recovery applications. Cooling tower applications must be made with consideration of freeze protection and scaling problems. Contact the cooling tower manufacturer for equipment characteristics and limitations for the specific application. Head pressure control must be provided if the entering condenser water can fall below 60°F. The WGZ condenser has two refrigerant circuits with a common condenser water circuit. This arrangement makes head pressure control with discharge pressure actuated control valves difficult.

If the tower water temperature cannot be maintained at a 60°F minimum, or when pond, lake, or well water that can fall below 60°F (15°C) is used as the condensing medium, special discharge pressure control must be used. A water recirculating system with recirculating pump as shown in Figure 4 is recommended. This system also has the advantage of maintaining tube velocity to help prevent tube fouling. The pump must cycle with the chiller.

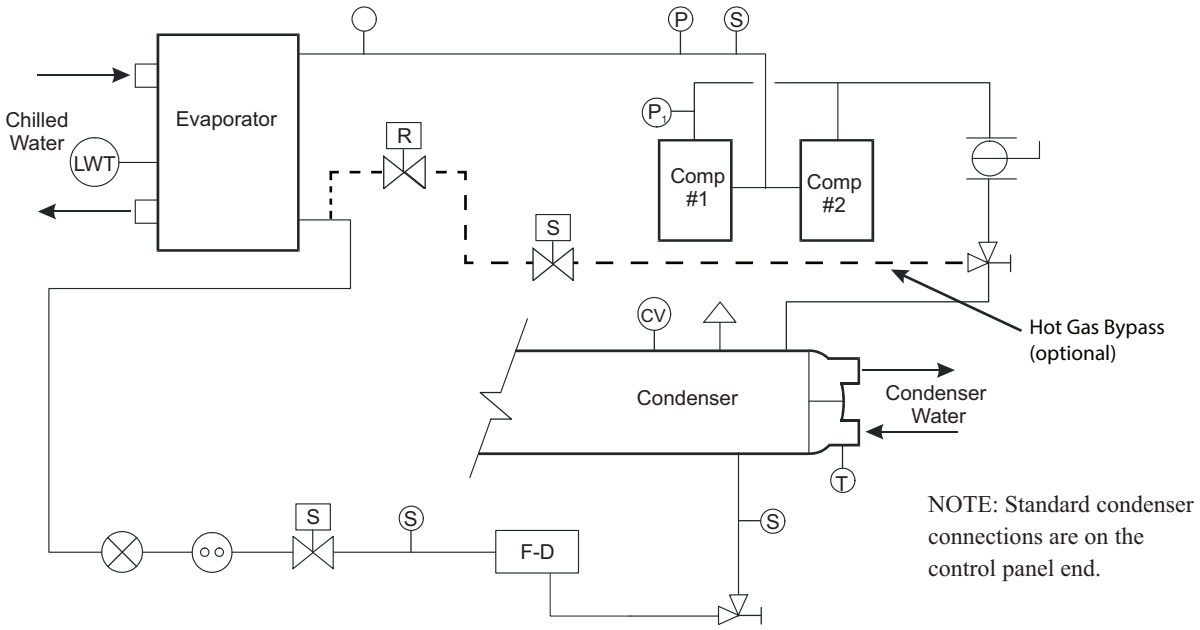
Figure 4: Recirculating Discharge Water System

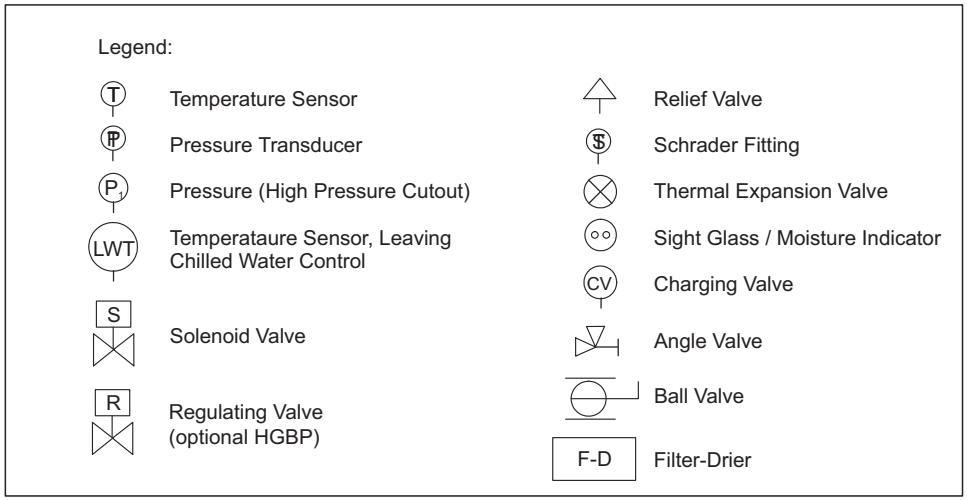


Packaged Unit Refrigerant Piping

WGZ 030DW to 130DW have two refrigerant circuits, two tandem scroll compressors (total of four), a single two-circuited brazed plate evaporator, a single two-circuited water-cooled condenser, interconnecting refrigerant piping and a control panel with associated sensors and transducers. Models WGZ 150DW to 200DW have two trio-compressors (total of 6) and a shell-and-tube evaporator. Packaged units are provided with complete refrigerant piping and full operating refrigerant charge at the factory.

Figure 5: Schematic Piping Diagram (One of Two Circuits for Brazed Plate Evaporators)





Remote Condenser Refrigerant Piping

Refrigerant piping, to and from the unit and remote components, should be sized and installed according to the latest ASHRAE Handbook, industry standards, and local code requirements. It is important that the unit piping be properly supported with sound and vibration isolation between tubing and hanger, and that the discharge lines be looped at the condenser and trapped at the compressor to prevent refrigerant and oil from draining into the compressors. Looping the discharge line also provides greater line flexibility.

Refrigerant piping is permitted to be installed below ground provided the following conditions are met:

- Piping or pipe insulation is NOT in contact with the ground
- Piping is installed in an open or enclosed chase that allows for inspection and leak testing
- Piping is sized and installed per ASHRAE guidelines

Relief Valve Piping

The ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems, specifies that pressure relief valves on vessels containing Group 1 refrigerant (R-410A) "shall discharge to the atmosphere at a location not less than 15 feet (4.6 meters) above the adjoining ground level and not less than 20 feet (6.1 meters) from any window, ventilation opening or exit in any building." The piping must be provided with a rain cap at the outside terminating point and with a drain at the low point on the vent piping to prevent water buildup on the atmospheric side of the relief valve. Also, a flexible pipe section should be installed in the line to eliminate any piping stress on the relief valve(s).

Relief valves are located in the following places depending on unit configuration:

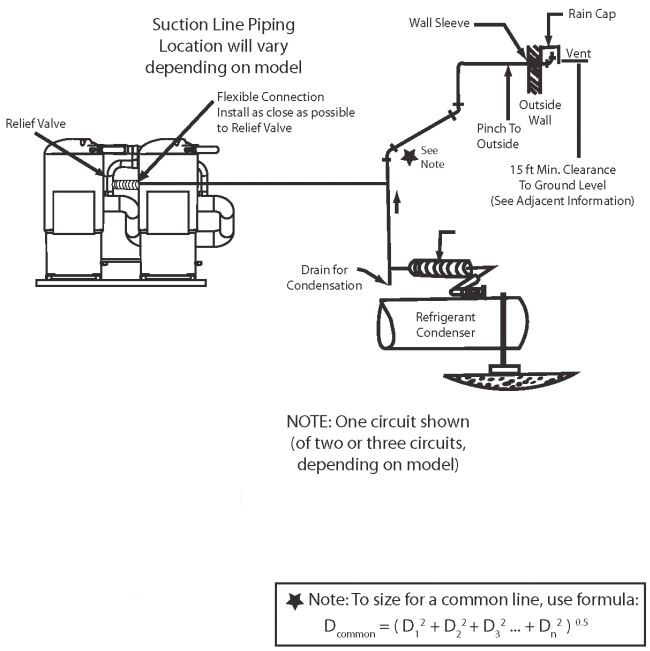
- Low side with brazed plate evaporator - on the suction line
- Low side with shell and tube evaporator - on the suction line
- High side on packaged unit - on the condenser shell
- High side on remote condenser - if required - not factory provided

Table 8: Relief Valve Information

Configuration	High or Low Side	Connection Size		Relief Pressure PSI	Relief Volume lb air/min
		Inlet	Outlet		
Packaged	Low	0.50" NPT	0.625" Flare	450	37.6
	High	0.50" NPT	0.625" Flare	500	33.3

The size of the discharge pipe from the pressure relief valve should not be less than the size of the pressure relief outlet (5/8 in. flare). See Figure 8 for pipe size when combining low side relief on compressor suction with the condenser relief valve.

