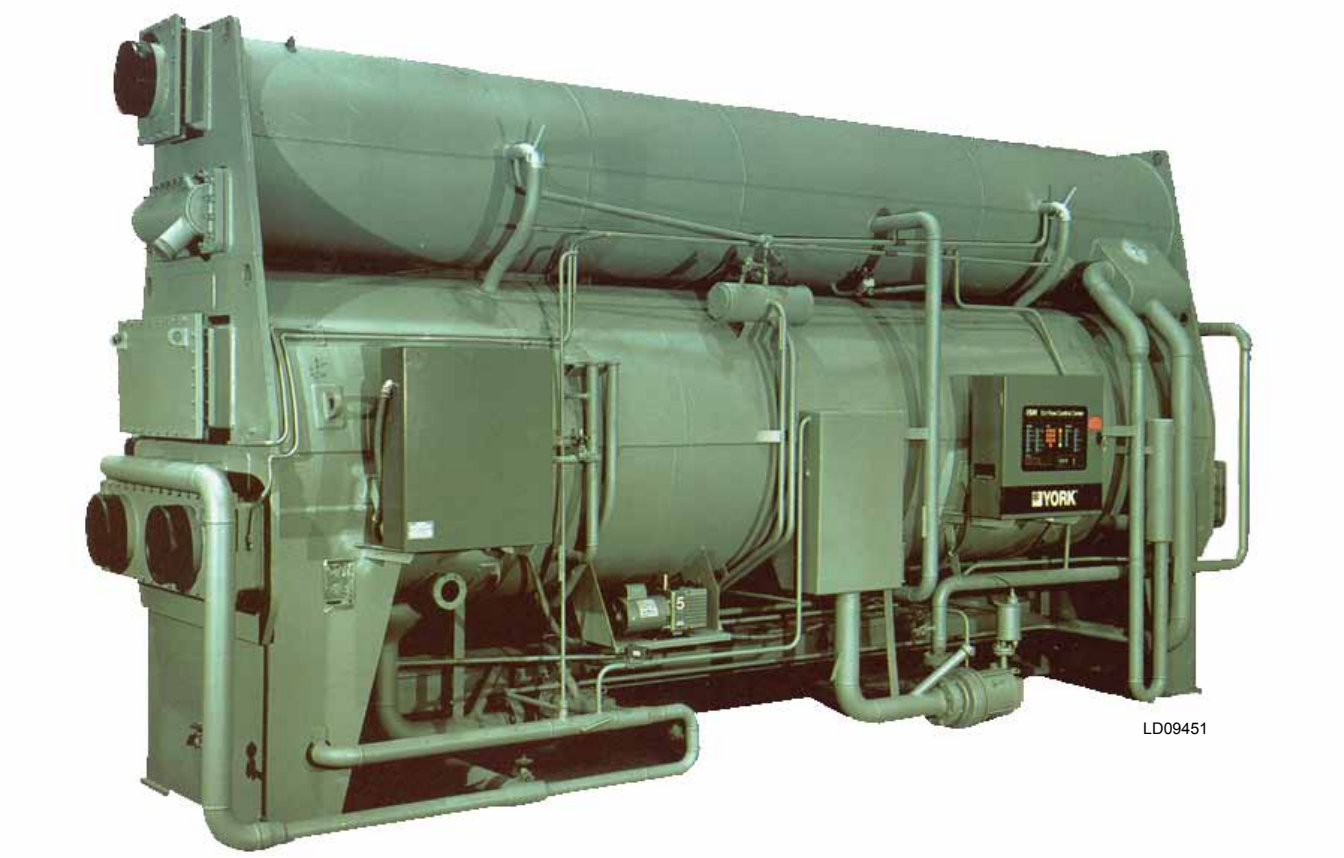
YORK BY JOHNSON CONTROLS	ABSORPTION CHILLERS WITH BUFFALO PUMPS	
INSTALLATION INSTRUCTIONS	Supersedes: 155.16-N3 (904)	Form 155.16-N3 (413)

MODELS

STEAM
YIA-ST-1A1 THRU YIA-ST-14F3
HOT WATER
YIA-HW-1A1 THRU YIA-HW-14F3



120 - 1377 TONS
(420 - 4840 KW)

Issue Date:
April 4, 2013

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

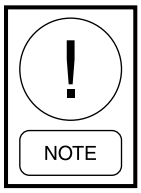
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.



Highlights additional information useful to the technician in completing the work being performed properly.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson In complying with Johnson Controls' policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls QuickLIT website at http://cgproducts.johnsoncontrols.com.

Operating/service personnel maintain responsibility for the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, the technician should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Field Control Modifications Diagram for Millennium Control Center	155.16-PA1
Dimensions and Physical Data for Steam Heat Source Units	155.16-PA1.1
Dimensions and Physical Data for Hot Water Heat Source Units	155.16-PA1.2
Field Connections for Micro Panel Control Center	155.16-PA2
Wiring Diagram for Units with Franklin Pumps	155.16-W1
Wiring Diagram for CE Coded Units with Franklin Pumps	155.16-W3
Wiring Diagram for All Units with Buffalo Pumps	155.16-W4
YIA Operating and Maintenance Manual	155.16-OM1

NOMENCLATURE

The model number denotes the following characteristics of the unit.

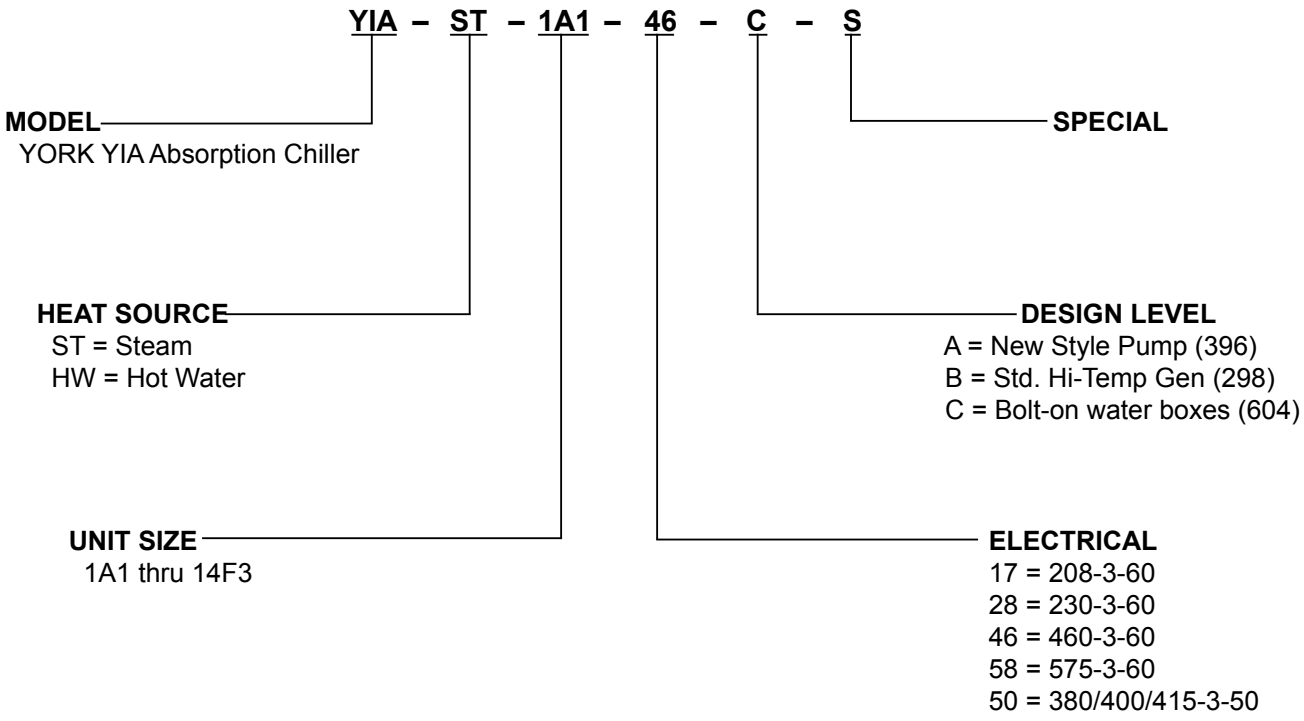


TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

LIST OF FIGURES

LIST OF TABLES

SECTION 1 - INSTALLATION RESPONSIBILITIES

The following steps must be completed for the proper installation of a YORK absorption chiller. These lists are not intended to be the final steps for each installer to complete, but only used as a guideline. Because some of the work may be completed by others, there may be duplicated steps. The most important part of a successful installation is that each installer knows ahead of time what to do and when to do it.

MECHANICAL CONTRACTOR

1. Construct a housekeeping pad and floor drains.
2. Rig and level the unit into place, set the unit on neoprene pads if applicable.
3. Move the solution, refrigerant drums and unit ship loose parts into the building.
4. If the unit is a two-piece shipment, install the Condenser/Generator section on the Absorber/ Evaporator section and weld the interconnecting piping between the two shells.
5. Install the absorber, evaporator and condenser lines. Construct and install Crossover Piping on applicable units. Provide flanges and taps in the piping for monitoring, control, and safety devices.
6. Install the steam/hot water lines and all applicable components, including; control valve, failsafe and condensate drain valves (if applicable). Provide flanges and taps in the piping for monitoring, control, and safety devices.
7. Install the rupture disk piping.
8. Installing/mechanical contractor is responsible for completely filling out and signing the "Installation Check List and Request for Authorized Start-up Engineer" form, located in *APPENDIX B* this document.

ELECTRICAL CONTRACTOR

1. Supply, mount, and wire a fused unit disconnect switch prior to the power panel of the absorption chiller.
2. Wire the main power supply lines into unit mounted power panel.
3. Run power wiring to unit external devices.

JOHNSON CONTROLS SERVICE OFFICE

1. Charge the unit with solution and refrigerant. Fill the Vacuum Pump with oil. Refer to *APPENDIX A* for proper oil volumes in the Vacuum Pump.
2. Re-check the levelness of the unit.
3. Land wiring to the flow switches, control valve, and fail closed valve on steam/hot water piping (if applicable). Land wiring to the condensate drain solenoid on steam units.
4. If the unit was a two-piece shipment, leak check all field assembled chiller piping connections.
5. Check all unit-mounted pumps for correct rotation direction.
6. Mount and connect the manometer pressure gauge. Refer to *SECTION 4 - UNIT RE-ASSEMBLY*.
7. Install all sensors, switches, and indicating devices pertaining to the unit in their appropriate wells on customers piping.
8. Perform all normal and customary unit pre-startup and start-up procedures (TCA). Refer to *APPENDIX B,* of this manual *Form 155.16-CL1*.

INSULATION CONTRACTOR

1. Insulate the chilled water lines and water boxes. Refer to *SECTION 12 - INSULATION*.
2. Insulate the steam/hot water lines and boxes. Refer to *SECTION 12 - INSULATION*.
3. Insulate the unit refrigerant piping, if applicable.
4. Insulate the evaporator shell if necessary. Refer to *SECTION 12 - INSULATION*.

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SECTION 2 - INTRODUCTION

INTRODUCTION

This manual describes the installation of an Iso-Flow absorption chiller with the new style (internally cooled) circulation pumps. The unit is a complete self-contained, forced circulation refrigeration system using steam or hot water as the activation medium. De-ionized water is used as the refrigerant and lithium bromide solution is used as an absorbent. The system consists of a generator-condenser shell mounted on top of an absorber-evaporator shell. The system also utilizes a solution pump, refrigerant pump; purge pump, and interconnecting piping. See the *APPENDIX A* for the location of the above listed components.

For more detailed information about design, specifications or operation on the particular unit being installed, please contact your local Johnson Controls office.

When using this manual, the installer should pay particular attention to the Safety Symbols: **DANGER, WARNING, CAUTION** and **NOTE**. These symbols alert the installer of areas of potential hazard. For further explanation, Refer to the Safety Symbols section at the beginning of this manual.

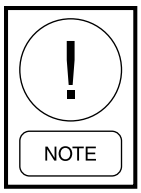
The contractor is advised to become thoroughly familiar with the installation requirements of the YORK YIA Chiller. Careful study of the factory submittal drawing package and this manual is highly recommended. Johnson Controls representatives are available to answer any questions and to coordinate delivery of the unit and the accessories.

Johnson Controls must be advised by the contractor of the scheduled Start-Up time so that qualified personnel can be made available on the Start-Up date. Complete the "Installation Check List And Request For Authorized Start-Up Engineer", Form 155.16-CL1, found in Appendix B and submit the form to Johnson Controls. A minimum of four weeks advance notice must be allowed to schedule a unit Start-Up and to have the Lithium Bromide Solution delivered to the jobsite.

ADVANCED PREPARATION SITE SELECTION

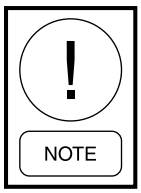
It is recommended the installer make a first-hand on site, job site inspection to ensure a smooth installation process. Check all factory submittals and drawings to verify unit clearances, overall dimensions and weight. Electrical requirements, steam or hot water pressure and temperature, foundation dimensions, and floor drains should also be verified before the chiller arrives.

When selecting an installation site, consider structural support, access of service and service equipment, overhead space, floor drains, and tube pulling space.



Tube pull area is approximately equal to the length of the main shell.

Follow standard engineering practices in designing the piping system and other services. See the *APPENDIX A* for a listing of the unit rigging and operational weights.



Johnson Controls does not recommend the YORK YIA unit to be installed out of doors. During unit operation the ambient temperatures in the immediate surrounds of the unit must not become lower than 35°F (1.67°C) or above 104°F (40°C).

The equipment room must be enclosed, well lighted, and properly ventilated. Relative humidity in the equipment room must never reach the saturation point.

Condensation of moisture may cause corrosion and damage to electrical components.

UNIT CLEARANCES

The minimum recommended UNIT clearances are listed in the following Table. If the site selection fails to meet these minimums, contact the local Johnson Controls office for special considerations.

TABLE 1 - UNIT CLEARANCES

UNIT CLEARANCES	
Unit Side Opposite Panel	40” (1.0 m)
Panel Side of Unit	Per Code
Tube Pull End of Unit	One Unit Length
Opposite Tube Pull End of Unit	60" (1.5 m)
Top of Unit	See Below
Bottom of Unit	Level with Floor

For clearance on top of the unit Johnson Controls recommends allowing enough room for removal of unit skids, ventilation, and accessibility for maintenance or unit cleaning. For unit overall dimensions refer to Johnson Controls Forms 155.16-PA1.1 and 155.16-PA1.2.

FOUNDATION

In many situations the YORK YIA units are set on concrete housekeeping pads to help with machine room cleanliness. These foundations are usually made of concrete with a compressive strength rating of not less than 4000 psi and are able to support the full operating weight of the unit. (See *APPENDIX A* for tables within this document for specific unit weights). When installing a concrete foundation, use steel to reinforce the concrete and finish the surface smoothly. The concrete foundation pad must be level within .25 inches (6.35mm) at all contact surface locations of the unit to the pad. Where equipment headroom allows, it maybe desirable to elevate the portions of the housekeeping pad just where the chiller’s mounting feet are. This will provide additional clearance under the unit for maintenance and cleaning purposes. For foundation sizes, footprints and unit dimensions, See Johnson Controls *Forms 155.16-PA1.1* and *155.16-PA1.2*.

UNIT SHIPMENTS

There are two types of shipments for the YORK YIA units, One-piece or two-piece. Model sizes 1A1 through 10E3 are shipped standard in one piece (completely assembled). Model sizes 12F1 through 14F3 are shipped in two separate sections, which require field assembly at the jobsite.

Unit Models 12F1 through 14F3 are assembled at the factory for fit-up then separated for shipment. The Condenser/Generator top shell is one piece and the Absorber/Evaporator bottom shell is the other.

An option is available to have any size unit ship as a two-piece, if specified at the time of factory order submittal. **However, if the unit model is smaller than a 12F1, the unit will ship as one-piece but will be separable at the jobsite, for a two-piece rig into the building.**

Shipments outside of North America will normally be shipped without a solution and refrigerant charge. The shells will have a nitrogen holding charge. All other unit shipments will normally be uncharged and in a vacuum.

All split ship (two-piece) units will be shipped with a nitrogen holding charge.

Depending on the unit shipping instructions, there will usually be two wooden crates of ship loose items included with the unit shipment. One crate will contain miscellaneous unit materials necessary to complete the unit re-assembly and or start-up. For an itemized listing of what is included in the ship loose items, see the “*Ship Loose Items List*” found in Form 155.16-RP3. The other crate will contain a unit control valve, if ordered with the unit.

SOLUTION AND REFRIGERANT SHIPMENT

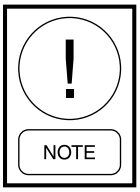
North America and Canada orders. YORK Factory Customer Service will place an order with the solution supplier and send a release form to the local Johnson Controls Service Office responsible for the chiller start-up. The local Johnson Controls Service Office is then responsible for completing and forwarding the release form to the solution/refrigerant supplier 2 weeks before they require shipment.

International orders. If the solution and refrigerant is purchased with the unit, YORK Factory Customer Service will place an order with the solution/refrigerant supplier. The solution and refrigerant will ship in barrels with the chiller to the port for packaging and consolidation. If the solution and refrigerant were not ordered with the unit, the local Johnson Controls Service Office would be responsible for obtaining this.

INITIAL INSPECTION OF UNIT

See Appendix B of this document for a "Receiving Inspection Checklist". This document must be filled out during the initial inspection and given to the local Johnson Controls Service Office upon completion. It is advisable to have a Johnson Controls Service Technician on site during the initial unit inspection process.

The unit should be checked on the trailer or rail car when received and before unloading, for any visible signs of damage. **Any signs of damage or possible damage must be reported to the transportation company immediately! Negating this step if unit is damaged during transit could result in the unit warranty being void!**



Johnson Controls will not be responsible for any unit damage during shipment or at the jobsite during installation or rigging.

Make sure all pieces of the shipment, such as boxes and crates are received with the unit. The solution and refrigerant charge is usually not part of the initial unit shipment; normally these materials must be ordered by requisition, contact the local Johnson Controls Customer Service office when these materials are required.