Figure 8: Relief Valve Piping



NOTE: Fittings should be provided to permit vent piping to be easily disconnected for inspection or replacement of the relief valve.

Pressure Drop Data

Figure 9: WGZ-D Condenser Pressure Drop Curves

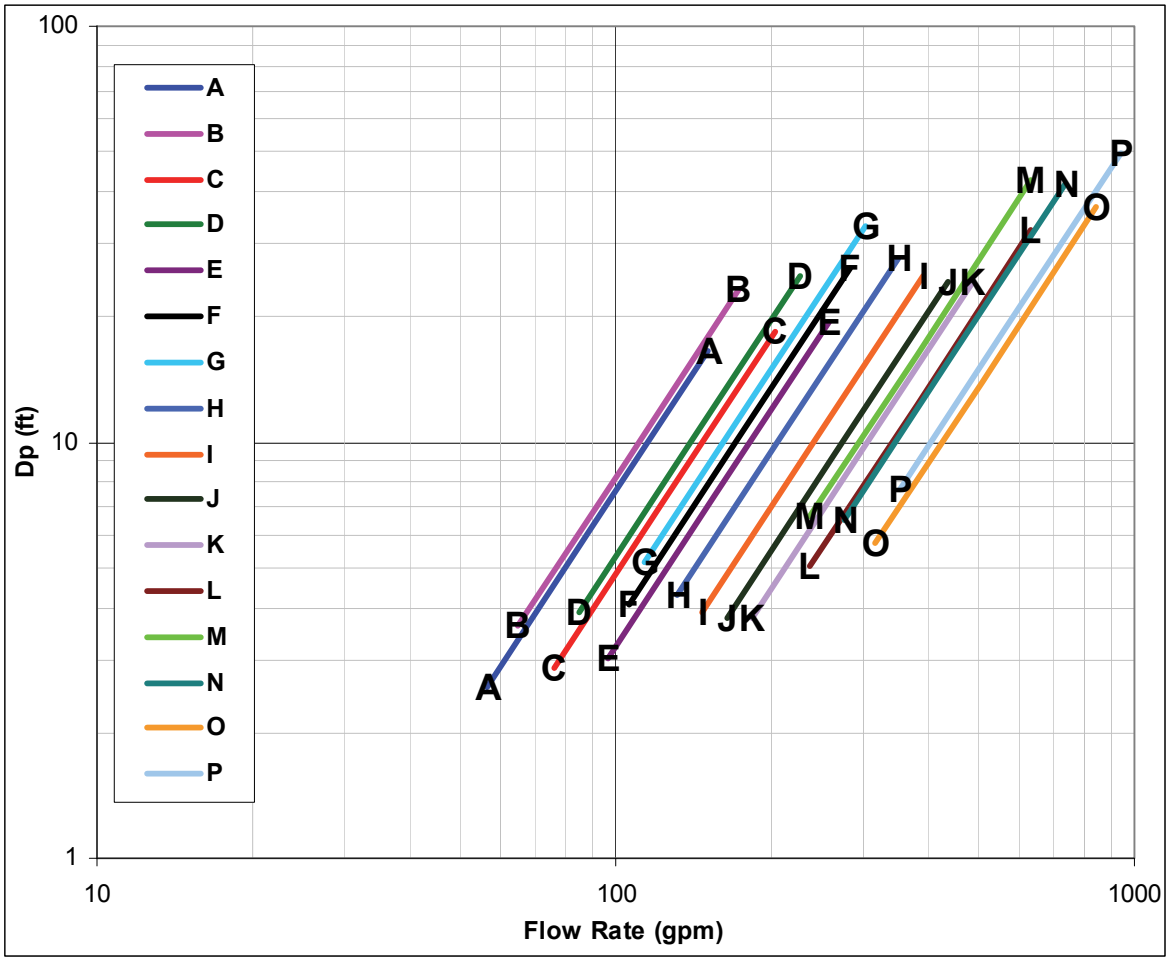


Table 9: WGZ-D CondenserPressure Drop Data

Model	Curve Ref	Minimum Flow & Pr. Drop				Nominal Flow & Pr. Drop				Maximum Flow & Pr. Drop			
		Inch-Pound		S.I.		Inch-Pound		S.I.		Inch-Pound		S.I.	
		GPM	Ft	L/S	kPa	GPM	Ft	L/S	kPa	GPM	Ft	L/S	kPa
WGZ030D	A	56.3	2.6	3.5	7.7	90.0	6.3	5.6	18.8	150.0	16.6	9.4	49.7
WGZ035D	B	64.9	3.6	4.1	10.8	103.8	8.8	6.5	26.3	173.0	23.2	10.8	69.4
WGZ040D	C	76.3	2.9	4.8	8.6	122.1	7.0	7.6	20.9	203.5	18.5	12.7	55.2
WGZ045D	D	85.3	3.9	5.3	11.6	136.5	9.5	8.5	28.4	227.5	25.1	14.2	74.9
WGZ050D	E	96.4	3.0	6.0	9.1	154.2	7.4	9.6	22.1	257.0	19.5	16.1	58.4
WGZ055D	F	105.8	4.1	6.6	12.1	169.2	9.9	10.6	29.6	282.0	26.1	17.6	78.1
WGZ060D	G	113.4	5.2	7.1	15.4	181.5	12.6	11.3	37.7	302.5	33.3	18.9	99.4
WGZ070D	H	131.6	4.3	8.2	12.8	210.6	10.5	13.2	31.4	351.0	27.7	21.9	82.8
WGZ080D	I	146.8	3.9	9.2	11.6	234.9	9.5	14.7	28.4	391.5	25.1	24.5	74.9
WGZ090D	J	163.3	3.8	10.2	11.3	261.3	9.2	16.3	27.5	435.5	24.3	27.2	72.6
WGZ100D	K	183.4	3.8	11.5	11.3	293.4	9.2	18.3	27.5	489.0	24.3	30.6	72.6
WGZ115D	L	237.6	5.0	14.8	15.1	380.1	12.3	23.8	36.8	633.5	32.5	39.6	97.0
WGZ130D	M	237.6	6.6	14.8	19.8	380.1	16.2	23.8	48.4	633.5	42.8	39.6	127.8
WGZ150D	N	277.9	6.5	17.4	19.3	444.6	15.8	27.8	47.2	741.0	41.7	46.3	124.7
WGZ170D	O	317.4	5.7	19.8	17.1	507.9	14.0	31.7	41.8	846.5	37.0	52.9	110.5
WGZ200D	P	352.7	7.7	22.0	23.0	564.3	18.8	35.3	56.2	940.5	49.6	58.8	148.3

Figure 10: WGZ-D Evaporator Pressure Drop Curves

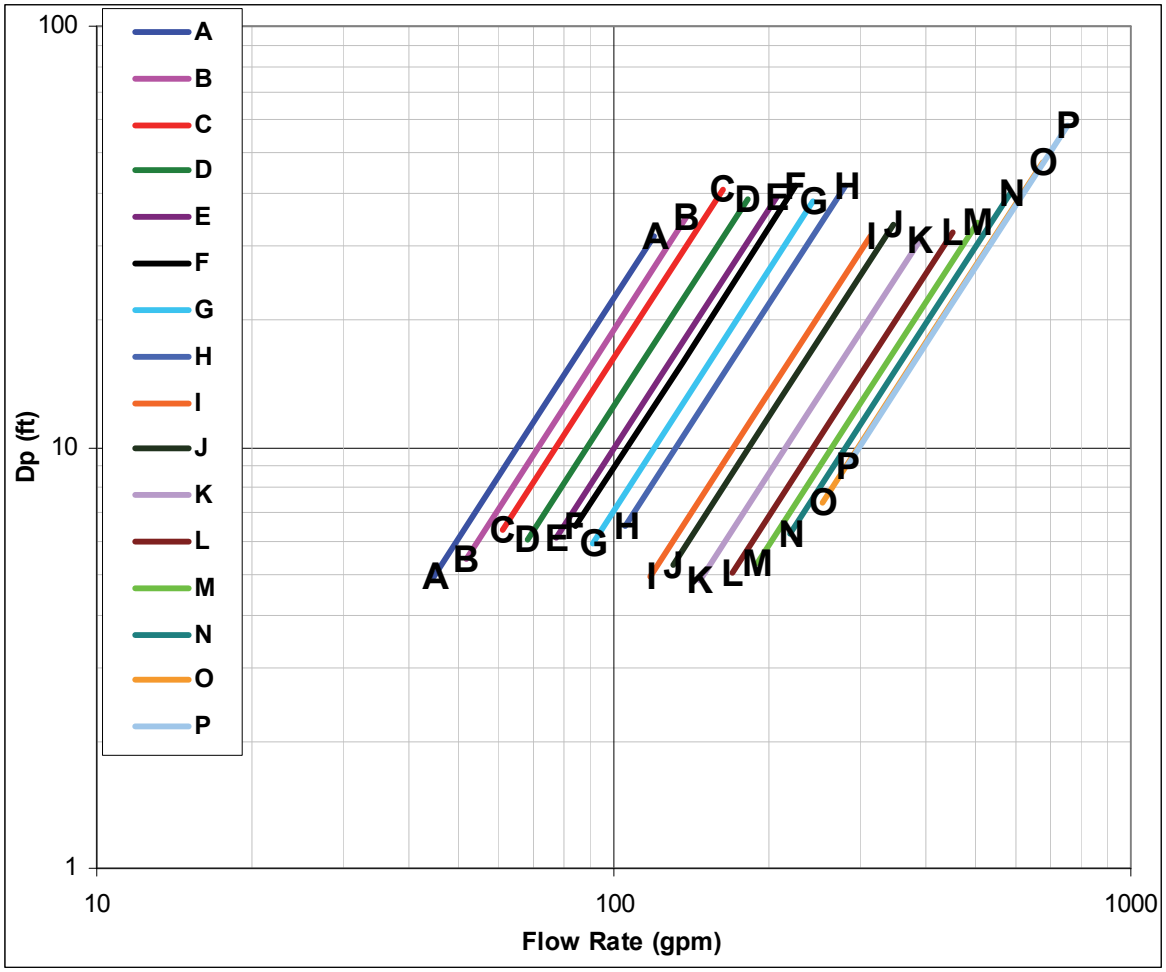


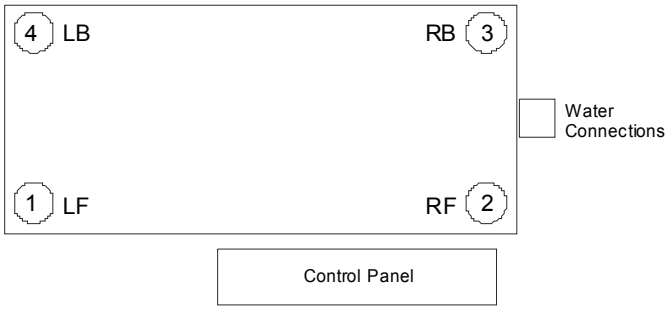
Table 10: WGZ-D Evaporator Pressure Drop Data

Model	Curve Ref	Minimum Flow & Pr. Drop				Nominal Flow & Pr. Drop				Maximum Flow & Pr. Drop			
		Inch-Pound		S.I.		Inch-Pound		S.I.		Inch-Pound		S.I.	
		GPM	Ft	L/S	kPa	GPM	Ft	L/S	kPa	GPM	Ft	L/S	kPa
WGZ030D	A	45.0	4.9	2.8	14.7	72.0	12.0	4.5	35.9	120.0	31.7	7.5	94.7
WGZ035D	B	51.9	5.4	3.2	16.3	83.0	13.3	5.2	39.8	138.3	35.1	8.6	104.9
WGZ040D	C	61.1	6.3	3.8	19.0	97.7	15.5	6.1	46.3	162.8	40.9	10.2	122.3
WGZ045D	D	68.3	6.0	4.3	18.0	109.2	14.7	6.8	43.9	182.0	38.8	11.4	116.0
WGZ050D	E	77.1	6.1	4.8	18.2	123.4	14.9	7.7	44.5	205.7	39.3	12.9	117.6
WGZ055D	F	84.6	6.5	5.3	19.3	135.4	15.8	8.5	47.2	225.7	41.7	14.1	124.7
WGZ060D	G	90.8	5.9	5.7	17.7	145.2	14.5	9.1	43.3	242.0	38.3	15.1	114.4
WGZ070D	H	105.3	6.5	6.6	19.3	168.5	15.8	10.5	47.2	280.8	41.7	17.6	124.7
WGZ080D	I	117.4	4.9	7.3	14.7	187.9	12.0	11.7	35.9	313.2	31.7	19.6	94.7
WGZ090D	J	130.6	5.2	8.2	15.7	209.0	12.8	13.1	38.3	348.3	33.8	21.8	101.0
WGZ100D	K	146.7	4.8	9.2	14.4	234.7	11.8	14.7	35.3	391.2	31.1	24.4	93.1
WGZ115D	L	169.4	5.0	10.6	15.1	271.0	12.3	16.9	36.8	451.7	32.5	28.2	97.0
WGZ130D	M	190.1	5.3	11.9	15.9	304.1	13.0	19.0	38.9	506.8	34.3	31.7	102.6
WGZ150D	N	222.3	6.2	13.9	18.6	355.7	15.2	22.2	45.4	592.8	40.1	37.1	119.9
WGZ170D	O	253.9	7.4	15.9	22.0	406.3	18.0	25.4	53.8	677.2	47.5	42.3	142.0
WGZ200D	P	282.1	9.0	17.6	26.9	451.4	22.0	28.2	65.8	752.3	58.1	47.0	173.6

Vibration Isolators

It is recommended that isolators be used on all upper level installations or in areas where vibration transmission is a consideration.

Figure 26: Isolator Locations



Transfer the unit as indicated under "Moving the Unit." In all cases, set the unit in place and level. When spring-type isolators are required, install springs running under the main unit supports.

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

A rubber anti-skid pad should be used under isolators if hold-down bolts are not used.

Installation of spring isolators requires flexible piping connections and at least three feet of flexible electrical conduit to avoid straining piping and transmitting vibration and noise.

Refer to unit dimension drawing for mounting locations.

Table 17: Isolator Kit Part Numbers

WGZ-DW Packaged Chiller Isolator Kit Part Numbers

Model Number	030-060	070-080	90	100-130	150-200
Spring-Flex	332320501	332320502	332320503	332320504	332320505
R-I-S	332325501	332325502	332325502	332325503	332325503

Table 18: Vibration Isolator Mounting Locations (Packaged Chillers)

Unit Size	Spring-Flex Mountings				R-I-S Mountings			
	M1	M2	M3	M4	M1	M2	M3	M4
WGZ030DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ035DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ040DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ045DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ050DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ055DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ060DW	ID-900 Green	ID-900 Green	ID-900 Green	ID-900 Green	RP-3 Gray	RP-3 Gray	RP-3 Gray	RP-3 Gray
WGZ070DW	ID-1350 Purple	ID-1350 Purple	ID-1350 Purple	ID-1350 Purple	RP-4 Brown	RP-4 Brown	RP-4 Brown	RP-4 Brown
WGZ080DW	ID-1350 Purple	ID-1350 Purple	ID-1350 Purple	ID-1350 Purple	RP-4 Brown	RP-4 Brown	RP-4 Brown	RP-4 Brown
WGZ090DW	ID-1800 Green	ID-1800 Green	ID-1800 Green	ID-1800 Green	RP-4 Brown	RP-4 Brown	RP-4 Brown	RP-4 Brown
WGZ100DW	ID-1800 Green	ID-1800 Green	ID-1800 Green	ID-2400 Gray	RP-4 Brick Red	RP-4 Brick Red	RP-4 Brick Red	RP-4 Brick Red