If the unit is a one-piece shipment, a pressure gauge will be mounted directly off the unit's Purge System line on the lower shell. If a two-piece shipment is received, an additional pressure gauge will be installed at one of the pipe closure plates on the upper shell. The gauge(s) must either read a vacuum or a pressure depending on the type of shipment. If any gauge(s) indicates "0", **notify the local Johnson Controls Service Office immediately.** Bring the unit into the building as soon as possible after it has been off loaded.

A "Field Material Catalog" can be found in with the unit's ship loose parts. This catalog is a pictorial listing of all parts that were shipped with the unit before it left the YORK Factory. Use this catalog along with the unit's package list to identify and determine if all ship loose items arrived with the unit. **Any missing or damaged ship loose items must be reported to the local Johnson Controls Service Office immediately!**

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SECTION 3 - UNIT RIGGING

NOTE

Under no circumstances should the unit internals be opened to the atmosphere during the rigging operation.

ONE-PIECE UNIT LIFTS

See *APPENDIX A* in this document for complete and partial unit weights.

When lifting the complete unit, use a spreader bar equal to or greater in length as the unit. Keep the chains vertical! Attach the chains at the Absorber/Evaporator endsheets lifting holes as shown in *Figure 4 on page 17*.

CAUTION

DO NOT lift a one-piece unit from a single point as shown in Figure 5. Damage to the external unit components may occur.

Care should be used at all times during the rigging and handling of the unit to avoid damage to any projecting brackets, pipes, fittings, or any apparatus. These components may be damaged under the weight of the unit when lifted. Keep the unit Horizontal and level at all times.

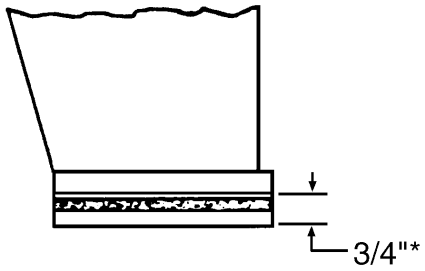
DANGER

Do not rig the unit in a vertical position, the unit must be kept horizontal during the entire rigging operation! The unit is not designed to be in a vertical position. Internal unit damage and/or personal injury may result.

DANGER

Do not attempt to lift the complete unit via the holes located in the top shell! These holes are plugged at the factory – Do not unplug these holes for any reason! Lifting from these holes will not support the entire weight of the unit and personal injury and/or unit damage will result!

If the unit has skids, remove them before setting the unit into its final position. If the unit is to receive neoprene pads, set the unit squarely on the pads as shown below.



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*Compressed Thickness of Isolation Pad Assembly

FIGURE 1 - UNIT NEOPRENE PADS

TWO-PIECE UNITS

See *APPENDIX A* in this document for complete and partial unit weights.

All units have the option of being a two-piece unit. This means the unit will ship in one piece but will allow for separation at the jobsite for a two-piece rigging into the building. Some of the larger model units, due to their physical size, always ship in two pieces, these units are model sizes 12F1 through 14F3.

When lifting the bottom shell of the unit, attach the chains at the Evaporator/Absorber endsheets lifting holes as shown in *Figure 6 on page 19***.**

When lifting the top shell of the unit, attach the chains at the Condenser/Generator endsheets lifting holes as shown in *Figure 7 on page 20*.

Care should be used at all times during the rigging and handling of the unit to avoid damage to any projecting brackets, pipes, fittings, or any apparatus. These components may be damaged under the weight of the unit when lifted. **Keep the unit Horizontal and level at all times.**

DANGER

Do not rig the unit in a vertical position, the unit must be kept horizontal during the entire rigging operation! The unit is not designed to be in a vertical position. Internal unit damage and/or personal injury may result.

Place the lower shell on the foundation pad. Disconnect any skidding from the upper shell and rig using spreader bar and hooks into the end sheets holes. Hoist the top shell assembly into position above the bottom shell assembly. Refer to *Figure 2 on page 16*.

Make sure the ends of the top shell assembly are in the correct orientation. See note below.

NOTE

Match identification numbers are stamped on each shell end sheet. Do not mismatch the upper and lower shell assemblies!

The inside end sheets of the top and lower shells have a mounting angle bracket with mounting holes installed at the factory. Using two tapered pins (supplied by others) at opposite corners, align the brackets and carefully set the top shell on the lower shell. Install the four factory supplied bolts and nuts to hold the shell assemblies in place. Refer to *Figure 2 on page 16*.

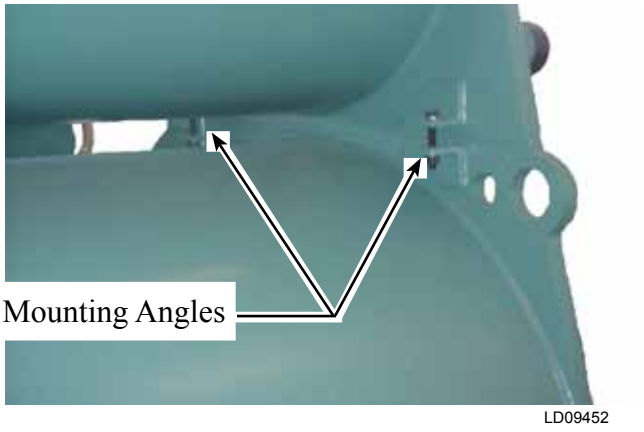


FIGURE 2 - MOUNTING ANGLES

UNIT LEVELING AND MOUNTING

YORK YIA units do not have any leveling marks on the unit. Do not attempt leveling the unit by corresponding locations on the unit.

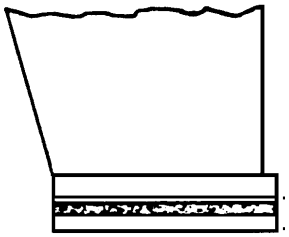
Leveling is accomplished by setting the unit on a flat, level surface of the foundation pad as described in *SECTION 2 - INTRODUCTION*, *Foundation on page 12* in this document. The foundation pad must be level within .25 inches (6.35mm) at all four unit contact locations with the pad. If the concrete foundation pad is not level within Johnson Controls requirements, metal shims may be placed between the bottom of the unit feet and the concrete pad to compensate. Do not place any shims between the top shell and the lower shell.

Steam / Hot Water Units

Whether the unit is shipped as a one-piece or two-piece, the mounding feet on the lower shell at the steam inlet end are 1/2" (12.7 mm) thicker than the mounting feet at the steam outlet end. *The steam inlet end is always on the right when looking at the unit control panel.* This design allows for generator tube drainage during unit operation in the event of wet steam.

Neoprene Pads

YORK YIA units are quiet and operate free of vibration. Normally the unit will not require fasteners into the concrete to hold the unit in place. Johnson Controls does offer neoprene isolator pads to set the unit on if the unit is going to be installed in an area where even mild noise would be objectionable. If the unit is to set on neoprene pads, the unit mounting feet must make direct contact with the neoprene. If shims must be used, they must be placed between the concrete and the neoprene pad. Please keep in mind that total pad compression will not take place until the unit is fully charged with solution and refrigerant and each tube bundle section is completely filled with fluid.



Floor to be level within 1/4" (6.35 mm). Place optional isolation pads squarely under all four unit feet. No bolting to floor required. Approximate height after deflection is 3/4" (19 mm).

FIGURE 3 - ISOLATION PADS

Spring Isolators

Spring-type vibration eliminating mountings are not necessary the therefore not recommended. If the unit is being installed in a seismic restraint area, Johnson Controls recommends seeking the advise of a professional vibration consultant for mounting requirements.

Unit Mounting

Due to the nature of operation, YORK YIA units do not normally require bolting down. Simply set the unit on a level surface according to the recommendations in *SECTION 2 - INTRODUCTION*, *Foundation on page 12* in this document.

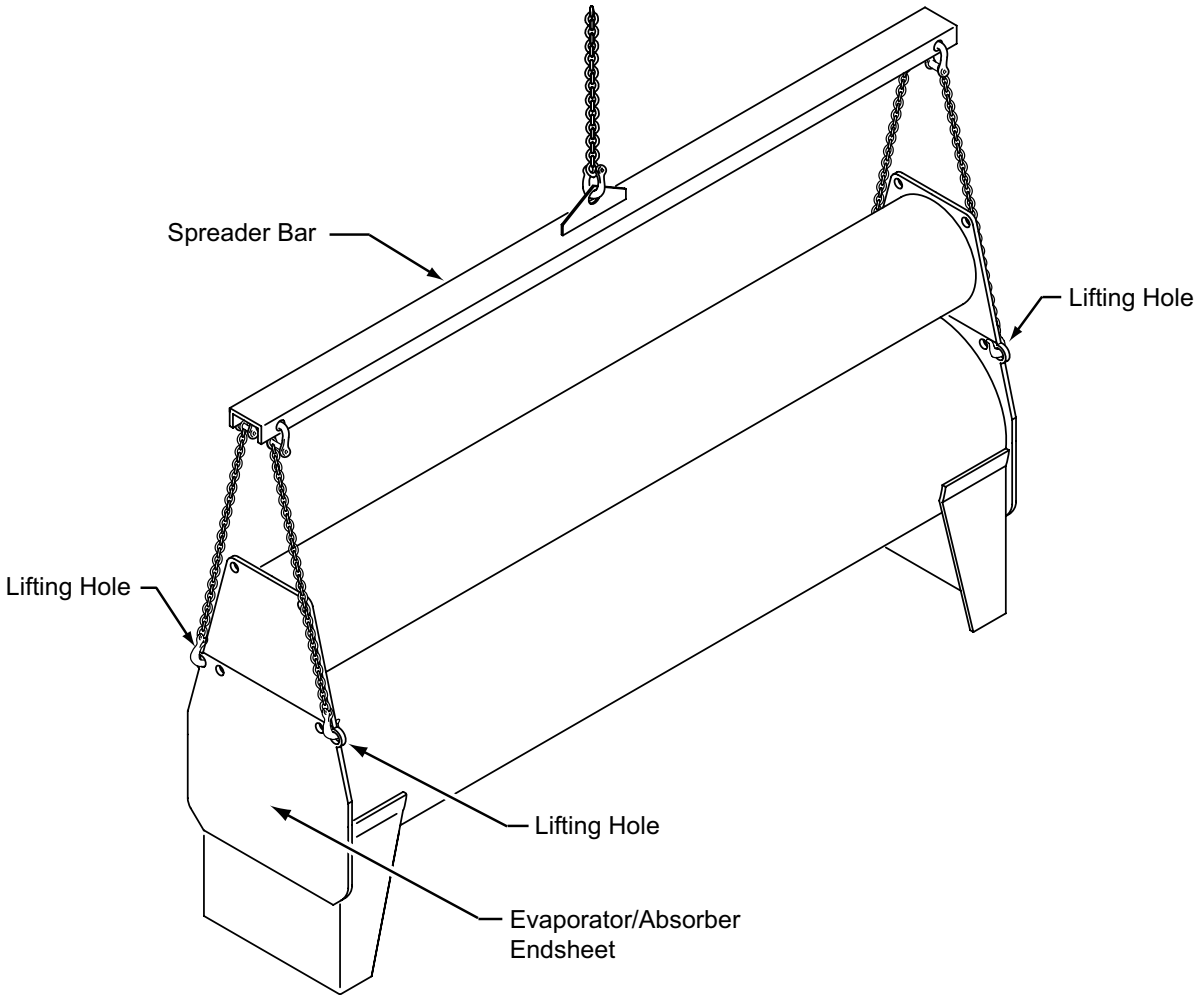


FIGURE 4 - CORRECT ONE-PIECE UNIT LIFTING METHOD

ONE-PIECE SHIPMENTS

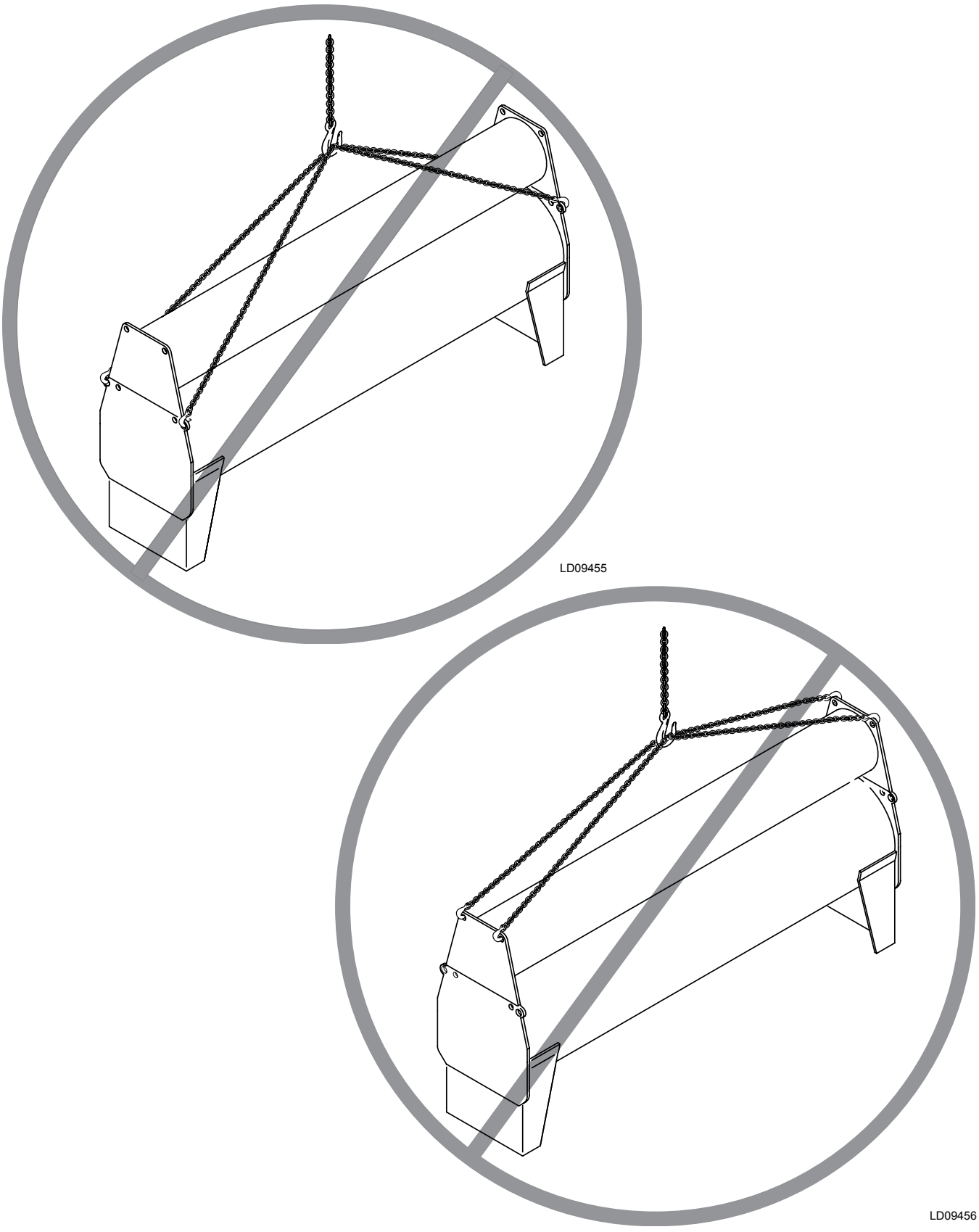


FIGURE 5 - INCORRECT ONE-PIECE UNIT LIFTING METHODS

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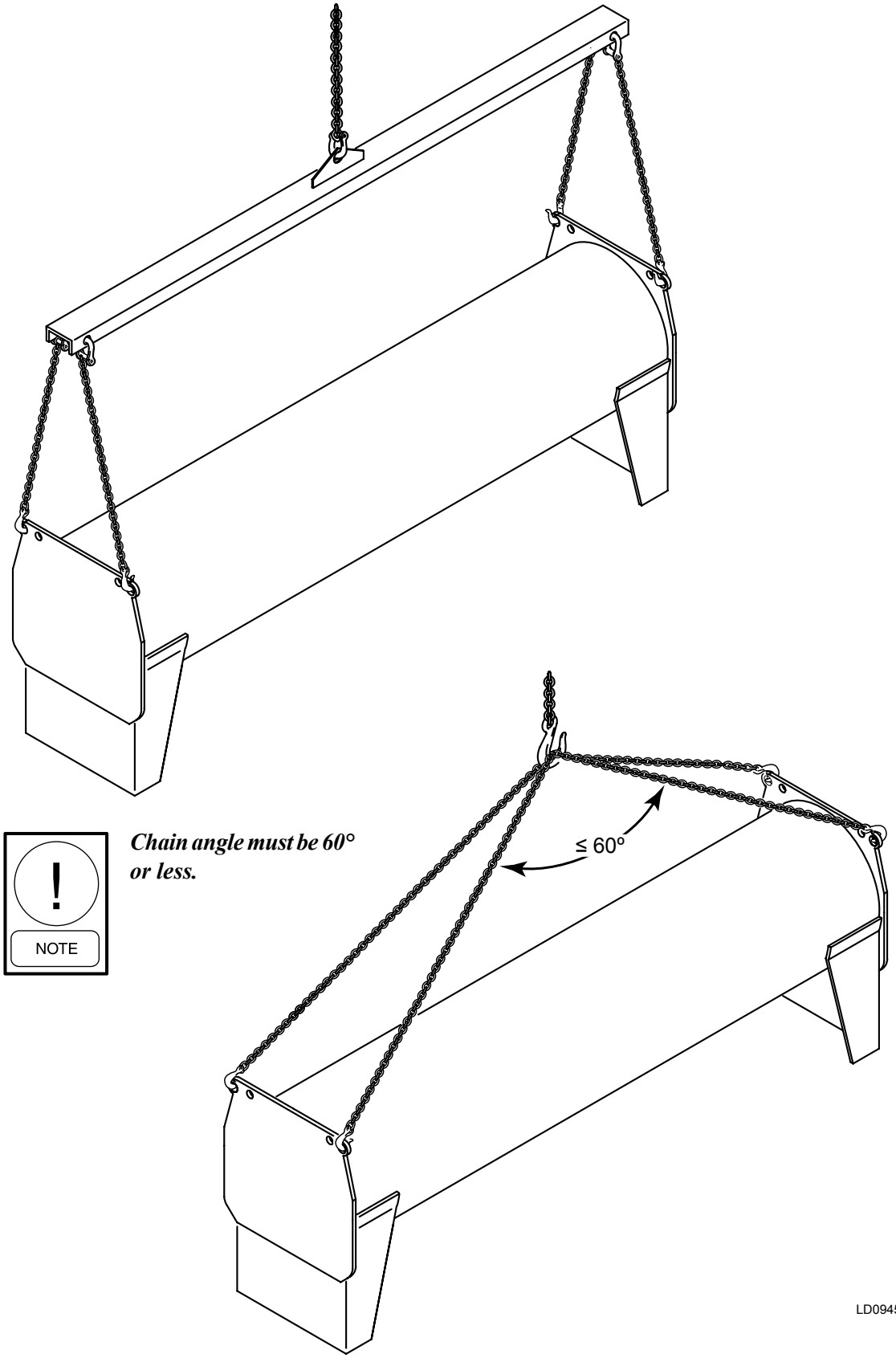
TWO-PIECE SHIPMENTS
(BOTTOM SHELL)



NOTE

Chain angle must be 60° or less.