Table 23: Physical Data - WGZ060D - WGZ070D

Physical Data (Packaged Chillers)	WGZ060D		WGZ070D	
	CIRCUIT 1	CIRCUIT 2	CIRCUIT 1	CIRCUIT 2
BASIC DATA				
Operating Weight- lb (kg)	2771 (1257)		3696 (1676)	
Shipping Weight- lb (kg)	2658 (1206)		3555 (1613)	
R410A Operating Charge- lb (kg)	50 (22.7)	50 (22.7)	74 (33.6)	74 (33.6)
COMPRESSORS, SCROLL, HERMETIC				
Nominal HP	15 / 15	15 / 15	15 / 20	15 / 20
Oil Charge, per Tandem Compressor Set - oz. (L)	220 (6.6)	220 (6.6)	255 (7.6)	255 (7.6)
4 Stages (Dependent on Lead Compressor)	25-50-75-100	25-50-75-100	22-44-72-100	22-44-72-100
CONDENSER				
Diameter- in. (mm)	10 (254)		14 (356)	
Tube Length- in. (mm)	120 (3048)		120 (3048)	
Refrigerant Side Working Pressure- psig (kPa)	500 (3447)		500 (3447)	
Water Side Working Pressure- psig (kPa)	232 (1599)		232 (1599)	
Pump-Out Capacity- lb (kg) [90% Full at 90°F]	205.4 (93.4)		415.1 (188.7)	
Grooved Conn. In & Out- in. (mm)	4 (102)		4 (102)	
Relief Valve, Flare- in. (mm)	5/8 (15.9)		5/8 (15.9)	
Service Valve, Flare- in. (mm)	1/2 (12.7)		1/2 (12.7)	
Vent & Drain- in. (mm) NPT	1/4 (6.4)		1/4 (6.4)	
EVAPORATOR, BRAZED-PLATE				
Water Volume- gal (L)	3.2 (12.0)		5.6 (21.2)	
Refrigerant Side Working Pressure- psig (kPa)	653 (4500)		653 (4500)	
Water Side Working Pressure- psig (kPa)	653 (4500)		653 (4500)	
Grooved Conn. In & Out- in. (mm)	2.5 (65)		3 (76)	
Relief Valve, Flare- in. (mm)	5/8 (15.9)		5/8 (15.9)	
Vent & Drain	Field		Field	

Table 24: Physical Data - WGZ080D - WGZ090D

Physical Data (Packaged Chillers)	WGZ080D		WGZ090D	
	CIRCUIT 1	CIRCUIT 2	CIRCUIT 1	CIRCUIT 2
BASIC DATA				
Operating Weight- lb (kg)	4128 (1872)		4320 (1960)	
Shipping Weight- lb (kg)	3971 (1801)		4140 (1878)	
R410A Operating Charge- lb (kg)	80 (36.4)	80 (36.4)	80 (36.4)	80 (36.4)
COMPRESSORS, SCROLL, HERMETIC				
Nominal HP	20 / 20	20 / 20	20 / 26	20 / 26
Oil Charge, per Tandem Compressor Set - oz. (L)	290 (8.7)	290 (8.7)	290 (8.7)	290 (8.7)
4 Stages (Dependent on Lead Compressor)	25-50-75-100	25-50-75-100	22-44-72-100	22-44-72-100
CONDENSER				
Diameter- in. (mm)	14 (356)		14 (356)	
Tube Length- in. (mm)	120 (3048)		120 (3048)	
Refrigerant Side Working Pressure- psig (kPa)	500 (3447)		500 (3447)	
Water Side Working Pressure- psig (kPa)	232 (1599)		232 (1599)	
Pump-Out Capacity- lb (kg) [90% Full at 90°F]	397.5 (180.7)		371.1 (168.7)	
Grooved Conn. In & Out- in. (mm)	4 (102)		4 (102)	
Relief Valve, Flare- in. (mm)	5/8 (15.9)		5/8 (15.9)	
Service Valve, Flare- in. (mm)	1/2 (12.7)		1/2 (12.7)	
Vent & Drain- in. (mm) NPT	1/4 (6.4)		1/4 (6.4)	
EVAPORATOR, BRAZED-PLATE				
Water Volume- gal (L)	6.3 (23.8)		6.8 (25.7)	
Refrigerant Side Working Pressure- psig (kPa)	653 (4500)		653 (4500)	
Water Side Working Pressure- psig (kPa)	653 (4500)		653 (4500)	
Grooved Conn. In & Out- in. (mm)	3 (76)		3 (76)	
Relief Valve, Flare- in. (mm)	5/8 (15.9)		5/8 (15.9)	
Vent & Drain	Field		Field	

Start-Up and Shutdown

Complete operating instructions are contained in the current version of Operating & Maintenance Manual found on www.DaikinApplied.com.

Pre Start-up

1. The chilled-water system should be flushed and cleaned. Proper water treatment is required to prevent corrosion and organic growth.
2. With main disconnect open, check all electrical connections in control panel and starter to be sure they are tight and provide good electrical contact. Although connections are tightened at the factory, they can loosen enough in shipment to cause a malfunction.
3. Check and inspect all water piping. Make sure flow direction is correct and piping is made to correct connection on evaporator and condenser.
4. Open all water flow valves to the condenser and evaporator.
5. Flush the cooling tower and system piping to be sure the system is clean. Start evaporator pump and manually start condenser pump and cooling tower. Check all piping for leaks. Vent the air from the evaporator and condenser water circuit, as well as from the entire water system. The cooler circuit should contain clean, treated, non-corrosive water.
6. Check to see that the evaporator water thermostat sensor is securely installed.
7. Making sure control stop switch S1 is open (off) and pumpdown switches PS1 and PS2 are on "manual pumpdown," place the main power and control disconnect switches to "on." This will energize the crankcase heaters. Wait a minimum of 12 hours before starting the unit.
8. Check compressor oil level. Prior to start-up, the oil level should cover at least one-third of the oil sight glass located in the equalizing line between the compressors or on the compressor.
9. Check water pressure drop across evaporator and condenser, and see that water flow is correct (beginning on page 17) per the design flow rates.
10. Check the actual line voltage to the unit to make sure it is the same as called for on the compressor nameplate, within +/- 10%, and that phase voltage unbalance does not exceed 2%. Verify that adequate power supply and capacity is available to handle load.
11. Make sure all wiring and fuses are of the proper size. Also make sure that all interlock wiring is completed per Daikin Applied diagrams.
12. Verify that all mechanical and electrical inspections by code authorities have been completed.
13. Make sure all auxiliary load and control equipment is operative and that an adequate cooling load is available for initial start-up.

Start-up

1. Open the compressor discharge shutoff valves until backseated. Always replace valve seal caps.
2. Open the two manual liquid line shutoff valves.
3. Leak test the unit.
4. Check to see that the unit circuit breakers are in the "off" position.
5. Check to see that the pumpdown switches, PS1 and PS2, are in the "manual pumpdown" position and the control system switch S1 is in the "off" position.
6. Put the main power and control circuit disconnects to the "on" position.
7. Verify crankcase heaters have operated for at least 12 hours prior to start-up. Crankcase should be warm to the touch.
8. Check that the MicroTech II controller is set to the desired chilled water temperature.
9. Start the system auxiliary equipment for the installation by turning on the time clock, ambient thermostat and/or remote on/off switch and water pumps.
10. Check resets of all equipment protection controls.
11. Switch on the unit circuit breakers.
12. Set pumpdown switches PS1 and PS2 to "auto" for restart and normal operation.
13. Start the system by setting the system switch S1 to on.
14. After running the unit for a short time, check the oil level in each compressor crankcase, rotation of condenser fans (if any), and check for flashing in the refrigerant sight glass.
15. After system performance has stabilized, it is necessary that the "Compressorized Equipment Warranty Form" (Form # SF-990007) be completed to establish commencement of the warranty period. Be sure to list the pressure drop across both vessels. This form is shipped with the unit and after completion should be returned to the Daikin Applied service through your sales representative.

Weekend or Temporary Shutdown

Move pumpdown switches PS1 and PS2 to the "manual pumpdown" position. After the compressors have pumped down, turn off the chilled water pump. Note: With the unit in this condition, it will not restart until these switches are turned back on. The unit has one-time pumpdown. It is important that the compressors pump down before the water flow to the unit is interrupted to avoid freeze-up in the evaporator.

Leave S1 on and power to the unit so that the crankcase heaters will remain energized.

Start-up after Temporary Shutdown

1. Start the water pumps.
2. With the control system switch S1 in the "on" position, move the pumpdown switches PS1 and PS2 to the "auto pumpdown" position.
3. Observe the unit operation for a short time, noting unusual sounds or possible cycling of compressors.
4. Check compressor crankcase heaters.

Extended Shutdown

1. Close the manual liquid line shutoff valves.
2. After the compressors have pumped down, turn off the water pumps.
3. Turn off all power to the unit.
4. Move the control service switch S1 to the "off" position.
5. Close the discharge shutoff valves on the compressor(s) and the liquid outlet valves at the condenser.
6. Tag all opened disconnect switches to warn against start-up before opening the compressor suction and discharge valves.
7. Drain all water from the unit evaporator, condenser, and chilled water piping if the unit is to be shut down during the winter and exposed to below freezing temperatures. Do not leave the vessels or piping open to the atmosphere over the shutdown period.

Start-up after Extended Shutdown

1. Inspect all equipment to see that it is in satisfactory operating condition.
2. Remove all debris that has collected on the surface of the condenser coils (remote condenser models) or check the cooling tower, if present.
3. Open the compressor discharge valves until backseated. Always replace valve seal caps.
4. Open the manual liquid line shutoff valves.
5. Check circuit breakers. They must be in the "off" position.
6. Check to see that the pumpdown switches PS1 and PS2 are in the "manual shutdown" position and the control system switch S1 is in the "off" position.
7. Put the main power and control circuit disconnects to the "on" position.
8. Leak test the unit.
9. Allow the crankcase heaters to operate for at least 12 hours prior to start-up.
10. Start the chilled water pump and purge the water piping as well as the evaporator in the unit.
11. Start the system auxiliary equipment for the installation by turning on the time clock, ambient thermostat and/or remote on/off switch.
12. Check that the MicroTech II controller is set to the desired chilled water temperature.
13. Check resets of all equipment protection controls.
14. Switch the unit circuit breakers to "on."
15. Start the system by setting the system switch S1 to "on."

⚠ CAUTION

Most relays and terminals in the control center are powered when S1 is closed and the control circuit disconnect is on. Therefore, do not close S1 until ready for start-up or serious equipment damage can occur.

16. Set pumpdown switches PS1 and PS2 to the "auto pumpdown" position for restart and normal operation.
17. After running the unit for a short time, check the oil level in the compressor oil sight glass or in the compressor's equalizing lines for flashing indicating possible refrigerant in the oil (see System Maintenance section beginning on page 54).

To provide smooth operation at peak capacity and to avoid damage to package components, a program of periodic inspections should be set up and followed. The following items are intended as a guide to be used during inspection and must be combined with sound refrigeration and electrical practices to provide trouble-free performance.

The liquid line sight glass/moisture indicator on all circuits must be checked to be sure that the glass is full and clear and that the moisture indicator indicates a dry condition. If the indicator shows that a wet condition exists or if bubbles show in the glass, even with a full refrigerant charge, the filter-drier element must be changed.

Water supplies in some areas can tend to foul the water-cooled condenser to the point where cleaning is necessary. The fouled condenser will be indicated by an abnormally high condenser approach temperature (saturated discharge temperature minus leaving condenser water temperature) and can result in nuisance trip-outs. To clean the condenser, mechanical cleaning or a chemical descaling solution should be used according to the manufacturer's directions. The condenser flow sensor should be cleaned anytime the condenser is opened. This should typically be performed at the annual inspection; however, more frequent cleaning may be required depending on the conditions of the jobsite.

Recommended condenser flow sensor maintenance includes the following:

- Check the sensor tip for buildup.
- Clean the tip using a soft cloth. Stubborn buildup - such as lime - can be removed using a common vinegar cleaning agent.

Systems with remote air-cooled condensers require periodic cleaning of the finned surface of the condenser coil. Cleaning can be accomplished by using a cold water spray, brushing, vacuuming, or high-pressure air. No tools should be used that could damage the coil tubes or fins.

The compressor oil level must be checked periodically to be sure that the level is at the center of the oil sightglass located in the compressor's equalizing line or on the compressor itself. Low oil level can cause inadequate lubrication and if oil must be added, use oils referred to in the following Compressor Lubrication section.

A pressure tap has been provided on the liquid line downstream of the filter-drier and solenoid valve but before the expansion valve. An accurate subcooled liquid pressure and temperature can be taken here. The pressure read here could also provide an indication of excessive pressure drop through the filter-drier and solenoid valve due to a clogging filter-drier. Note: A normal pressure drop through the solenoid valve is approximately 3 psig (20.7 kPa) at full load condition.

⚠ DANGER

The panel is always energized to ground even when the system switch is off. To de-energize the complete panel including crankcase heaters, pull the main unit disconnect. Failure to do so can result in severe personal injury or death.

⚠ CAUTION

Warranty may be affected if wiring is not in accordance with specifications. A blown fuse or tripped protector indicates a short ground or overload. Before replacing fuse or restarting compressor, the trouble must be found and corrected. It is important to have a qualified control panel electrician service this panel. Unqualified tampering with the controls can cause serious damage to equipment and void the warranty. If motor or compressor damage is suspected, do not restart until qualified service personnel have checked the unit.

Electrical Terminals

⚠ WARNING

To avoid injury from electric shock hazard, turn off all power and perform lockout and tag-out of source before continuing with the following service. Note that the unit might be powered from multiple sources.

All power electrical terminals should be checked for proper torque every six months, as they tend to loosen due to normal heating and cooling of the wire.

Compressor Lubrication

The oil level should be watched carefully upon initial start-up and regularly thereafter.

All tandem and trio compressors on WGZ units come equipped with oil equalization lines connecting the crankcase of each set of compressors in each refrigerant circuit. This allows the oil to move from one compressor crankcase to the other during normal operation, and balance between the two when the compressors are off. The oil sight glass is located in the equalization line on or on the compressor body depending on model size. In either case, the oil level should be 1/4 to 1/3 of the glass.

POE type oil is used for compressor lubrication. This type of oil is extremely hygroscopic, which means it will quickly absorb moisture if exposed to air and may form acids that can be harmful to the chiller. Avoid prolonged exposure of POE oil to the atmosphere to prevent this problem. For more details on acceptable oil types, contact your Daikin Applied service representative.

The units are factory-charged with lubricant. It is important that only the manufacturer’s recommended oils be used. Acceptable POE oil types are:

- CPI/Lubrizol Emkarate RL32-3 MAF
- Copeland Ultra 32-3 MAF
- Parker Emkarate RL32-3MAF

- Virginia LE323MAF
- Nu Calgon 4314-66
- Exxon/Mobil EAL Arctic 22 CC*
- Hatcol 22CC*
- Everest 22CC*

Note - * These types of oils can only be used as “Top Off” oils. Oil can be added to the compressor through the oil fill hole in the crankcase. Special equipment is required to add oil and the work should be done by qualified refrigeration technicians with the proper training and equipment.

⚠ WARNING

POE oil must be handled carefully using proper protective equipment (gloves, eye protection, etc.) The oil must not come in contact with certain polymers (e.g. PVC), as it may absorb moisture from this material. Also, do not use oil or refrigerant additives in the system.

Sightglass and Moisture Indicator

The refrigerant sight glasses should be observed periodically. A monthly observation should be adequate. A clear glass of liquid indicates that there is adequate refrigerant charge in the system to provide proper feed through the expansion valve.

The sight glass should be clear when:
- Ambient temperature is above 75°F (23°C)
- Both compressors on a circuit are running
- All fans on a circuit are running

Bubbling refrigerant in the sight glass may occur at other conditions and may indicate that the system is short of refrigerant charge. Refrigerant gas flashing in the sight glass could also indicate an excessive pressure drop in the line, possibly due to a clogged filter-drier or a restriction elsewhere in the system. An element inside the sight glass indicates what moisture condition corresponds to a given element color. If the sight glass does not indicate a dry condition after about 12 hours of operation, the unit should be pumped down, the filter-driers changed, and oil sample should be tested for acid.