FIGURE 6 - EVAPORATOR / ABSORBER CORRECT LIFTING METHODS

TWO-PIECE SHIPMENTS
(TOP SHELL)

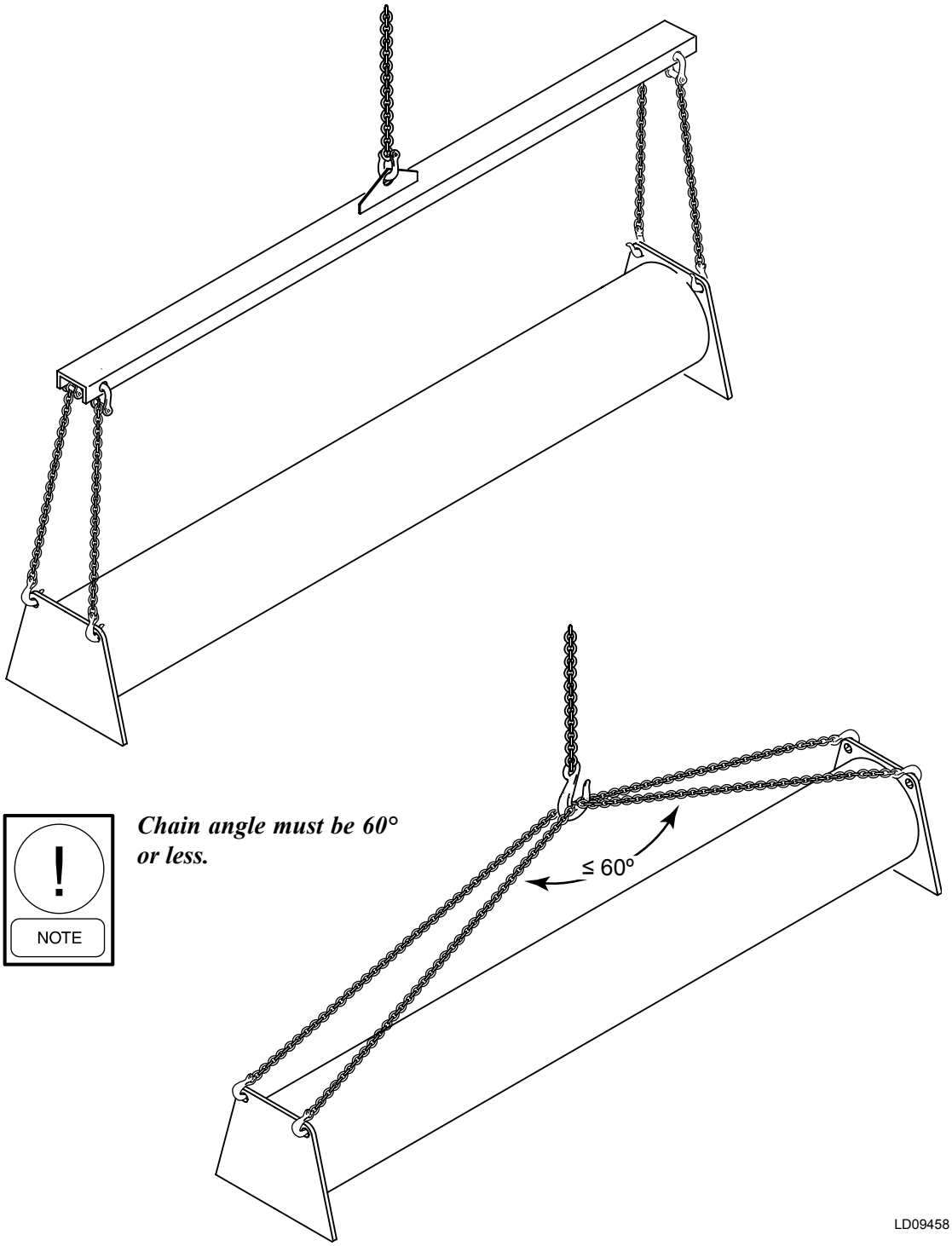
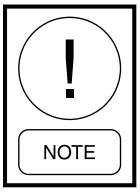


FIGURE 7 - CONDENSER / GENERATOR CORRECT LIFTING METHODS

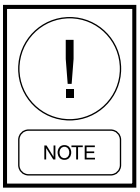
SECTION 4 - UNIT RE-ASSEMBLY

TWO-PIECE SHIPMENTS

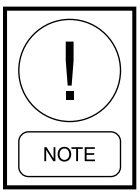
Units shipped in two pieces require field welding to re-connect the piping between the upper and lower shells.



Notify the local Johnson Controls Service Office before proceeding with the unit re-assembly. Do not open the unit to expose the interior surfaces to atmospheric conditions unless a Johnson Controls Service Technician is present. Johnson Controls must provide guidance and supervision during the welding, re-assembly, and leak check process.



All YORK units are shipped in either a vacuum or a nitrogen holding pressure. The Johnson Controls Service Technician can instruct how to bring the unit to atmospheric pressure. Do not open the unit to atmospheric pressure without Johnson Controls guidance.



If order consists of multiple units, ensure serial numbers are matched up correctly with top and bottam shells. Serial numbers are stamped on tubesheet.

YORK Factory installs pressure gauges on each shell section (total 2 for each unit). These gauges will indicate whether the unit is in a vacuum or pressure. Two-piece unit shipments will always be pressurized.

BREAKING THE UNIT PRESSURE

There are two standard forms of shipment for YORK YIA units: one piece or two-piece (sometimes called, Split Shipment). Units shipped as one piece with destinations in North America are shipped uncharged and in a vacuum. Units with overseas destinations and two-piece shipments will be shipped uncharged with a nitrogen holding pressure. A service valve with pressure indicator will be attached to the purge piping of the lower shell and off a closure plate on the upper shell. (Refer to *Figure 8 on page 21*) The following are procedures for breaking the unit pressure.

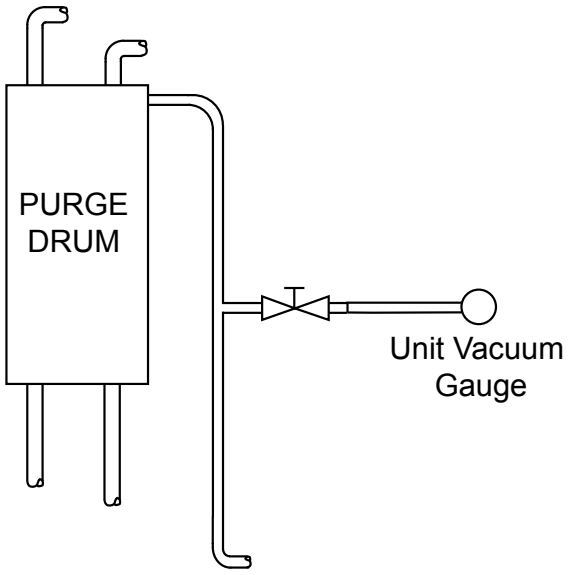


FIGURE 8 - BREAKING UNIT PRESSURE

Procedures

1. Open the service valves and read the pressure.
2. Close the service valves and remove the factory-supplied pressure gauge.
3. After the gauge has been removed, slowly open the service valves again to discharge the pressure from the shells.

For safety reasons, do not open the valves to a complete full open position.

4. Close the service valves when the unit pressure approaches atmospheric pressure (~ 0.5 psig, 3.4 KPa).

UNIT RE-ASSEMBLY

For a detail of what pipes and unit connections are required for each unit model, please refer to *APPENDIX A* of this document. Read the notes carefully on the appropriate figures to determine how many lines require welding and what is included in the unit's ship loose parts.

All factory pipe connections will have factory welded closure caps or flat plates that will require removal in the field. **When removing the closure caps or flat plates, always grind these enclosures from the pipes. DO NOT CUT INTO THE PIPE.** Each pipe is at the correct length to accept the factory supplied filler piece. Cutting into these pipes will shorten the length and an improper connection will result.

Carefully remove all debris from the filler pieces, fittings, and sections of pipe before installing on the unit.

NOTE

Care must be taken to keep dirt and other foreign matter out of the unit during the grinding and welding processes. If there is any delay in the work and the pipes will be open for a long period of time, tape the ends of the pipes shut and apply a nitrogen blanket to the unit.

When welding in the filler pieces, all welds must be full penetration welds. To achieve full penetration welds, grind both sides of each joint to a 75° angle prior to welding. Leave a small gap (~3/32 – 5/32") (2.5 – 4mm) between the two mating parts.

NOTE

NEVER USE BACKUP RINGS FOR ANY JOINTS. For field welding details ask for Form 155.17-M3.

All weld root passes and second (hot) passes must be made using Gas Tungsten-Arc Welding commonly called TIG. The purpose of using TIG for the first two passes is primarily to provide a smooth gap free surface on the inside of the pipe. Historically it is impossible to achieve the gap free surface using Shielded Metal Arc (commonly called stick) welding.

Never use any type of oil on any materials, tools or surfaces that may come in contact with the internals of the absorption unit. Oil in the system could seriously hinder the units performance.

CAUTION

Do not do any welding on the shell vessels of the unit. Doing so may void the unit's factory warranty!

Every field weld MUST be leak checked before unit commissioning can begin.

The leak check method used must, at minimum, be completed with an Electronic Halide leak detection device. This leak check must be completed or supervised by a qualified Johnson Controls Service Technician.

NOTE

Testing by soap or vacuum decay is not a recommended method for leak checking.

INSTALLING THE ABSOLUTE PRESSURE GAUGE

The Absolute Pressure gauge and a 1/4" copper connecting line can be found within the unit's ship loose parts container. The following are procedures for installing the Absolute Pressure Gauge.

Procedures

1. Locate the Absolute Pressure Gauge and inspect it for any damage.
2. Place the Absolute Pressure Gauge on the bracket located on the lower shell near the Purge Pump Oil Trap. (Refer to *Figure 9 on page 22*)

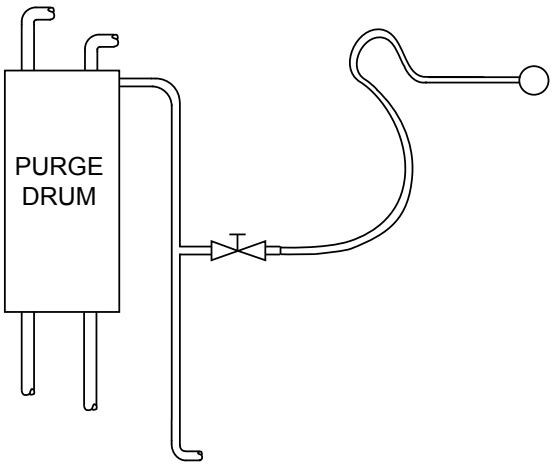


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FIGURE 9 - MANOMETER CONNECTIONS

3. Install the Absolute Pressure Gauge on the bracket using two #10-24 UNC x 1 inch flat head machine screws and hex nuts. The mounting hardware is included with the ship loose parts.
4. Make sure the Absolute Pressure Gauge is absolutely vertical by placing a level on the side edge of the gauge.
5. Tighten the mounting screws and nuts securely.

6. Close the Isolation Ball Valve.
7. Remove the factory-supplied pressure gauge from the valve outlet, if not already completed.
8. Install the two factory supplied flare connectors, one into the Absolute Pressure Gauge connection and the second into the valve outlet. (Refer to *Figure 9 on page 22*)
9. Connect the 1/4" copper line between the two flare connectors.
10. Tighten the connectors securely.

COMPLETING THE PURGE PUMP CONNECTIONS

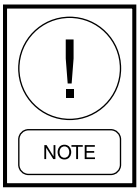
The purge pump is factory mounted and wired on all YIA units. The following are procedures for the Purge Pump connections.

Procedures

1. Carefully remove the shrink-wrap from the Purge Pump.

   The only required connection is to connect the Purge Pump suction inlet to the unit. The line is a 3/4" ID clear, wire-enforced hose that is included with the ship loose parts.

2. Connect the Suction line onto the suction port connector located at the top of the Purge Pump with the factory supplied hose clamp. (Refer to *Figure 10 on page 23*)



It is NOT recommended to use any oil, or vacuum grease on the line to make the assembly easier.

3. Install the other end of the Suction line over a factory installed pipe nipple. The pipe nipple is threaded, into a check valve, just below the oil trap. (Refer to *Figure 10 on page 23)*
4. Remove the pipe cap on the nipple and discard.
5. Tighten the Suction line over the nipple with a factory supplied hose clamp. (Refer to *Figure 10 on page 23*)

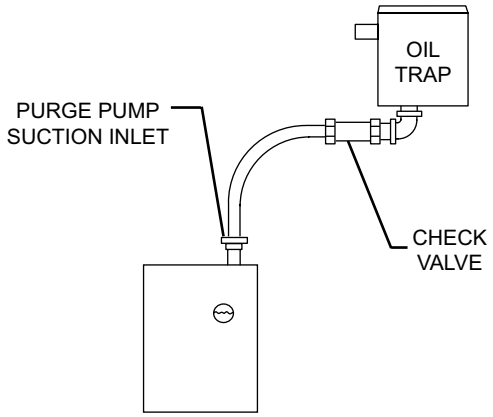


FIGURE 10 - PURGE PUMP CONNECTIONS

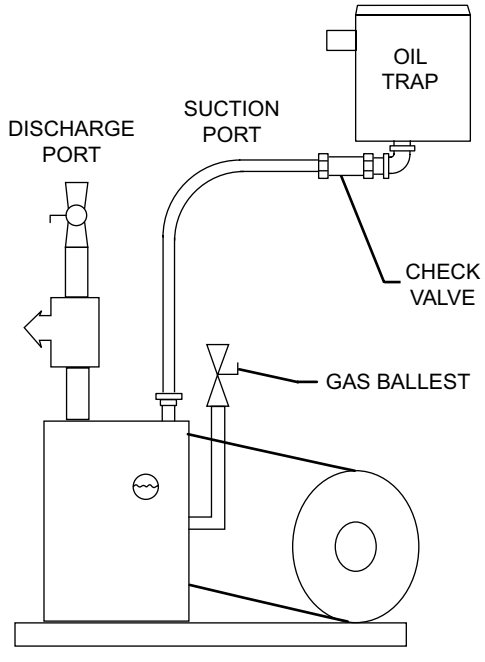


FIGURE 11 - PURGE PUMP

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SECTION 5 - UNIT WATER PIPING

UNIT WATER PIPING

Once the unit is placed on the foundation pad and leveled according to Johnson Controls's recommendations, the customer's piping connections may be fitted to the unit.

Johnson Controls does not mandate that any specific piping codes be followed for the unit's water piping fabrication. However good piping practices should be followed for best results. Johnson Controls recommends the responsible parties for the piping fabrication check to make sure all, if any, local codes be followed during the system piping fabrication.

The absorber, evaporator and condenser tube bundles come from the factory rated for 150 PSIG (10 Bar) designed working pressure (DWP) on the tubeside of the bundle. The water connections (nozzles) will be a pipe stub suitable for Victaulic couplings or welding. Tube bundles can also be specially ordered for 300 PSIG (21 Bar) DWP. Also, raised faced, ANSI flanges for the water connections can be supplied if ordered with the unit. When flanges are specified, they are selected in accordance with the design pressure of the vessel.

The nozzle diameter is based on the customer's requirements. The local Johnson Controls Sales office can provide information on the sizes of the nozzles, the DWP of the vessel and whether or not the unit will have flanges, if not known.

GENERATOR NOZZLE CONNECTIONS

Refer to the following tables for the unit's generator DWP and nozzle connections. The standard is always supplied unless a special option is ordered from the factory.

TABLE 2 - HOT WATER UNITS SHIPPED TO USA, EUROPE AND THE REST OF THE WORLD

GENERATOR SECTION DWP	
Standard	150 psig (10 Bar)
Option	300 psig (21 Bar)
GENERATOR CONNECTIONS	
Standard	Pipe stub w/Victaulic groove
Option	ANSI, RF Flanges

TABLE 3 - HOT WATER UNITS SHIPPED TO GERMANY

GENERATOR SECTION DWP	
Standard	150 psig (10 Bar)
Option	300 psig (21 Bar)
GENERATOR CONNECTIONS	
Standard	Pipe stub w/Victaulic groove
Option	N/A

TABLE 4 - STEAM UNITS SHIPPED TO USA, EUROPE AND THE REST OF THE WORLD

GENERATOR SECTION DWP	
Standard	150 psig (10 Bar)
Option	N/A
GENERATOR CONNECTIONS	
Standard	150 psi ANSI, RF Flanges
Option	N/A

TABLE 5 - STEAM UNITS SHIPPED TO GERMANY

GENERATOR SECTION DWP	
Standard	150 psig (10 Bar)
Option	N/A
GENERATOR CONNECTIONS	
Standard	Pipe stub w/Victaulic groove
Option	N/A

For Hot water units shipped to USA, Europe and the rest of the world. The supplied flange rating will be in accordance with the vessel DWP. Others must obtain all gaskets required for completing flange connections.