If the system is suspected of being short of refrigerant, a qualified service technician with EPA certification should be contacted to thoroughly check out the unit and add refrigerant if necessary.

Crankcase Heaters

The compressors are equipped with crankcase heaters. The function of the heater is to keep the temperature in the crankcase high enough to prevent refrigerant from migrating to the crankcase and condensing in the oil during off-cycle. When a system is to be started up initially, the power to the heaters should be turned on for at least 12 hours before the compressors are started. The crankcase should be up to about 80°F (26.7°C) before the system is started, to minimize lubrication problems or liquid slugging of compressor.

If the crankcase is cool (below 80°F) (26.7°C) and the oil level in the sight glass is full to top, allow more time for oil to warm before starting the compressor.

The crankcase heaters are on whenever power is supplied to the unit and the compressor is not running.

Phase/Voltage Monitor (Optional)

The phase/voltage monitor is a device that provides protection against three-phase electrical motor loss due to power failure conditions, phase loss, under/over voltage, and phase reversal. Whenever any of these conditions occur, an input relay is deactivated, disconnecting power to the thermostatic control circuit. The compressor does a rapid shutdown pump down.

The input relay remains deactivated until power line conditions return to an acceptable level. Trip and reset delays prevent nuisance tripping due to rapid power fluctuations.

When three-phase power has been applied, the input relay should close and the "run light" should come on. If the relay does not close, perform the following tests.

1. Check the voltages between L1-L2, L1-L3, and L2-L3. Voltages should be approximately equal and within +10% of the rated three-phase line-to-line voltage.
2. If these voltages are extremely low or widely unbalanced, check the power system to determine the cause of the problem.
3. Verify phasing with a phase sequience meter before changing any leads.

Factory settings are as follows:
- Voltage Setting: set at nameplate voltage.
- Trip Delay Time: 2 seconds
- Restart Delay Time: 60 seconds

Hot Gas Bypass (Optional)

This option allows passage of discharge gas to the evaporator, permitting operation at lower loads than available with compressor unloading. It also keeps the velocity of refrigerant gas high enough for proper oil return at light load conditions.

The pressure regulating valve is set to begin opening at 97 psig (665 kPa) and can be changed by changing the pressure setting. The adjustment range is 75to 150 psig. To raise the pressure setting, remove the cap on the bulb and turn the adjustment screw clockwise. To lower the setting, turn the screw counterclockwise. Do not force the adjustment beyond the range it is designed for, as this will damage the adjustment assembly. The regulating valve opening point can be determined by slowly reducing the system load while observing the suction pressure. When the bypass valve starts to open, the refrigerant line on the evaporator side of the valve will begin to feel warm to the touch.

⚠ CAUTION

The hot gas line can become hot enough to cause personal injury in a very short time. Avoid contact when it is operating or during cool-down period.

Maintenance Schedule

Table 47: Periodic Maintenance Schedule

	Monthly	Quarterly	Semi-Annually	Annually	As Required By Performance
I. Compressor					
A. Performance evaluation (log & analysis) *	O				
B. Motor					
• Meg. windings			X		
• Ampere balance (within 10%)		X			
• Terminal check (tight connections, porcelain clean)				X	
• Motor cooling (check temperature)		X			
C. Lubrication system					
• Oil level	O			X	
• Oil appearance (clear color, quantity)	O				
• Oil change if indicated by oil analysis					X
II. Controls					
A. Operating Controls					
• Check settings and operation			X		
B. Protective Controls					
• Test operation of:					
Alarm relay		X			
Pump interlocks		X			
High and low pressure alarms		X			
III. Condenser					
B. Test water quality		X			
C. Clean condenser tubes (or as required)				X	
D. Clean condenser flow sensor (or as required)				X	
E. Eddycurrent test -					X
F. Seasonal protection					X
IV. Evaporator					
B. Test water quality		X			
C. Clean evaporator tubes or plates (or as required)					X
D. Eddycurrent test - (or as required)					X
E. Seasonal protection					X
V. Expansion Valves					
A. Performance evaluation (superheat control)		X			
VI. Compressor - Chiller Unit					
A. Performance evaluation	O				
B. Leak test:					
• Compressor fittings and terminal		X			
• Piping fittings		X			
• Vessel relief valves		X			
C. Vibration Isolation Test		X			
D. General Appearance:					
• Paint				X	
• Insulation				X	
VII. Starter(s)					
A. Examine contactors (hardware and operation)		X			
B. Verify overload setting and trip		X			
C. Test electrical connections		X			
VIII. Optional Controls					
A. Hot gas bypass (verify operation)		X			

⚠ DANGER

Service on this equipment is to be performed only by qualified refrigeration personnel. Causes for repeated tripping of equipment protection controls must be investigated and corrected. Disconnect all power before doing any service inside the unit or serious personal injury or death can occur.

NOTE: Anyone servicing this equipment must comply with the requirements set forth by the EPA concerning refrigerant reclamation and venting.

Filter-Driers

To change the filter-drier, pump the unit down (with the compressor running) by closing the manual liquid line shutoff valve(s). The unit will start pumping down until it reaches the low-pressure cutoff setting of 85 psi (585 kPa).

Close the discharge valve. Remove the refrigerant in the liquid line with a recovery unit to EPA required pressure. Remove and replace the filter-drier(s). Evacuate the lines through the liquid line manual shutoff valve(s) to remove noncondensables that may have entered during filter replacement. A leak check is recommended before returning the unit to operation.

Liquid Line Solenoid Valve

The liquid line solenoid valve(s), which are responsible for automatic pumpdown during normal unit operation, do not normally require any maintenance. However, in the event of failure they can require replacement of the solenoid coil or of the entire valve assembly.

The solenoid coil can be removed from the valve body without opening the refrigerant piping by moving pumpdown switch PS1 or PS2 to the "manual" position.

The coil can then be removed from the valve body by simply removing a nut or snap-ring located at the top of the coil. The coil can then be slipped off its mounting stud for replacement. Be sure to replace the coil on its mounting stud before returning the pumpdown switch to the "auto pumpdown" position.

To replace the entire solenoid valve, follow the steps for changing a filter-drier.

Thermostatic Expansion Valve

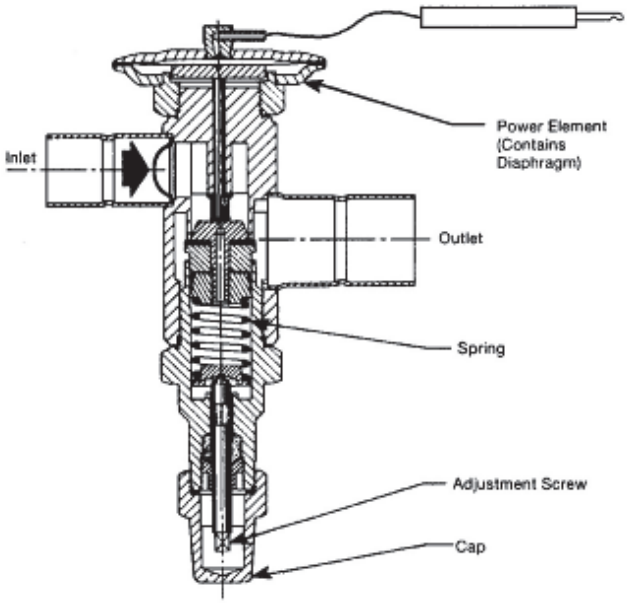
The expansion valve is responsible for allowing the proper amount of refrigerant to enter the evaporator regardless of cooling load. It does this by maintaining a constant superheat. (Superheat is the difference between refrigerant temperature as it leaves the evaporator and the saturation temperature corresponding to the evaporator pressure). All WGZ chillers are factory set for between 8°F and 12°F (4.4°C to 6.7°C) superheat at full load.

To increase the superheat setting of the valve, remove the cap at the bottom of the valve to expose the adjustment screw. Turn the screw clockwise (when viewed from the adjustment screw end) to increase the superheat and counterclockwise to reduce superheat. Allow time for system rebalance after each superheat adjustment.

The expansion valve, like the solenoid valve, should not normally require replacement, but if it does, the unit must be pumped down by following the steps involved when changing a filter-drier.

If the problem can be traced to the power element only, it can be unscrewed from the valve body without removing the valve, but only after pumping the unit down.

Figure 29: Thermostatic Expansion Valve



⚠ CAUTION

Adjustment of expansion valve should only be performed by a qualified service technician. Failure to do so can result in improper unit operation.

Note: Superheat will vary with compressor unloading, but should be between 8°F and 12°F (4.4°C and 6.7°C) with stable operation.

Water-cooled Condenser

The condenser is of the shell-and-tube type with water flowing through the tubes and refrigerant in the shell. Integral subcoolers are incorporated on all units. All condensers are equipped with 500 psig (3450 kPa) relief valves. Normal tube cleaning procedures can be followed.

Evaporator

The evaporators are sealed, brazed-stainless steel plate unit or DX shell-and-tube. Normally no service work is required on the evaporator.

Troubleshooting Chart

Table 48: Troubleshooting Chart

PROBLEM	POSSIBLE CAUSES	POSSIBLE CORRECTIVE STEPS
Compressor Will Not Run	Main switch, circuit breakers open.	Close switch
	Fuse blown.	Check electrical circuits and motor winding for shorts or grounds. Investigate for possible overloading. Replace fuse or reset breakers after fault is corrected.
	Thermal overloads tripped or fuses blown.	Overloads are auto reset. Check unit closely when unit comes back on line.
	Defective contactor or coil.	Repair or replace.
	System shut down by equipment protection devices.	Determine type and cause of shutdown and correct it before resetting protection switch.
	No cooling required.	None. Wait until unit calls for cooling.
	Liquid line solenoid will not open.	Repair or replace coil.
	Motor electrical trouble.	Check motor for opens, short circuit, or burnout.
	Loose wiring.	Check all wire junctions. Tighten all terminal screws.
Compressor Noisy or Vibrating	Flooding of refrigerant into compressor.	Check superheat setting of expansion valve.
	Improper piping support on suction or liquid line.	Relocate, add or remove support.
	Worn compressor.	Replace.
High Discharge Pressure	Condenser water insufficient or temperature too high.	Readjust temperature control or water regulating valve. Investigate ways to increase water supply.
	Fouled condenser tubes (water-cooled condenser). Clogged spray nozzles (evaporative condenser). Dirty tube and fin surface (air cooled condenser).	Clean.
	Noncondensables in system.	EPA purge the noncondensables.
	System overcharge with refrigerant.	Remove excess refrigerant.
	Discharge shutoff valve partially closed.	Open valve.
	Condenser undersized (air-cooled).	Check condenser rating tables against the operation.
	High ambient conditions.	Check condenser rating tables against the operation.
Low Discharge Pressure	Faulty condenser temp. regulation.	Check condenser control operation.
	Insufficient refrigerant in system.	Check for leaks. Repair and add charge.
	Low suction pressure.	See corrective steps for low suction pressure below.
	Condenser too large.	Check condenser rating table against the operation.
	Low ambient conditions.	Check condenser rating tables against the operation.
High Suction Pressure	Excessive load.	Reduce load or add additional equipment.
	Expansion valve overfeeding.	Check remote bulb. Regulate superheat.
Low Suction Pressure	Lack of refrigerant.	Check for leaks. Repair and add charge.
	Evaporator dirty.	Clean chemically.
	Clogged liquid line filter-drier.	Replace cartridge(s).
	Clogged suction line or compressor suction gas strainers.	Clean strainers.
	Expansion valve malfunctioning.	Check and reset for proper superheat. Replace if necessary.
	Condensing temperature too low.	Check means for regulating condensing temperature.
	Compressor will not unload.	See corrective steps for failure of compressor to unload.
	Insufficient water flow.	Adjust flow.
Little or No Oil Pressure	Clogged suction oil strainer.	Clean.
	Excessive liquid in crankcase.	Check sump heater. Reset expansion valve for higher superheat. Check liquid line solenoid valve operation.
	Low oil level.	Add oil.
	Flooding of refrigerant into compressor.	Adjust thermal expansion valve.
Compressor Loses Oil	Lack of refrigerant.	Check for leaks and repair. Add refrigerant.
	Velocity in risers too low (A-C only).	Check riser sizes.
	Oil trapped in line.	Check pitch of lines and refrigerant velocities.
Motor Overload Relays or Circuit Breakers Open	Low voltage during high load conditions.	Check supply voltage for excessive line drop.
	Defective or grounded wiring in motor or power circuits.	Replace compressor-motor.
	Loose power wiring.	Check all connections and tighten.
	High condensing temperature.	See corrective steps for high discharge pressure.
	Power line fault causing unbalanced voltage.	Check Supply voltage. Notify power company. Do not start until fault is corrected.
	High ambient temperature around the overload relay	Provide ventilation to reduce heat.
Compressor Thermal Switch Open	Operating beyond design conditions.	Add facilities so that conditions are within allowable limits.
	Discharge valve partially shut.	Open valve.
Freeze Protection Opens	Thermostat set too low.	Reset to 42°F (6°C) or above.
	Low water flow.	Adjust flow.
	Low suction pressure.	See “Low Suction Pressure.”

Attention: Warranty Department
Daikin
P.O Box 2510
Staunton, VA 24402-2510
Email Address: STN.Wty_Startup_Registration@daikinapplied.com

Scroll Compressor Equipment Warranty Registration Form

This form must be completely filled out and returned to the Staunton Warranty Department within **ten (10) days** of start-up in order to comply with the terms of "Daikin Limited Product Warranty".

Check, Test and Commissioning for Scroll Product (AGZ, ACZ, WGZ, TGZ)

Job Name: _____ **Startup Date:** _____

Daikin G.O. No.: _____ **Daikin S.O. No.:** _____

Installation Address: _____ **City/State/Zip:** _____

Purchasing Contractor: _____ **Phone:** _____

City/State/Zip: _____ **No. of units at site:** _____

Unit Model No.: _____ **Serial No.:** _____

Compressor # 1 Serial #: _____ **Compressor # 4 Serial No.:** _____

Compressor # 2 Serial. #: _____ **Compressor # 5 Serial No.:** _____

Compressor # 3 Serial #: _____ **Compressor # 6 Serial No.:** _____

Benshaw/DRC Control Box M/M #: _____ **Benshaw/DRC Control Box S/N #:** _____

I. PRE START-UP PROCEDURE

II. Pre Start-Up Checklist

Pre Start-Up Checklist, All NO checks require an explanation under "Description". Please check yes or no.

	YES	NO
A. Is the unit free of visible shipping damage, corrosion or paint problems?	☐	☐
B. Is unit installed level?	☐	☐
C. Does the unit meet all location, installation and service clearances per IM Bulletin?	☐	☐
D. Has sensor bulb been properly installed in the well?	☐	☐
E. Are all set screws on all fans tight?	☐	☐
F. Does electrical service correspond to unit nameplate? Nameplate: Volts _____ Hertz _____ Phase _____	☐	☐
G. Has electrical service been checked for proper phasing at each circuit power terminal block?	☐	☐
H. Has unit been properly grounded?	☐	☐
I. Has a fused disconnect and fuses or breaker been sized per product manual and installed per local code? Number of conduits _____ Number of Wires _____ Wire Size _____	☐	☐
J. Are all electrical power connections tight?	☐	☐
K. been operating for 24 hours prior to start-up?	☐	☐

L. Does all field wiring conform to unit electrical specifications? ☐ ☐

M. Are all service and liquid line valves in correct position? ☐ ☐

N. Water Strainer installed? Shell & Tube Evaporators 0.125”(3.175mm) or smaller perforations ☐ ☐
Brazed Plate Evaporator 0.063” (1.6mm) or smaller perforations