When connecting the piping to the unit nozzles take note to which nozzle is the inlet and which is the outlet. Factory supplied labels will identify all unit nozzles. First the tower water return line must be piped into the absorber nozzle. The tower water supply line will come off the condenser outlet nozzle.

All water piping MUST be adequately supported and braced independent of the unit. Excessive nozzle strain will cause gasket failure and leakage.

5

All unit system piping must be arranged with offsets for flexibility and movement. All piping must be fabricated so that water box removal can be facilitated easily. Installing a set of flanges close to the water box nozzles may do this. All piping must be adequately supported and braced independently of the unit to avoid strain on the unit and vibration transmission. Hangers must allow for alignment of pipe. Isolators (supplied by others, if required) in the piping are not necessary but may be desirable in some cases.

PIPING COMPONENTS

Wells For Sensors

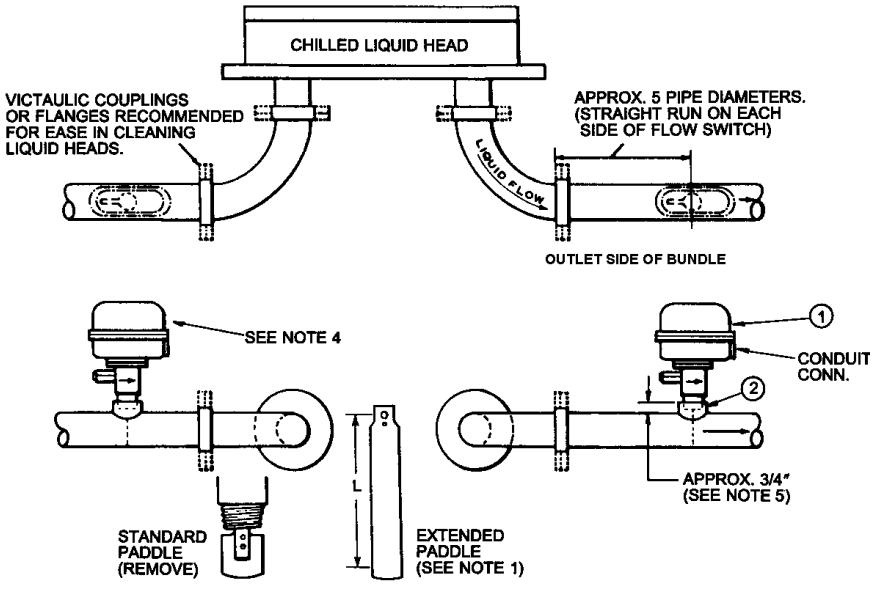
Various temperature and pressure sensors are required for building and tower water circuits. Please make sure both the supply and return lines to the unit have these connections installed. Seek the advice of the systems piping engineer if uncertain about the proper location or sizing of these wells.

Chilled Water Flow Switch

A chilled water flow switch is supplied as a ship loose item from the factory. This devise can be found among the unit's shipped loose parts. It is recommended that the flow switch be installed in the leaving chilled water line (as depicted in the following figure). Johnson Controls highly recommends the mounting of this switch in a horizontal length of pipe with the switch in a vertical position. It is NOT recommended to mount the flow switch in a vertical pipe with an upward flow due to the fact that minimum flow may not be substantial enough to lift the switches paddle. Please see the following figure for additional assembly and installation guidelines of this device.

Tower Water (Condenser) Flow Switch

This switch may or may not be supplied by the factory but it is required for proper unit operation. If the YORK Factory supplies it, it will be found within the unit's shipped loose parts container. Please follow the same assembly and installation guidelines for this device as you did the chilled water flow switch.



ITEM	DESCRIPTION
1	Switch, Flow Control
2	Coupling, Pipe, 1" x 1" Lg.
3	Compound, Heat Conductive

NOTES:

1. Adjust the Flow Switch Paddle to the size of the pipe in which it is to be used. Trim extended paddle to the "L" dimension as follows:

DIAMETER OF PIPE (INCHES)	"L" DIMENSION (INCHES)
5	4-5/8
6	5-5/8
8 AND LARGER	FULL PADDLE

2. The Flow Switch is to be installed and upright, as shown.
3. Screw the Flow Switch in position so that the paddle is at a right angle to the liquid flow. (Arrow mark on side of casting must point in same direction as liquid flow.)
4. The Flow Switch must be installed in outlet flow connection of the bundle.
5. Before installing Item (2), make sure it is 1 inch long maximum.

LD09813

FIGURE 12 - INSTALLATION OF FLOW SWITCH

Differential Pressure Control

Differential pressure control may be substituted in the place of a flow switch. Johnson Controls has options for this type of control if the device is not purchased locally. Differential control serves the same function as a flow switch – to ensure that flow is established for chiller operation. This is accomplished by determining a difference between two sample points in the chiller's water piping, usually near the inlet and outlet of a heat exchanger bundle. It is very important that the pressure differential switch be installed as close to the heat exchanger bundle as possible so that only the pressure difference across the bundle is sensed. Do not put the pressure differential switch across the suction and discharge of a heat exchanger pump. Doing so may not absolutely ensure flow across the chiller bundle due to other piping valves that could be closed.

Another important aspect to remember when using a pressure differential switch is to ensure both the sample points are on the same elevation with each other. If one connection to the control is higher than the other, static pressure becomes a factor in reading total differential across the switch. In this condition, the control could possibly read a difference in pressure even when no flow is present.

Strainers

Permanent strainers (supplied by others) are required in both the tower water and chilled water circuits to protect the chiller water bundles and controls. The strainer should be a #10 mesh and be installed in the entering water piping line, directly upstream of the chiller. Water piping circuits should be arranged so that the pumps discharge to maintain essentially constant chilled and tower water flows through the unit at all load conditions. If pumps discharge through the chiller, the strainer may be located upstream from the pumps to protect both pump and chiller. If pumps are remotely installed from chiller, strainers should be located directly upstream of the chiller.

Unit Crossover Line

The crossover line is a unit-mounted line that is the same diameter as the tower water (condenser) water lines. It serves the purpose of transferring the tower water from the outlet of the absorber bundle to the inlet of the condenser bundle. THIS LINE IS ALWAYS FIELD FABRICATED. Others must obtain all fabrication materials. In some rare cases, the factory can supply this line but it must be ordered as a special at the time when the chiller is ordered.

Johnson Controls recommends the following for fabrication of the Unit Crossover line:

1. The arrangement of this line must be made so that easy access to the bundle tubes can be accomplished. For every time the Absorber/Condenser tube bundle gets cleaned, this line must be removed.
2. The crossover line should be positioned so that the evaporator water boxes can be removed without removal of this line. This may not be possible in some cases.
3. **The crossover line must be fabricated so that the pressure drop across the line is kept to an absolute minimum!** The average pressure drop should be 1 psi or less. The following tips are suggested to accomplish this:
    a. Use butt-welded connections. Do not use Victaulic connections other than at the unit nozzles.
    b. If the absorber and condenser nozzles are not the same size, use a gradual reducer. Do not go from one diameter size to another abruptly!
    c. Use long radius elbows if possible.
    d. Make the line as short as possible.
    e. Do not use back-up welding rings.
    f. Use the couplings on the absorber outlet box and condenser inlet box to check the pressure drop across the line.

The design working pressure rating on the crossover line must be the same pressure rating as the remainder of the tower water system piping.

Tower Water (Condenser) Bypass Valve

This valve is sometimes referred to as a three-way mixing valve. This valve is not a requirement, due to the fact that YORK YIA units are capable of operating with entering tower water temperatures down to 45°F (7.2°C). However, Johnson Controls recommends installing this valve if efficient chiller operation is desired. See Detail "A" on *Figure 13 on page 28* for piping.

The valve functions to keep a constant tower water temperature to the absorption unit. It does this by monitoring the tower water temperature just before entering the unit via an attached temperature sensor. The valve, located upstream, will open or close to allow warmer

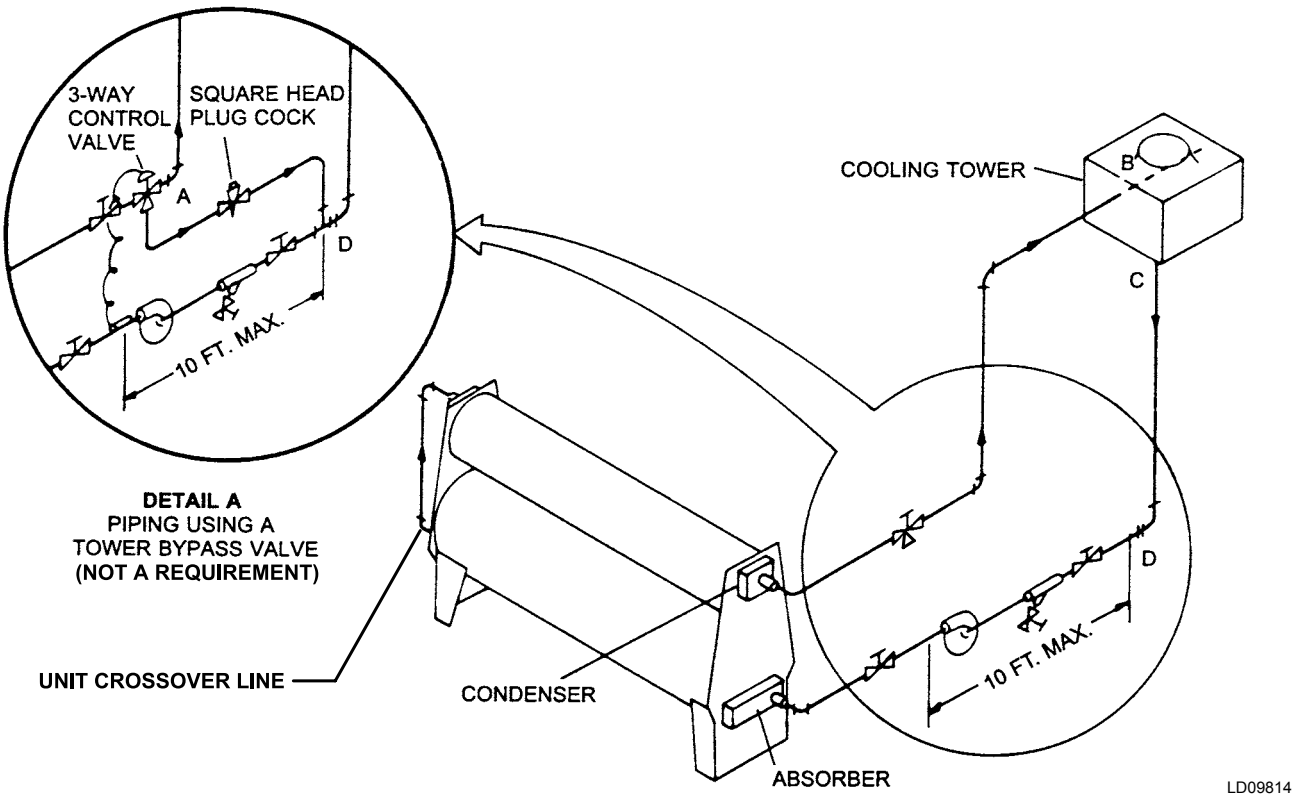


FIGURE 13 - INSTALLATION OF FLOW SWITCH

leaving tower water to mix with the colder entering tower water to maintain a constant temperature.

COMPLETING THE PIPING

Upon completion of the piping, a connection in each line as close to the unit as possible should be opened, by removing the flange bolts or coupling and check for piping alignment. If any of the bolts are bound in their holes, or if the connection springs out of alignment, the misalignment must be corrected by properly supporting the piping or by applying heat to the anneal the pipe.

NOTE

If piping is annealed to relieve stress, the inside of the pipe must be cleaned of scale before it is finally bolted in place.

Foreign objects that could lodge in, or block flow through the chiller's tubes must be cleaned or flushed before being connected to the chiller pumps, or other equipment. Furthermore, when flushing the water piping, **DO NOT flush through the chiller tubes.** Make sure the chiller is out of the circuit when doing this operation. Otherwise, dirt, small particles and fabrication debris may become lodged in the chiller bundles.

WARNING

All chiller water piping must be properly cleaned and flushed before putting the unit into service!

Johnson Controls will not be held responsible for failures or damages of any kind to the chiller or the piping due to construction debris in the chiller tubes and unit piping.

SYSTEM PUMP CONTROL

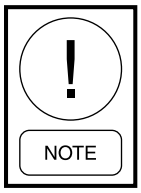
Since absorption chillers require a dilution cycle of an unpredictable amount of time, it is important that the unit's control panel control the operation of the chilled water and Absorber/Condenser water pumps.

Johnson Controls's prescribed method to employ pump control is to hardwire the pump starter control circuit through the appropriate contacts on the relay board.

Should a customer insist on using another device such as an Energy Management System (EMS) to control the pumps, that device must turn on and off as a result of this direct interface with the contacts on the relay board.

If there is a desire to interface the pumps with some device other than the unit control panel, that device must receive its instructions from the control panel and not from the EMS.

As a minimum, the customer must monitor the dry contacts in the unit's control panel and control his pumps in response to these contacts opening and closing.



Johnson Controls will not be responsible for any costs associated with equipment problems, failures or damage due to Johnson Controls not controlling the system pumps.

Failure to adhere to the instructions given in this section could result in evaporator tube freeze-up and unit crystallization.

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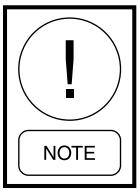
SECTION 6 - RUPTURE DISK AND RELIEF PIPING

RUPTURE DISK AND RELIEF PIPING



The ANSI/ASHRAE 15-2001 safety standard code was recently revised to include absorption chiller relief devices. Please read and follow these instructions closely to ensure the chiller installation is compliant to the revised code.

Both the steam and hot water YORK YIA units are fitted with an ANSI/ASHRAE 15-2001 safety standard code compliant pressure relief device. For YORK YIA units, this device is a metallic, one time use, rupture disk burst rated at 7.0 PSIG, +/- 2.0 PSI (48.2 kPa, +/- 13.8 kPa).

The rupture disk will protect the chiller's integrity should there ever be a tube rupture or in the very unlikely event that the unit's refrigerant vapor pressure gets too high. Unlike vapor compression cooling machines that relieve refrigerant vapor, if the rupture disk bursts, absorption machines could expel a vapor and a liquid.

Liquid coming out of the rupture disk could be in excess of 200°F (93.3°C)!

The metallic disk is mounted at the factory between two special flanges. The flanges have a knife-edge that perforates a special flange on the disk to create an airtight seal. **Do not loosen the bolts around the flange or remove the disk from the holder. If the disk is removed for any reason, it must be replaced with a new one!** The outer flange of the disk holder has a plastic pipe stub supplied by the factory for shipping purposes. THE PLASTIC STUB MUST BE REMOVED! Refer to *Figure 14 on page 31*.

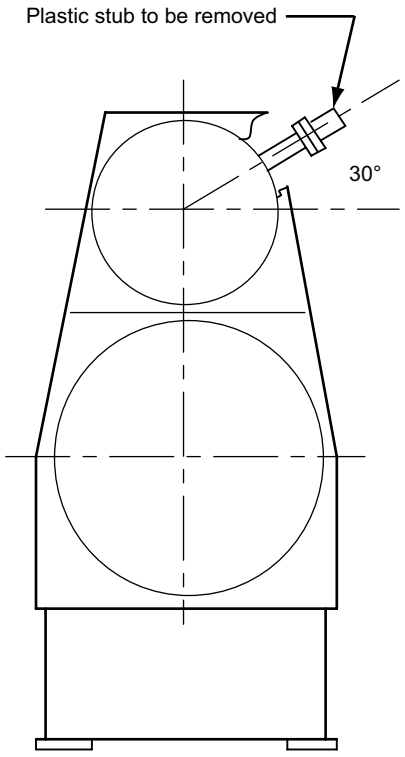


FIGURE 14 - PLASTIC PIPE STUB

Rupture Disk Discharge Piping Material

ANSI/ASHRAE 15-2001 calls for the relief piping material to be compatible with the refrigerant in the system. The refrigerant is De-ionized water that could exceed 200°F (93.3°C) in some cases. Johnson Controls recommends using schedule 40 steel pipe for the rupture disk discharge line material.

Rupture Disk Discharge Piping Construction

For the piping material, Johnson Controls recommends carbon steel. The relief piping must be fabricated and constructed in accordance with piping best practices. Follow any local codes (if applicable) governing the rupture disk discharge relief piping. Due to the high temperatures of an absorption unit during operation, and the expansion and contraction associated with this, the rupture disk vent piping must have a flexible connection between the rupture disk outlet and the relief piping. The installing contractor must supply the flexible connection and the relief piping.

Piping supports must be spaced according to the pipe material, size and temperature. **At no time should there be any weight or moment arm forces imposed on the flanges of the rupture disk!**

Rupture Disk Discharge Piping Sizing

The sizing of the rupture disk discharge piping must not be less than the rupture disk diameter. Where two or more relief devices are connected to a common line or header the effect of backpressure that will be developed when more than one relief device operates shall be considered. The sizing of the discharge line for above condition must be based on the sum of each rupture disk outlet area in addition to the pressure drop allowance through the outlet piping. Please see the appropriate table in this section for the rupture disk outlet areas.

Rupture Disk Discharge Piping Lengths

The maximum length of the discharge piping installed on the outlet side of the rupture disk discharging to the atmosphere must not exceed the equivalent length valve column in the following table.