O. Has a flow switch been installed per the IM manual? ☐ ☐

P. Has the chill water circuit been cleaned, flushed, and water treatment confirmed? ☐ ☐

Q. Does the chiller and condenser water piping conform to the IM manual? ☐ ☐

R. Are fans properly aligned and turn freely? ☐ ☐

S. Is wind impingement against the air cooled condenser a consideration? ☐ ☐

T. Description of unit location with respect to building structures. Include measured distances.

Description: _____

_____

_____

III. REFRIGERATION SYSTEM

	N/A	YES	NO
A. Has all field piping been leak tested at 150 psig (690 kPA)?	☐	☐	☐
B. Has system been properly evacuated and charged?	☐	☐	☐
C. Refrigerant R-____ Circuit 1 _____ lbs (kg) Circuit 2 _____ lbs. (kg)		☐	☐
D. Does piping to unit appear to be adequately sized and installed according to the IM bulletin?	☐	☐	☐
E. Is a liquid line filter-drier installed in each circuit?	☐	☐	☐
F. Is level of oil in sightglass visible butnot more than 1/2 glass with compressors running?		☐	☐
G. Is a liquid line solenoid installed correctly in each circuit?	☐	☐	☐
H. Is expansion valve bulb or suction sensor properly installed and insulated?		☐	☐

IV. DESIGN CONTROLS

A. CHILLER
Water Pressure Drop: _____ psig(kPa) _____ Ft. (kPa) _____ gpm (lps)
Water Temperatures: Entering _____ °F (°C) Leaving _____ °F (°C)

B. CONDENSER
Water Pressure Drop: _____ psig(kPa) _____ Ft. (kPa) _____ gpm (lps)
Water Temperatures: Entering _____ °F (°C) Leaving _____ °F (°C)

V. START-UP

	YES	NO
A. Does unit start and perform per sequence of operation as stated in the IM Manual?	☐	☐
B. Do condenser fans rotate in the proper directions?	☐	☐

MICROTECH STATUS CHECK-Each Reading Must be Verified with Field Provided Instruments of Known Accuracy?

		MicroTech	Verification
C. Water Temperatures:	Leaving Evaporator ……	_____ °F (°C)	_____ °F (°C)
	Entering Evaporator ……	_____ °F (°C)	_____ °F (°C)
	Entering Condenser ……	_____ °F (°C)	_____ °F (°C)
	Leaving Condenser ……	_____ °F (°C)	_____ °F (°C)
D. Circuit #1 Refrigerant Pressures:			
	Evaporator ……	_____ psig (kPa)	_____ psig (kPa)
	Liquid Line pressure ……		_____ psig (kPa)
	Condenser Pressure ……	_____ psig (kPa)	_____ psig (kPa)
E. Circuit #2 Refrigerant Pressures:			
	Evaporator ……	_____ psig (kPa)	_____ psig (kPa)
	Liquid Line Pressure ……		_____ psig (kPa)
	Condenser Pressure ……	_____ psig (kPa)	_____ psig (kPa)
F. Circuit #1 Refrigerant Temperatures:			
	Saturated Evaporator Temperature ……	_____ °F (°C)	_____ °F (°C)
	Suction Line Temperature ……	_____ °F (°C)	_____ °F (°C)
	Suction Superheat ……	_____ °F (°C)	_____ °F (°C)
	Saturated Condenser Temperature ……	_____ °F (°C)	
	Liquid Line Temperature ……		_____ °F (°C)
	Subcooling ……		_____ °F (°C)
	Discharge Temperature ……		_____ °F (°C)
G. Circuit #2 Refrigerant T	Saturated Evaporator Temperature ……	_____ °F (°C)	_____ °F (°C)
	Suction Line Temperature ……	_____ °F (°C)	_____ °F (°C)
	Suction Superheat ……	_____ °F (°C)	_____ °F (°C)
	Saturated Condenser Temperature ……	_____ °F (°C)	
	Liquid Line Temperature ……		_____ °F (°C)
	Subcooling ……		_____ °F (°C)
	Discharge Temperature ……		_____ °F (°C)
H. Outdoor Air Temperature: ……		_____ °F (°C)	_____ °F (°C)

NON-MICROTECH READINGS

I. Does the system contain glycol? ☐ Yes ☐ No
Percentage by weight _____ or by volume _____ Glycol Type _____

J. If the chilled water system include glycol, have the freezstats been adjusted lower to me☐a(Yes ☐ No
Note: See operation manual for low temperature on ice bank applications.

K. Chiller: _____ psig (kPa)_____ Ft. (kPa) _____ gpm (lps)
Condenser: _____ psig (kPa)_____ Ft. (kPa) _____ gpm (lps)

L. Unit Voltage Across Each Phase: L1-L2 _____ V **L2-L3** _____ V L1-L3 _____ V
M. Unit Current Per Phase: L1 amps _____ L2 amps _____ L3 amps _____
N. Compressor Current Per Phase:

Comrpessor #1: _____	L1 Amps _____	L2 Amps _____	L3 Amps
Compressor #2: _____	L1 Amps _____	L2 Amps _____	L3 Amps
Compressor #3: _____	L1 Amps _____	L2 Amps _____	L3 Amps
Compressor #4: _____	L1 Amps _____	L2 Amps _____	L3 Amps
Compressor #5: _____	L1 Amps _____	L2 Amps _____	L3 Amps
Compressor #6: _____	L1 Amps _____	L2 Amps _____	L3 Amps

Warranty Registration Form (Scroll)

VI. MICROTECH SETPOINTS — MICROTECH Setting

A. Leaving Evaporator …….. _____ °F (°C)
B. Reset Leaving …… _____ °F (°C)
C. Reset Signal …… _____ ma
D. Reset Option …… _____
E. Maximum Chilled Water Reset …… _____ °F (°C)
F. Return Setpoint …….. _____ °F (°C)
G. Maximum Pulldown …… _____ °F (°C)
H. Evaporator Full Load Delta T …… _____ °F (°C)
I. Evap Recirc Timer …… _____ sec.
J. Start-to-Stop Delay …….. _____ min.
K. Stop-to-Stop Delay …… _____ min.
L. Stage Up Delay …… _____ sec.
M. Stage Down Delay …….. _____ sec.

ALARM SETPOINTS MUST BE VERIFIED WITH INSTRUMENTS OF KNOWN ACCURACY

N. Low Pressure Hold …… _____ psig (kPa)
O. Low Pressure Unload…… _____ psig (kPa)
P. Evaporator Water Freeze…… _____ psig (kPa)
Q. High Pressure Cut-Out…….. _____ psig (kPa)
R. Unit Type = _____
S. Number of Compressors = _____
T. Number of Stages = _____
U. Number of Fan Stages = _____
V. Software Version = _____

VII. FOR TGZ Templifier CHILLERS ONLY (Must Be Taken At Full Load)

A. Place Unit in heat recovery mode.
B. Condenser Pressure Drop: _____ psig (kPa) _____ Ft. (kPa) _____ gpm (lps)
C. Condenser Temperatures: _____ Inlet _____ Outlet
D. Head Pressure: Circuit #1 _____ psig (kPa) Circuit #2: _____ psig (kPa)
E: Evaporator Pressure Drop: _____ psig (kPa) _____ Ft. (kPa) _____ gpm (lps)
F: Evaporator Temperatures: _____ Inlet _____ Outlet
G. Suction Pressure: Circuit #1 _____ psig (kPa) Circuit #2: _____ psig (kPa)
F. Compressor Current Per Phase

Compressor #1	_____ L1 AMPS	_____ L2 AMPS	_____ L3 AMPS
Compressor #2	_____ L1 AMPS	_____ L2 AMPS	_____ L3 AMPS
Compressor #3	_____ L1 AMPS	_____ L2 AMPS	_____ L3 AMPS
Compressor #4	_____ L1 AMPS	_____ L2 AMPS	_____ L3 AMPS
Compressor #5	_____ L1 AMPS	_____ L2 AMPS	_____ L3 AMPS
Compressor #6	_____ L1 AMPS	_____ L2 AMPS	_____ L3 AMPS

VIII. GENERAL

	YES	NO
A. Are all control lines secure to prevent excess vibration and wear? ……	☐	☐
B. Are all gauges shut off, valve caps, and packings tight after startup? ……	☐	☐

Refrigerant Leaks: _____

Repairs Made _____

_____

Items Not installed per IM Manual and/or reccommended corrective actions _____

_____

_____

Performed By: _____ Title: _____

Company Name: _____

Address: _____

City/State/Zip Code: _____ Telephone: _____

Modem Number: _____

Signature: _____ Date: _____

Contractor's Signature _____

RETURN COMPLETED FORM TO: DAIKIN, WARRANTY DEPT., PO BOX 2510, STAUNTON, VA 24402