LD09819

FIGURE 15 - RUPTURE DISK FROM FACTORY

TABLE 6 - MAXIMUM DISCHARGE PIPING LENGTH FOR SCHEDULE 40 STEEL PIPE

DISK SIZE	**CAPACITY** Lbs air/min	**P** Psi.	**NPS** In	**ID** In	**F**	**DISK AREA** sq. in.	**L *** Ft.
UNIT MODELS 1A1 THROUGH 4B4							
1-1/2	24.55	7.0	1-1/2	1.610	0.0202	1.623	19.12
1-1/2	24.55	7.0	2	2.067	0.019	1.623	77.55
1-1/2	24.55	7.0	2-1/2	2.469	0.0182	1.623	201.86
1-1/2	24.55	7.0	3	3.068	0.0173	1.623	637.89
UNIT MODELS 4C1 THROUGH 10E3							
2	47.50	7.0	2	2.067	0.019	3.140	17.88
2	47.50	7.0	2-1/2	2.469	0.0182	3.140	50.38
2	47.50	7.0	3	3.068	0.0173	3.140	165.77
2	47.50	7.0	4	4.026	0.0163	3.140	701.91
UNIT MODELS 12F1 THROUGH 14F3							
3	106.95	7.0	3	3.068	0.0173	7.070	27.63
3	106.95	7.0	4	4.026	0.0163	7.070	131.40
3	106.95	7.0	5	5.047	0.0155	7.070	444.83
3	106.95	7.0	6	6.065	0.0149	7.070	1175.38

NOTES:
1. Length calculation per ANSI/ASHRAE 15-2001, Appendix H

Rupture Disk Discharge Piping Arrangement and Location

ANSI/ASHRAE 15-2001 specifies the discharge piping shall discharge to the atmosphere at a location not less than 15 ft above the adjoining ground level and not less than 20 ft from any window, ventilation opening, or exit in any building.

The section of discharge piping that will see a liquid should never be at an elevation higher than the unit. Doing so will impose an undesirable static head backpressure, which the unit must first overcome before relieving the internal pressure within the unit.

Description Of Figure 16

Depending on the situation of a rupture disk bursting, a vapor, liquid or both may be expelled out of the unit. If a vapor is expelled, it will travel up and out of the discharge line. If a liquid expels out of the unit, it will flow into a holding tank that is sized to hold the complete unit's refrigerant charge. If more liquid comes out of unit than what the tank can hold, an overflow pipe located near the top of the tank will expel liquid to a floor drain.

There may be restrictions for discharging certain types of liquids into floor drains. Check with your local water treatment company or sewer authority for possible restrictions in your area.

TABLE 7 - APPROXIMATE STORAGE/HOLDING TANK SIZES

UNIT FAMILY	APPROX TANK SIZE GALLONS (LITERS)
A	50 (190)
B	70 (265)
C	90 (341)
D	125 (473)
E	200 (757)
F	230 (871)

6

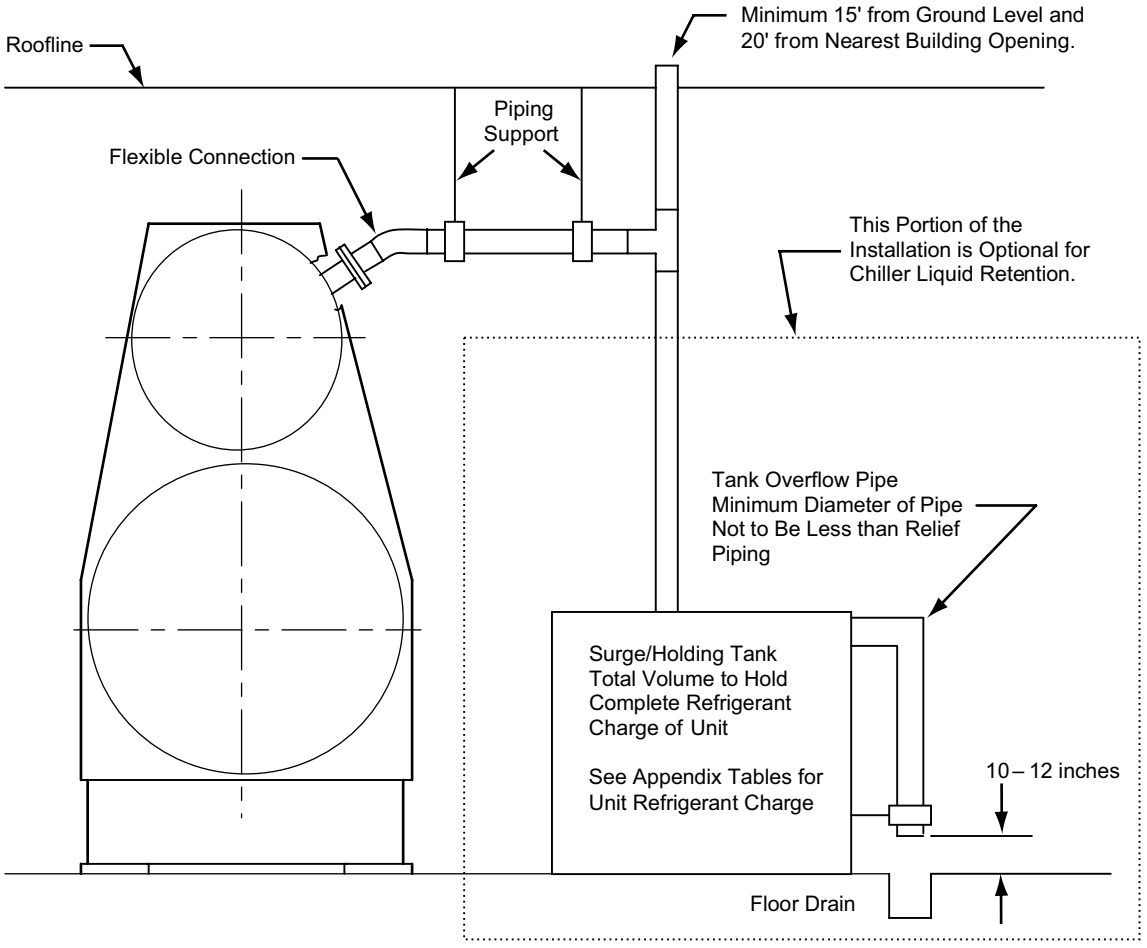


FIGURE 16 - RUPTURE DISK DISCHARGE PIPING ARRANGEMENT

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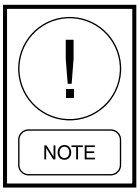
SECTION 7 - INLET STEAM PIPING

INLET STEAM PIPING

YORK Steam fired YIA absorption units are designed for a maximum generator inlet steam pressure of 150 PSIG DWP, (1.5 bar G if PED code is specified), and a maximum steam temperature of 337°F (169°C). The generator tubeside will be ASME coded unless otherwise indicated on the factory order submittal.

Since generator nozzle connections can vary, refer to *SECTION 5 - UNIT WATER PIPING* to determine which type of connection is supplied on your unit.



Steam piping should be designed in accordance with good engineering practice. All field installed steam piping must be in accordance with all local, state, or federal codes that may apply.

The steam inlet piping support system must be capable to adequately support the full weight of all piping and components independent of the unit. The support system must account for the expansion and contraction of the steam piping. **No imposing forces or strains are to be on the generator inlet nozzle.**

All piping must be fabricated so that water box removal can be facilitated easily. If your unit's generator nozzles are not supplied with flanges from the factory, a set of flanges installed in the steam piping close to the generator inlet will satisfy this requirement.

INLET STEAM CONDITIONS

Pressure

The main steam supply may be either low-pressure steam or high-pressure steam that is reduced to a low pressure via a pressure reducing station or other process. The preferred steam quality is dry and saturated (D and S) with minimal superheat. The generator is designed for latent heat transfer, increasing the sensible heat by allowing higher steam temperatures will provide little, if any, performance improvement. Since steam saturation pressure corresponds to a specific temperature, YORK YIA chiller's available capacity will vary greatly with the steam pressure at the inlet to the generator. Steam pressure into the inlet nozzle of the generator should not exceed 14.0 PSIG (1.0 bar). Steam supply pressure upstream of the unit control valve must not exceed 16.0 PSIG (2.1 bar). This will allow for a typical pressure drop through the control valve of 2.0 psi (13.8 kPa). All pipe design and fabrication must be done so the pressure drop is kept to a minimum.

Generator operating pressure may not exceed the specified unit operating pressure. Under no circumstances may the chiller operate with steam pressure exceeding 14.0 psig (1.0 barG)! Doing so will over fire the unit and cause operational problems as well as shorten the unit's longevity!

Flow

Steam flow is equally important as steam pressure. Flow is usually measured in pounds per hour (lb/hr) or (liters/min). Each YORK YIA chiller is rated at a specific steam flow and pressure at time of unit selection. It is very important that these values are maintained throughout the operational lifetime of the unit. **Not adhering to this specification will drastically affect the performance and longevity of the chiller.**

Consideration should be given to the steam flow velocity, especially in applications where noise will be a factor. Generally speaking, steam velocities up to 6,000 fpm (30 m/s) will not produce an objectionable noise level.

Steam Purity

It is the responsibility of the customer to engage the services of an experienced and reputable steam / condensate treatment specialist to constantly maintain the purity. Improperly treated or maintained steam / condensate will result in decreased efficiency, high operation costs and premature tube failure due to steam / condensate side corrosion.

Steam/condensate samples should be collected and analyzed on at least a monthly basis by the treatment specialist. A quarterly review with the treatment supplier should address the conditions of the steam systems and develop action plans based on these analysis. A third party consulting company can help oversee the treatment programs in order to properly protect the physical plant and avoid costly downtime.

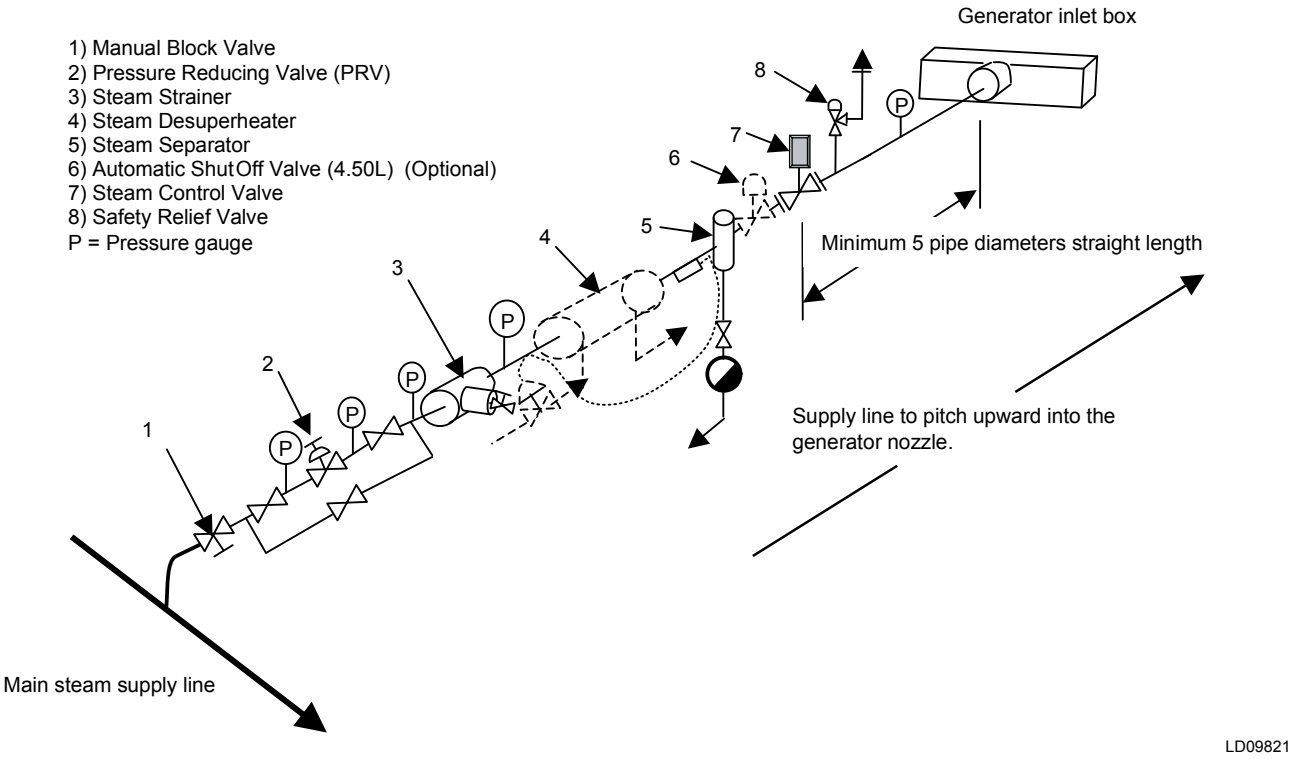


FIGURE 17 - STEAM PIPING ARRANGEMENT

It is equally important that the customer of the equipment perform an inspection of the generator tubes at the frequencies recommended in the preventive maintenance schedule located in Form 155.16-OM1. In addition to periodic cleaning with tube brushes, tubes must be inspected for wear and corrosion. Tube failures usually occur due to corrosion, erosion, and fatigue due to thermal stress. Eddy current analysis and visual inspection by boroscope of all tubes are invaluable preventative maintenance methods. These provide a quick method of determining waterside / steam generator tube condition at a reasonable cost.

STEAM PIPING ARRANGEMENT

Refer to *Figure 17 on page 36* for the proceeding discussion and correct placement of the steam inlet components.

Steam piping mains, condensate pipes and the steam line to the unit must be properly sized in accordance with the required unit full load steam flow rate and acceptable pressure drops. The steam inlet piping should avoid sharp curves and abrupt piping size changes. Whenever possible, the steam supply line to the unit should be taken off the main steam supply line from the topside to minimize the possibility of condensate carry-over into the unit. Both steam supply and condensate pipes must be properly sized and pitched to prevent liquid hammering. Johnson Controls recommends a straight length of pipe approximately 5 to 10 pipe diameters long just before the steam enters the generator.

INLET PIPING COMPONENTS

Manual Block Valve

The Manual Block Valve is required to manually shut off steam supply to all devices downstream for serviceability (refer to *Figure 17 on page 36*). This valve is often closed during prolonged chiller shutdown periods to prevent steam flow into the generator bundle. A tap may be installed just downstream of this valve to allow for draining the condensate from the steam line. The Manual Block Valve must be bubble tight to ensure no leakage of steam.

Pressure Reducing Valve (PRV) (If Applicable)

The pressure-reducing valve reduces high-pressure steam to a lower pressure. A pressure reducing station will also act to help steady fluctuating steam pressures. As a general rule of thumb, if the steam pressure fluc-

tuates more than 5 lbs (1.3 bar A) it is recommended to incorporate a pressure reducing station. When selecting a pressure-reducing valve, it should be sized on the basis of the pressure drop at the unit's full load design steam conditions. **Do not size this valve based solely on the pipe size.** The valve must be suitable for dead-end service.

The pressure-reducing valve should be provided with stop valves and pressure gauges on both the inlet and outlet sides of the valve. A full size bypass with a globe valve will permit manual operation during maintenance periods.

Two pressure reducing valves; one large and one small, piped in parallel may be desirable for those applications with continued operation at low loads or where highly variable upstream pressures exist. The smaller valve would be set at a slightly higher pressure than the large valve so it will stay open at low flow rates while the larger valve closes, thus protecting the seat of the larger valve. The use of a two-step steam pressure reduction method may be desirable on applications with pressure differentials in excess of 100 psig (8.0 bar A). Furthermore, the noise generation in a single step pressure reduction system may be objectionable.

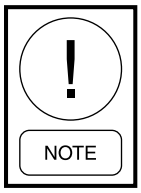
Steam Strainer

A fine mesh steam strainer (#50 mesh) is used to capture any impurities in the steam supply line. These impurities may manifest themselves in the form of dirt, rust, or precipitates. This strainer will prevent the chiller system components form getting plugged. Plugged components will reduce system capacity and increase maintenance costs. A pressure gauge must be installed just before and after the steam strainer. If the pressure drop as read from these two gauges increases to an unacceptable level, the steam strainer should be removed and cleaned.

Steam Desuperheater (If Applicable)

Latent heat at saturation temperature is much larger than the sensible heat that is extracted when superheated steam cools down. Therefore, superheated steam has little benefit to the absorption process. For this reason superheated steam should be kept to a minimum.

In some applications, high-pressure steam expanding through a pressure-reducing valve can be at an undesirable high temperature, which is not recommended for use in the absorption process. In these cases a desuperheater must be incorporated to reduce the steam temperature before entering the unit.



Damage to the unit and/or chiller warranty will be VOID if the steam temperature exceeds Johnson Controls specified recommendations.

The desuperheater must be located downstream of the pressure reducing valve, if one is utilized. The flow of coolant to the desuperheater should be automatically controlled to maintain a constant steam supply temperature to the absorption unit within the design limits specified. Suitable automatic means should be provided to remove any condensate that may accumulate within the desuperheater. This task could also be accomplished by a steam separator located downstream of the desuperheater. Care should be taken to ensure that the desuperheater is installed according to the manufacturer's recommendations.

Steam Separator

All YORK YIA absorption chillers must operate with only dry steam entering the generator section. Wet steam will lessen the heating content of the steam, which in turn will affect unit performance. Wet steam may also cause excess tube erosion or water hammer. Both of these conditions could be detrimental to generator tubes or steam piping components. If dry stream can be supplied to the chiller with minimal superheat, it may not be necessary to install a steam separator. In cases where a desuperheater is utilized and the desuperheater does not automatically remove liquid condensate, a steam separator must be installed.

The steam separator is installed in the steam supply line downstream of the desuperheater. It is used to separate any liquid present in the steam after leaving the desuperheater and before entering the unit. All trapped condensate liquid should normally be piped through a steam trap before going back to the condensate tank. The steam trap will prevent any steam from blowing through the separator into the condensate return system. The use of a steam separator and trap will ensure only dry steam to enter the unit at all times

Automatic Shut-Off Valve (4SOL)

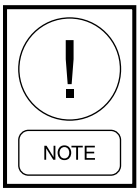
(If Applicable)

This valve may not be necessary for all YORK YIA units. It is only recommended if the unit is steam-fired and **DOES NOT** have a spring-return, fail-closed control valve .

If a power failure occurs, a non-spring return unit control valve will remain in whatever position it happened to be in at the time of the power failure. However, at the same time the automatic shut-off valve will close due to the power loss. Since the steam boiler will emit steam for an undetermined period of time. This valve will prevent the steam from entering the unit, protecting it from crystallization during this period. Please see the note in this section for more info.

As stated above, this valve is recommended by Johnson Controls to help protect the unit from crystallization. It is under the discretion of the customer or his representative to supply and install this valve. The valve type is not critical as long as it meets the following.

The Valve's size is usually the same size as the steam inlet line; however, sizing determination must be based upon the steam system design, application and condition. Valve wiring will originate in unit-mounted junction box 3, (JB3) terminals 2 and 5. The coil should be 120 volts, 60 Hz, a transient suppressor must be wired in parallel with the coil. Maximum allowable current draw is 1 amp holding, 10 amps inrush. Please see wiring Form 155.16-W4 for more details on the wiring and voltage. The valve must be a NC, bubble-tight (100% tight shut off), **designed to keep the pressure drop through the valve to a minimum.** The valve's closing time should not exceed 2 minutes.



The Automatic Shut-off valve offers the lowest form of protection from crystallization in the event of a short interval of power loss. It will not protect the unit from crystallization during long extended periods of power loss.

Steam Control Valve

This valve is selected and supplied by the YORK Factory unless otherwise specified on the chiller order. If not supplied by YORK Factory others must supply the control valve. If this is the case, **the YORK Factory will not be responsible for the valve or consequential equipment damage if not supplied by the YORK Factory.** If supplied by the factory, it will be found among the unit's ship loose parts. The control valve assembly consists of a valve, positioner and actuator. A separate set of installation and operation instructions will be packaged along with each valve from the valve's original manufacturer. Please make sure these instructions are kept safe for future use. All personnel involved in the installation of the control valve must read and understand the safety and installation instructions.

The valve controls the steam flow into the unit and is wired to unit-mounted junction box 3, (JB3). The micropanel will throttle the valve open or closed based upon the customers cooling load demands and/or built-in unit safety controls. All YORK supplied steam valves are two-way valves of either the cage or butterfly design. Cage valves have a fail-safe, spring-return feature included within the actuator. If loss of power is experienced the valve will fail-closed. The YORK supplied butterfly type control valves **DO NOT** have the fail-safe, spring-return closed feature. Please see the previous discussion under "Automatic shut-off valve" for these installations.

DO NOT under any circumstances remove the factory-sealed screws on the type 3274 actuator case cover. Opening this cover will render the valve assembly inoperative!

Steam Control Valve Installation

The valve will mount between flanges that are to be supplied by others. Please note the valve body size and pressure rating before selecting the mounting flanges. Also note the flow direction arrow as indicated on the valve body before inserting between the flanges. The valve assembly must be installed in a location where ambient temperatures are between 0 to +140 deg F (-20 to +60 deg C). If high temperature fluctuations or high humidity will be a factor, it is suggested that a heating resistor be fitted to prevent the buildup of condensation within the actuator enclosure.

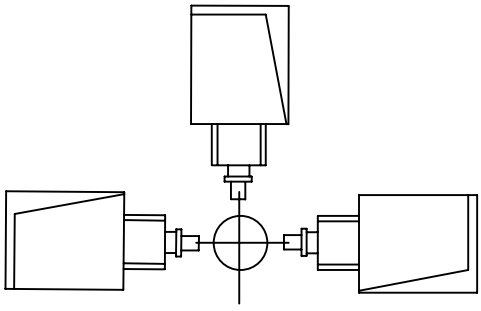
Steam Control Valve Wiring

Johnson Controls supplies the control signal wiring to the valve, however Johnson Controls DOES NOT supply the power wiring to the control valve. For the power wiring, Johnson Controls recommends the following: #18 AWG, AWG dia 0.049, UL or CSA (nom) 1620 with 16 strands, 600 volt rating, AWM/UL style 1015. Insulation with minimum temp rating 105 deg C, nominal thickness 2/64, color white for the wire #2 because it will be the neutral and black for the other wires. These wires should be routed using 1/2" (12.7 mm) metallic flexible conduit and appropriate fittings at each end. The length is determined by how far the control valve is mounted from the JB3 terminal box, which is mounted on the right side of the unit.

Steam Control Valve Orientation and Placement

The normal arrangement for all actuated control valves is to install the valve in a horizontal line with the actuator vertical above the valve. Other positions may result in uneven valve plug and cage wear and improper operation. If the actuator is not completely vertical, it may require additional support to keep the weight off the valve body. Never install the control valve actuator where condensate could drip or flow into it. **It is NOT RECOMMENDED to mount the control valve in a vertical line.**

Johnson Controls recommends that the Steam Control Valve not be installed more than 10 feet (3 meters) away from the generator inlet nozzle. Pressure drops may result from greater installation distances. Refer to *Figure 22 on page 43* thru *Figure 26 on page 49* for the 3274 or PSQ Actuator orientation to the steam line.



No installation is permitted where actuator is beneath the centerline of the steam line or where condensate could drip or flow into actuator.

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FIGURE 18 - 3274 ACTUATOR ORIENTATION

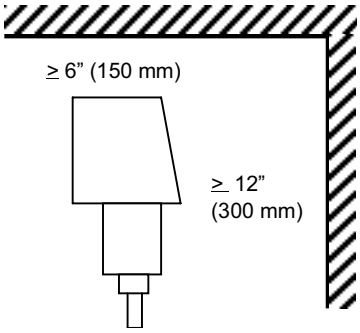

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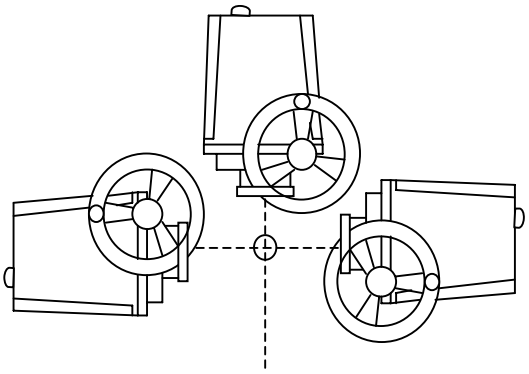
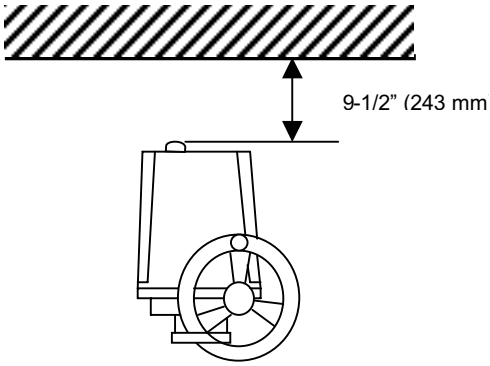
FIGURE 19 - 3274 ACTUATOR INSTALLATION CLEARANCES



No installation is permitted where actuator is beneath the centerline of the steam line or where condensate could drip or flow down into actuator. Do not mount actuator so that it's cover points downwards.

LD09824

FIGURE 20 - PSQ ACTUATOR ORIENTATION



LD09825

FIGURE 21 - PSQ ACTUATOR INSTALLATION CLEARANCES

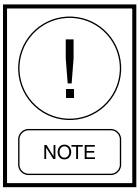
Safety Relief Valve (Supplied by Others)

A safety relief valve must be mounted between the unit's control valve and the generator inlet steam connection. The purpose of the relief valve is to ensure high-pressure steam does not enter the generator tubes.

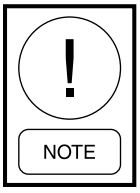
The valve must be a rapid opening, self-closing valve, sized and designed for the specified pressure, temperature and flow of steam into the unit. **This valve must not be used to control steam pressure into the unit.**

The relief valve MUST NOT; UNDER ANY CIRCUMSTANCES be set for pressures higher than 15.0 psig (2.047 bar A). Although the set pressure should be high enough to allow the valve to remain closed during normal chiller operation. Follow the valve's manufacture's recommendations and all applicable codes for installing and venting the safety relief valve.

Even though the generator tubes are designed for a higher pressure, the saturation temperature of steam at 15.0 psig (205 kPa) is appropriate for proper chiller operation. Exceeding this pressure, large amounts of superheat or greater flow than design could cause the unit to overfire. This in turn could result in inefficient operation, unit failure or damage to the unit.



Damage to the unit and/or chiller warranty will be VOID if the steam design conditions are not adhered to during chiller operation.



A relief valve is not required if there is a properly sized relief valve on the boiler of a low-pressure steam system.

SECTION 8 - STEAM CONDENSATE RETURN SYSTEM

STEAM CONDENSATE RETURN SYSTEM

The following descriptions of the basic types and approaches used in condensate return systems.

This section does not describe the fine details of the proper condensate system design. Because of the large number of variables, an experienced individual knowledge in steam piping systems, fluid flow and all code requirements must address this on an application specific basis.

The chiller's steam condensate return system is designed for the purpose of removing condensate from the absorption unit's generator and returning it to the boiler. An Inefficient or poorly designed condensate return system could interfere with steam flow through the unit causing poor chiller capacity and damage to the unit.

Before a discussion of condensate return systems, it would be beneficial to the reader to have a general understanding of the YORK single-stage absorption unit operating requirements and characteristics.

The absorption chiller will operate at full load steam pressure in the 9 to 12 PSIG (62 to 88 kPa) range, down to pressures well into the vacuum region at part loads. As the cooling load decreases, the micropanel will throttle the steam control valve closed, hence reducing the steam flow and pressure into the generator section of the unit. At some part load point, say 50% for illustration, the steam pressure will be at or near 0 PSIG, in other words, atmospheric pressure. With further reduction in load, the steam valve will continue to close, resulting in generator steam pressures traveling below atmospheric pressure. If the condensate return system were not designed for sub-atmospheric pressures, the steam flow through the unit would not flow smoothly thus resulting in inefficient and/or unstable unit operation.

Types of Condensate Systems

There three basic types of condensate return systems possible:

1. A complete atmospheric system.
2. An atmospheric/vacuum type system.
3. A system that operates in a total vacuum.

System (1)

(Refer to *Figure 22 on page 43*)

For an entirely atmospheric system, a vacuum breaker may be installed at the outlet of the generator. (See "Condensate Return System Components" in this section for a description of this device). A float and thermostatic type steam trap is used to minimize steam loss. Two traps piped in parallel will allow continuous unit operation during maintenance of the trap. A check valve installed downstream in the line will keep the condensate from back flowing during chiller shutdowns. In this system both the auxiliary condensate receiver (if needed) and the main condensate receiver, must be vented to atmospheric pressure. The auxiliary condensate receiver should be used on completely atmospheric systems when the main condensate receiver is located a far distance from the condensate outlet or above the condensate outlet. This type of system requires a float controlled pump to move condensate from the auxiliary receiver to the main condensate receiver in addition to the main condensate pump/boiler feed pump.

System (2)

(Refer to *Figure 23 on page 44*)

This system allows the chiller and steam traps to operate at atmospheric pressure, but the remainder of the condensate system, after the auxiliary condensate receiver, is under a vacuum. Since the condensate will be at atmospheric pressure when it leaves the chiller, a vacuum breaker can be installed on the generator outlet box. Two float and thermostatic type steam traps are piped in parallel, followed by a check valve. Up to this point, system 2 is exactly the same as System 1.

The auxiliary condensate receiver must be used in system number 2. The main condensate tank will no longer be vented to the atmosphere. A float control is still used in the auxiliary condensate receiver however; it controls a valve instead of a pump. The low pressure in the main tank will draw the condensate through another check valve installed between the two tanks when the valve is opened.

System (3)

(Refer to *Figure 24 on page 45*)

This system is designed for operating the chiller generator tube bundle while under a vacuum; even at the inlet to the generator bundle. This system works well when the incoming steam to the generator comes from the exhaust of a non-condensing type steam turbine (Turbo-Absorption).

By using a vacuum pump on the condensate return system, the entire system can run at a higher efficiency. This is because more latent energy can be extracted from the steam because it can be used well into the vacuum region. This becomes particularly true when the unit is operating at low loads with the steam valve throttled.

Since the condensate will be at sub-atmospheric pressure when it leaves the generator bundle, a vacuum breaker cannot be used. The float and thermostatic type steam traps and check valve are piped the same as in Systems 1 and 2.

After the condensate leaves the check valve the condensate liquid flows into a condensate cooler. The condensate cooler will ensure a 5 to 10°F (3.3 to 5.5°C) of subcooling to the condensate. A thermostatic valve sensing the condensate cooler outlet temperature while controlling the cooling medium flow does this. This is necessary to make sure that no flashing takes place with further pressure drop in the downstream condensate system. See the *Condensate Return System Components on page 42* for sizing the condensate cooler.

Any air trapped in the condensate system after leaving the check valve will slowly flow upward into the bellows-type, thermostatic steam trap. When the air reaches the trap it will be nearly the same temperature as the steam. However, as the air cools down the steam trap will open to expel the air.

Both the subcooled liquid coming out of the condensate cooler and the air coming out of the steam trap will converge into a common line downstream of these devices. The condensate/air will then continue to a condensate return tank/vacuum system where it will be collected so it can be returned back to the boiler.

CONDENSATE RETURN SYSTEM COMPONENTS

Refer to *APPENDIX A* in this document for shell and tube volumes for the various YORK model units. The following table will aid in the selection and sizing of various condensate components.

UNIT MODEL FAMILY	VALVE SIZE
A and B	2 inch
C, D, E and F	3 inch

Steam Condensate Drain Solenoid Valve

If the unit has a factory supplied, butterfly-type steam control valve. A condensate drain solenoid valve will be supplied by Johnson Controls and shipped loose for field installation. If the unit has a fail-safe, cage-type steam control valve or a UPS (Uninterrupted Power Supply) the unit does **NOT** require this valve.

The steam condensate drain solenoid valve is a NC solenoid valve that will close at unit shutdown or power loss to the unit. Its function is to stop heat input to the generator tube section via stopping condensate flow when the unit is shutdown. It is particularly beneficial in the event of a power outage to the unit.

The condensate drain solenoid valve offers the lowest form of protection from crystallization in the event of a power loss. **It will not protect the unit from crystallization during extended periods of power loss.**

Valve Installation and Wiring

This should be within 24 inches (0.6 m) of the generator condensate outlet box. The preferred valve orientation is horizontal however other positions are acceptable. Wiring for this valve is supplied by the factory and comes already prewired in the control panel. The remainder of the wiring will be coiled and ty-wrapped in the vicinity of the generator condensate outlet box. Locate electrical junction box (JB8) among the units ship loose parts. This box is directly connected to the valve's coil housing via a ridged conduit connection and lock nut, also supplied by YORK. Remove one MOV out of the cloth bag located in the unit's panel. Connect the MOV between wire #17 and white natural wire #2. JB8 houses the MOV and the remainder of the valves connections (refer to Form 155.16-W4). This valve will work in conjunction with the Automatic shut-off valve.

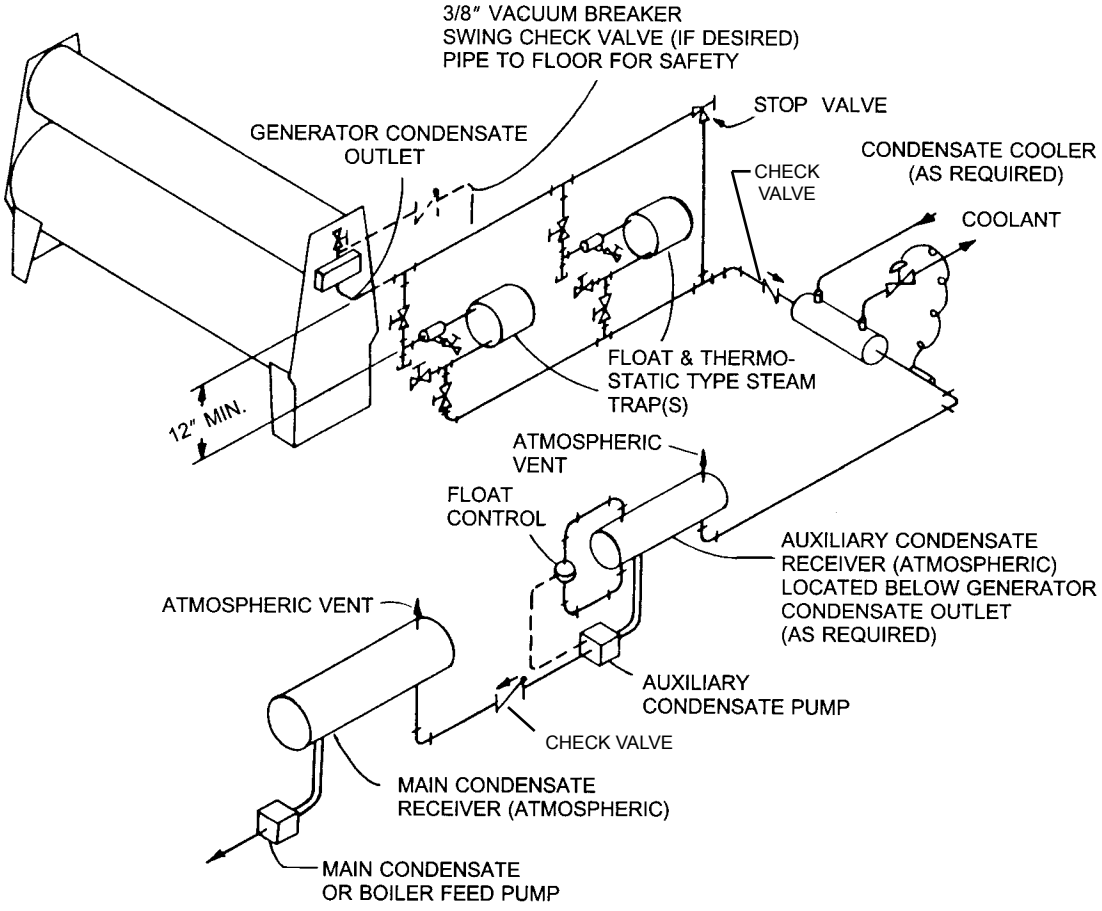


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FIGURE 22 - SYSTEM 1 - ATMOSPHERIC CONDENSATE RETURN SYSTEM

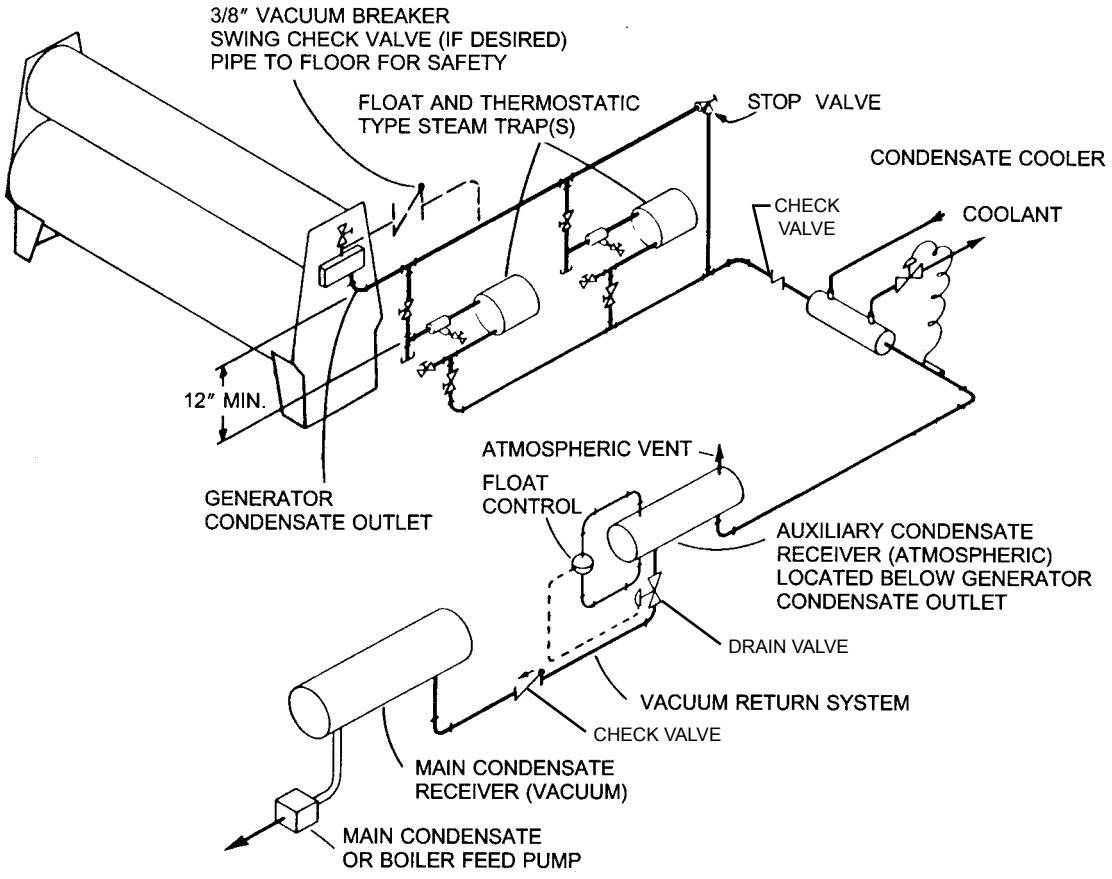

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FIGURE 23 - SYSTEM 2 - VACUUM CONDENSATE RETURN SYSTEM

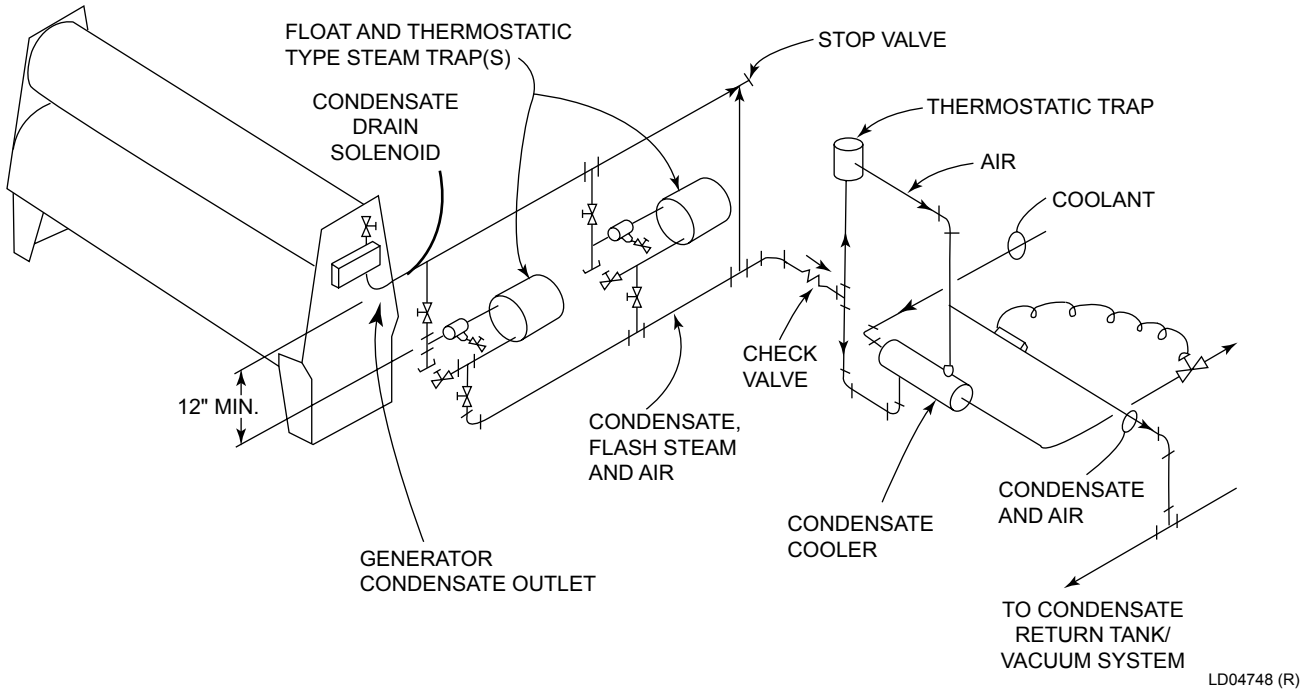


FIGURE 24 - SYSTEM 3 - VACUUM CONDENSATE RETURN SYSTEM WHEN INLET STEAM AND OUTLET CONDENSATE ARE UNDER VACUUM

8

Vacuum Breaker

A vacuum breaker may not always be necessary or desired. Its main function is to prevent condensate build-up and/or water hammer in the generator tube section of the chiller. This is especially so on condensate return system's that operate in atmospheric conditions. Basically, the vacuum breaker will provide a non-fluctuating flow rate of condensate leaving the generator hence; the steam flow into the generator will also be steady. The vacuum breaker does this by keeping the generator tubes from going into a sub-atmospheric condition by allowing air into the system.

CHILLER OPERATION AND THE FUNCTION OF THE VACUUM BREAKER

If the Condensate Return System 1 or 2 is employed, the generator tube bundle should always be above atmospheric pressure for proper operation. This may not always be the case especially at a part load condition. At part load, the steam valve will throttle the steam input to the chiller unit. This may cause the steam to collapse (or condensate) thus creating a vacuum condition due to the reduced volume in the generator tubes. At this condition, the condensate will start to backup into the generator tubes and impede steam flow. Consequently, the vacuum breaker will open to allow air into the steam system. By doing this, it will prevent a vacuum condition thus allowing proper flow. If no vacuum breaker were installed, the flow would temporary stop or slow down until the heat and pressure were able to build-up and overcome the vacuum. This condition should not hurt unit performance at part loads. However, the accumulation of condensate in the generator tubes and subsequent drainage could overload the main system condensate receiver if not over-sized accordingly to handle the fluctuation of condensate quantities.

The capacity of the condensate system receiver(s) is assumed to be equal to the absorption unit generator tube volume as a maximum. *See APPENDIX A for unit generator tube volumes.*

A vacuum breaker device should be selected and applied with discretion. If the condensate is to be used for other processes downstream of the chiller introduced air through the vacuum breaker maybe objectionable. Any air that enters the condensate return system, must be purged from the system.

Strainer(s)

A fine mesh strainer with a blow-off valve should be provided ahead of the steam traps(s). A stop valve should be installed upstream of the strainer for isolation.

Steam Traps

The latent heat in steam is a very effective and efficient means of providing heat to a building or process. The by-product of steam as it cools is condensate. If condensate were not drained from the devices and components that provide the process, they would soon fill with condensate and quit operating. A steam trap's main function is to remove condensate away from the steam vapor. Its second function is to move air and/or non-condensable gasses to the condensate system.

There are many types of steam traps available on the market today. However, no one type is "best" for all applications; each type of trap has its unique features and abilities. There are basically three groups of steam traps based on how the trap makes the distinction between condensate and steam; thermostatic, mechanical, and thermodynamic. The following descriptions cover two of the three groups this is recommended for the condensate system.

Float and Thermostatic Steam Trap

This type of steam trap incorporates two groups of steam traps in one: mechanical and thermostatic. A float located at the bottom of the trap rises with increased condensate level to open a valve. When steam enters the trap, the float drops, closing the valve. At the top of the trap is a thermostatic vent. This type of trap is essential if the condensate is to be used for other in plant operations where air in the condensate would be objectionable.

The float and thermostatic steam trap should be installed in accordance with the manufactures recommendations. A by-pass line with isolation valves before and after the steam trap will allow for maintenance of the trap without taking the chiller off line. The trap should be located below and as close to the generator's outlet as possible in a horizontal plane. A full size trap outlet line size connection and valve should be provided for blow-down and testing purposes.

Thermostatic Trap

This type of trap senses the temperature difference between steam and condensate by means of a bellows, flexible disk or bi-metal sensing element. For this to happen, the condensate must be slightly subcooled.

As steam enters the trap a sensing element heats up and expands, forcing the stem against the valve seat to keep the steam within the trap. As the steam cools, condensate is formed; which collects behind the seat. As the temperature lowers, the sensing element will contract and lift the stem off the valve seat to allow the condensate to exit.

Check Valve

A check valve installed in the condensate drain line will prevent any condensate or air from back flowing in the condensate system during reduced load conditions. **THIS IS A MUST FOR ALL CONDENSATE DRAIN SYSTEMS.** Please see the system diagrams for the location of the check valve.

Condensate Cooler

The condensate cooler is installed in drain system between the steam trap and condensate receiver. The purpose is to sub cool the condensate below its flash point. The usage of this device is especially important in vacuum drain systems (system #3) where flashing of the condensate liquid would be more likely to occur.

Variations in condensate flow must be recognized and the cooler selected to cool the maximum flow of condensate 5-10 deg F (3 – 6 deg C) below the saturation temperature of the lowest pressure in the system. Sufficient coolant must be provided to cool the maximum condensate flow to the desired temperature. Coolers may be air or evaporatively cooled, providing they can produce the desired leaving condensate temperature. Coolant flow could be manually set for maximum load and allowed to operate continuously at that level with no operation difficulties, but the poor economics of such an arrangement make automatic control preferable.

Auxiliary Condensate Receiver

An auxiliary condensate receiver must be used if the main condensate receiver is located above the chiller or a long distance from the chiller. An auxiliary condensate pump is used to send condensate from the auxiliary receiver to the main condensate receiver.

The auxiliary condensate receiver should be located at floor level as close to the absorption unit as possible. A check valve in the auxiliary condensate pump discharge line is recommended where condensate backflow may occur.

SECTION 9 - HOT WATER PIPING

HOT WATER PIPING

YORK Hot Water single-stage (YIA) absorption units are designed for a maximum generator inlet hot water temperature of 266°F (130°C) and a generator working hot water pressure of 150 PSIG (10 bar). A special option can be purchased to enable the hot water working pressure up to 300PSIG (21 bar).

Do not exceed the unit's design hot water temperature or pressure ratings. Possible damage to the unit, components or serious personal injury could result!

TABLE 8 - GENERATOR HOT WATER CONNECTIONS TABLE

GENERATOR TUBE BUNDLE DWP	
Standard	150 psig (10 bar)
Option	300 psig (21 bar)
GENERATOR CONNECTIONS	
Standard	Pipe stub w/Victaulic groove
Option	ANSI, RF flanges
Units shipped to Germany	Pipe stub w/Victaulic groove, no other options available.

All field hot water supply and return piping should be installed in accordance with all local, state, or federal codes that may apply. All piping must be adequately supported and braced independent of the chiller. The chiller water boxes and nozzles are not designed to handle any load bearing stress or strain. The support system must account for the expansion and contraction of the hot water being supplied to and from the unit. All hot water piping should be designed in accordance with good engineering practice.

The hot water piping must be fabricated so that water box removal can be facilitated easily for maintenance purposes. Installing a set of flanges close to the water box nozzles may do this.

Hot water piping must be properly sized in accordance with the required unit full load flow rates and pressure drops. Piping must be designed to avoid abrupt pipe size changes and sharp curves to keep system pressure drops to a minimum. For the inlet to the generator, Johnson Controls recommends a straight length of pipe down stream of the control valve approximately 5 to 10 pipe diameters long.

HOT WATER FLOW AND CONTROL

There are basically two types of hot water valves that are utilized on YORK absorption chillers: two-way and three-way. The three-way valve is the more common type of control method. Three-way valves can be further broke down into two categories.

1. Diverging (flow-splitting)
2. Converging (flow-mixing)

Normally a tag fixed on the valve will indicate which type it is and how it operates; see the below example.

DIVERGING FLOW

The three-way, diverging type valve will have its inlet on the bottom (sometimes called the branch or common port) and flow will go either to the left port or right port or both ports depending on the position of the valve's plug. Whether the hot water goes to the generator or by-pass depends on how it's piped.

3-Way Diverging Valves

The valves will vary the water flow rate through the generator while keeping the temperature constant. This is the recommended valve for hot water temperatures equal to or below 266 ºF (130º C).

A three-way, diverting valve will have one inlet and two outlets. The valve will vary the flow rate through the generator section of the chiller as load increases or decreases. At a full load condition, the by-pass port will be completely shut off allowing all the flow of the hot water to go directly to the generator section of the chiller. As the load decreases, the by-pass port will begin to open, allowing some of the hot water to bypass the generator section of the chiller. When there is no demand for cooling, the by-pass port on the control valve will be completely open while the port to the chiller will be completely closed. Refer to *Figure 26 on page 49*.

2-Way Hot Water Valves

The valves are a straightforward open/shut type of valve. One important thing to keep in mind is that the hot water circulator pump must be kept from dead-heading when the hot water control valve completely closes. If the hot water pump does not have other hot water appliances in the same loop, the piping must be arranged so that an upstream “by-pass” valve will automatically open upon hot water control valve closing. This will allow the hot water flow to travel back to the pump suction. Refer to *Figure 25 on page 48*.

Contact YORK Factory if the hot water temperature is above Johnson Controls recommendations.

3-Way Converging Valves

These valves have two inlets and one outlet; they will vary the water temperature while the flow remains the same. This type of flow is recommended for hot water temperatures above 266º F (130º C). The outlet of this valve is normally piped to the generator section of the chiller and usually incorporates an inner loop circulation pump. Hot water is continually circulated around this piping loop while a temperature sensor throttles the valve open or closed to keep the water temperature at a preset temperature less than 266 ºF (130ºC). Refer to *Figure 27 on page 50*.

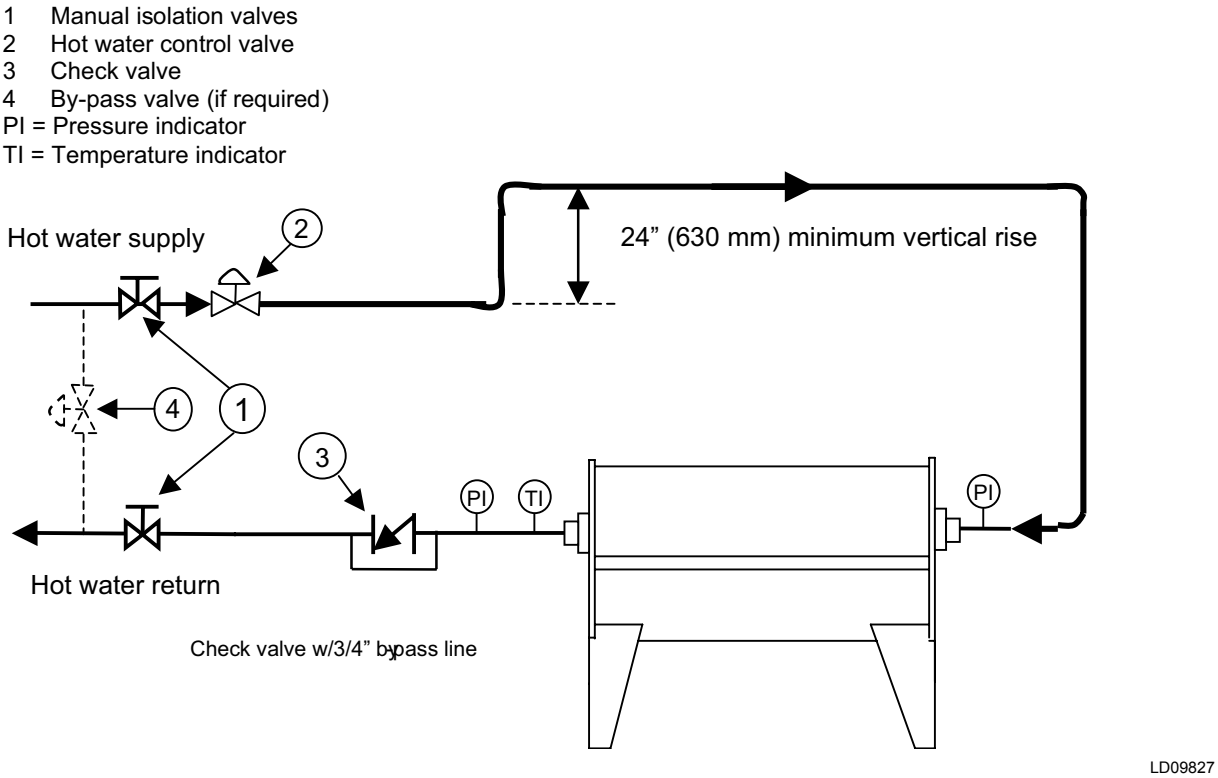


FIGURE 25 - TYPICAL 2-WAY CONTROL VALVE ARRANGEMENT

HOT WATER PIPING COMPONENTS

Manual Isolation Valves

These valves are furnished and installed by others for serviceability of the inlet hot water piping system. For convenience purposes, they should only isolate the unit and it's required components.

Hot Water Control Valve

As a standard, one hot water control valve is furnished with each absorption unit. This valve may be separately packaged in it's own create or it may be among the remainder of the unit's shipped loose parts. The control valve may also be omitted from the unit's factory order if preferred by the customer. In these cases, others must supply the valve. **Johnson Controls will not be responsible for the control valve or it's operation if NOT supplied by the YORK Factory.** A separate set of installation and operation instructions will be packaged along with each valve from the valve's original manufacturer. All personnel involved in the installation of the control valve must read and understand the safety and installation procedure. These instructions may have more details in valve installation than what this document covers; in these cases follow the valve's manufacturers instructions. Always keep the valve's instructions in a safe place for future use.

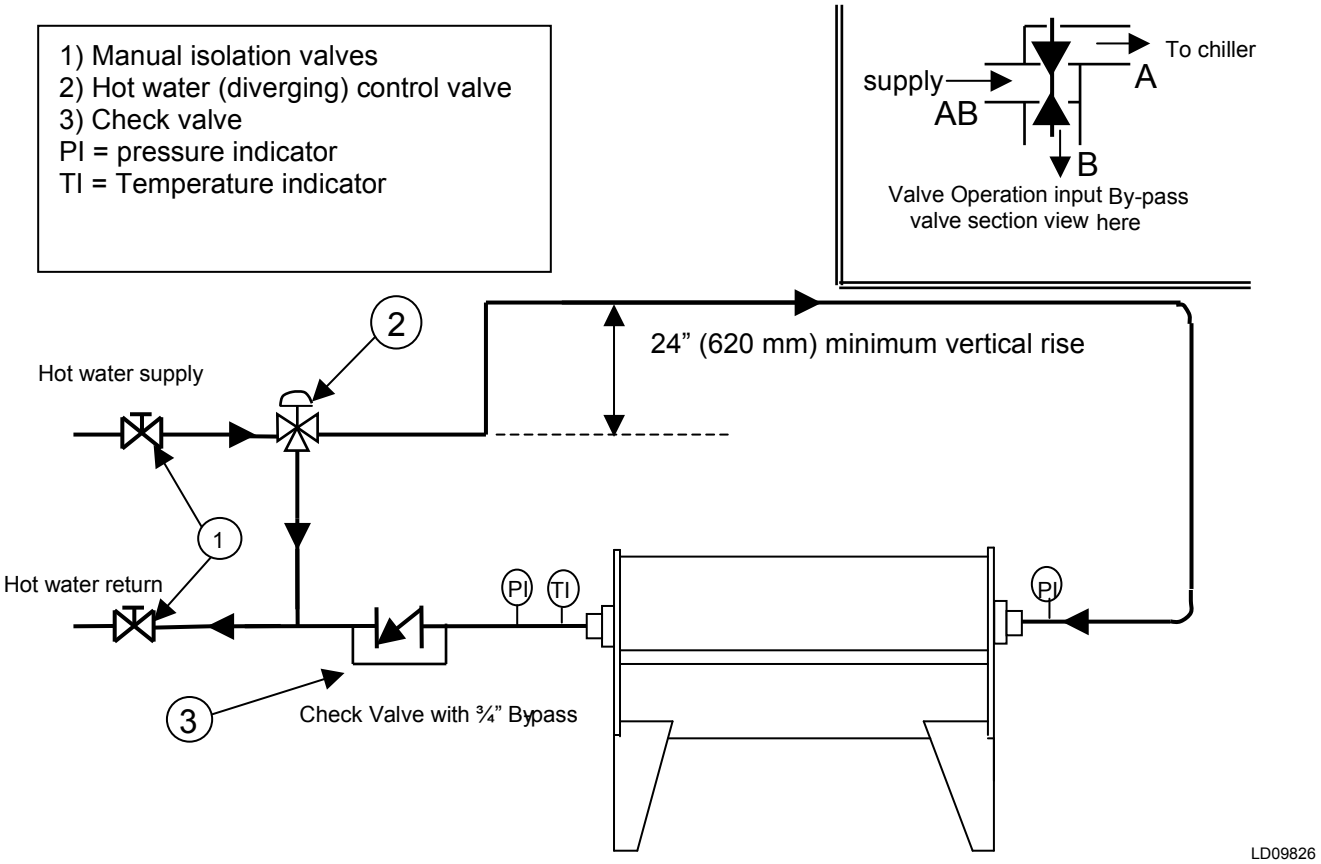
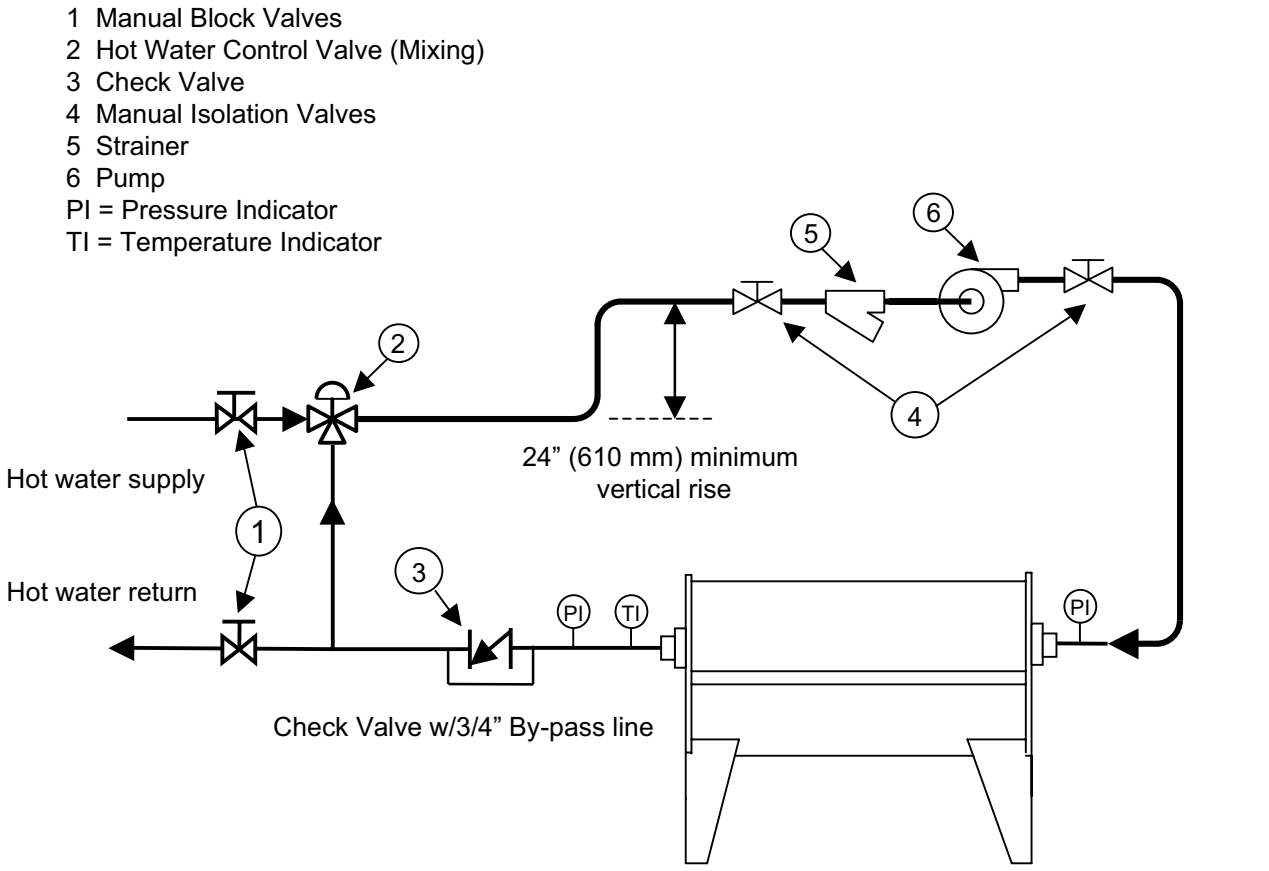


FIGURE 26 - TYPICAL 3-WAY DIVERGING CONTROL VALVE ARRANGEMENT

Valve Installation

The mechanical contractor is usually the responsible party for installation of the control valve. Please refer to the appropriate piping diagram in this section for a guideline on how this valve is arranged in the piping system. The valve will mount between mating flanges supplied by others, these flanges must comply with the same size and body pressure design as the valves. A label on the valve will indicate flow directions, please study this to make sure the valve gets installed correctly. The valve assembly must be installed in a location where ambient temperatures are between 0 to +140º F (-20 to +60º C). If high temperature fluctuations or high humidity will be a factor, it is suggested that a heating resistor be fitted to prevent the buildup of condensation within the actuator enclosure. **No installation is permitted where the actuator is beneath the centerline of the hot water line or where liquid could drip or enter the actuator.**

Always support the actuator if it is not completely vertical above the valve. It is not recommended to install the control valve in a vertical line. See the following figure for actuator clearances.



NOTE: For Hot Water Temperatures > 266ºF (130ºC)

LD10076a

FIGURE 27 - TYPICAL 3-WAY MIXING CONTROL VALVE ARRANGEMENT

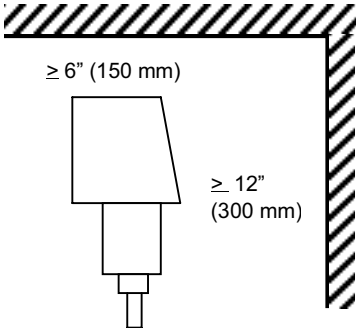


FIGURE 28 - ACTUATOR CLEARANCES

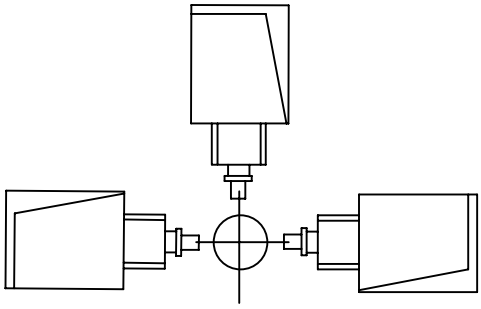


FIGURE 29 - 3274 ACTUATOR ORIENTATION

Valve Wiring

The valve control harness is supplied by the factory and will be coiled up on the generator inlet end of the unit. This harness will connect to unit-mounted junction box 3 (JB3) and terminate in the valve actuator. *It is recommended that a trained Johnson Controls Service Technician complete the valve control wiring.*

The YORK Factory does not supply the power wiring to the control valve. The following is recommended, #18 AWG, AWG dia 0.049, UL or CSA (nom) 1620 with 16 strands, 600 volt rating, AWM/UL style 1015. Insulation with minimum temp rating 105 deg C, nominal thickness 2/64, color white for the wire #2 neutral wire, black for the other wires. These wires should be routed using 1/2" (12.7 mm) metallic flexible conduit and appropriate fittings at each end. The length is determined by how far the control valve will be located fro from the unit mounted JB3 junction box.

Check Valve

Upon unit shutdown, the hot water left remaining in the generator section will start to contract as it cools down. This may form a vacuum inside the generator tube bundle. A check valve installed on the leaving waterside of the generator will break this vacuum. The check valve may not be necessary if the control valve is located 24" (610 mm) above the generator connection. A 3/4" (19 mm) bypass line should be installed around the check valve.

Pressure and Temperature Indicators

Appropriate indicators should be installed before and after the generator bundle. This will allow the operator and service technician to determine and verify operating conditions of the unit.

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SECTION 10 - ELECTRICAL CONNECTIONS

ELECTRICAL CONNECTIONS

All field wiring must be in accordance with the National Electrical Code (NEC) as well as all other applicable state and local laws, codes and specifications. The wiring installer(s) must be a fully qualified and licensed individual(s) that is familiar with and operates within these codes.

Disconnect and lockout all electrical power to the unit before proceeding with any work. Failure to adhere to this could result in damage to the equipment, personal injury or even loss of life.

A packet of unit literature is located with every unit on the inside door of the micropanel. Among the items in this package you will find a unit wiring and sensor location diagram. If for any reason this literature is not available, notify the local Johnson Controls Service office. The Wiring diagram manual is *Form 155.16-W4*. **Do not attempt to wire the unit without proper instruction.**

Incoming three-phase power supply to the unit MUST be routed through a CUSTOMER SUPPLIED remote, FUSED disconnect switch. See the appendix in the back of this document for determining the size of fuses, unit amp requirements and all electrical ratings for the unit.

Unit Grounding, the unit must be grounded in accordance with NEC, table 250-95 and any other applicable codes. **Use only copper conductors for all unit wiring, do not use aluminum!** The power panel is furnished with ground lugs suitable for wire sizes between #14 to 1/0 AWG.

Incoming power wiring, located in the unit mounted, power panel is a 100 amp, non-fused, service disconnect switch. The incoming power lines from the customer supplied, remote mounted, fused disconnect switch must be connected to terminals L1, L2 and L3 of this non-fused disconnect switch. Refer to the following figure for incoming 3-phase power wiring.

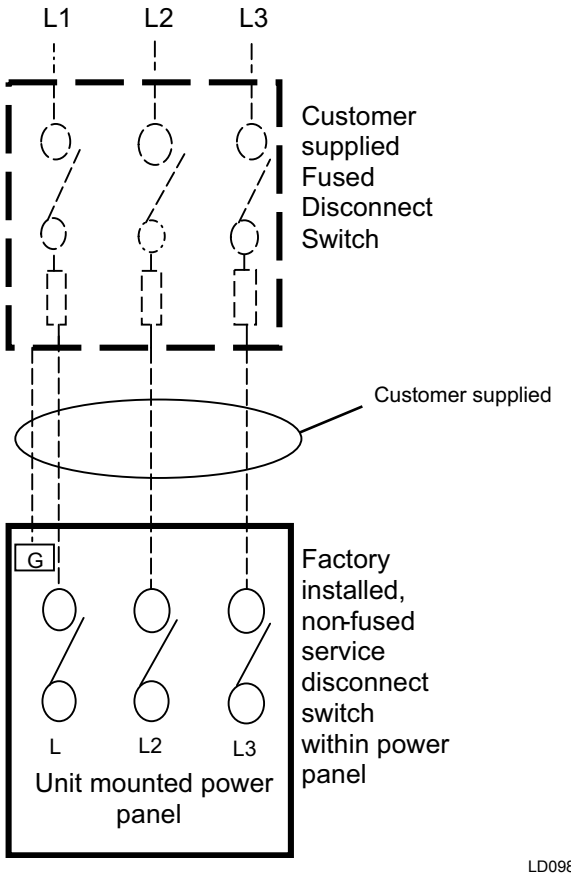


FIGURE 30 - INCOMING 3 PHASE POWER WIRING

The micro panel control center power (115V, 50/60 Hz, 10 amps, 1.0 KVA) is supplied through a factory mounted control power transformer (CPT) located in the power panel. If multiple conduits are used for the incoming three-phase power, they should contain an equal number of wires from each phase in each conduit to prevent overheating. Use copper conductors only for all unit wiring.

Power factor correction capacitors, Are rarely used on absorption equipment due to their low power usage. However, when used they must be sized to meet NEC and all applicable codes. *Improperly sized or installed capacitors may result in equipment malfunction or damage and will not be covered under Johnson Controls warranty.*

Refer to *Figure 31 on page 55*, in this section, "System water pump and flow switch interface details" for the proper installing location of the power factor correction capacitors.

Flow Switches

NOTE

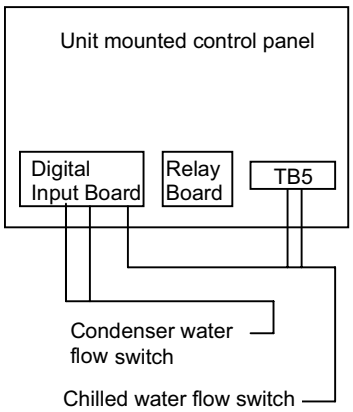
Refer to "System pump control" in the "Water Piping" section of this manual for important information on pump control.

The YORK YIA absorption chiller must monitor the flow of water through the various heat exchanger bundles in order to operate correctly. Therefore, flow switches or differential pressure control switches are required on the chilled water and tower (condenser) water flow circuits to determine if flow is established. The chilled water flow switch is a safety control. It must be connected to prevent operation of the unit whenever chilled water flow is stopped. One chilled water flow switch for each unit is always supplied by Johnson Controls and included with the unit's shipped loose parts. A differential pressure switch and a condenser flow switch are available on an optional basis. Johnson Controls highly recommends installing one of these devices.

For installation of these devices, refer to *SECTION 5 - UNIT WATER PIPING* of this manual. For wiring the chilled water flow switch, connect the common terminal on the switch to terminal 24 on TB5 in the panel. Connect the NO terminal of the switch to terminal 25 on TB5. Connect the NC terminal on the switch to terminal 12 located on the digital input board TB2.

For wiring the tower (condenser) water flow switch, connect the common terminal of the switch to terminal 1, and the NO to terminal 20. Both the 1 and 20 terminals can be found on TB2, digital input board.

The contact rating for these devices must be able to meet 5 milliamperes at 115 volts A.C.



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MISCELLANEOUS WIRING

This section covers wiring devices that may or may not be applicable to all units. To find out what applies to your unit, contact your local Johnson Controls Service Office.

The below items are listed for reference purposes only. A qualified Johnson Controls Service Technician must accomplish all wiring to unit control and junction boxes. Please refer to *Form 155.16-W4* for more details.

Each 115VAC field-connected inductive load i.e., relay coil, motor starter, etc. must have a transient suppressor wired in parallel with its coil, physically located at the coil. A bag of transient suppressors can be found inside the unit panel.

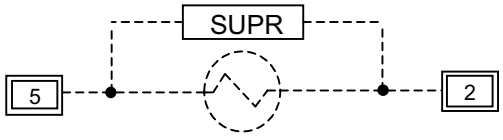
NOTE

All wiring must be of copper and wired in accordance with all National, state and local codes.

– – – – Customer supplied wiring
——— Factory supplied wiring

Automatic Steam Shut-off Valve (4SOL)

This device must not exceed 1 amp holding and 10 amps inrush for 115 volts AC.

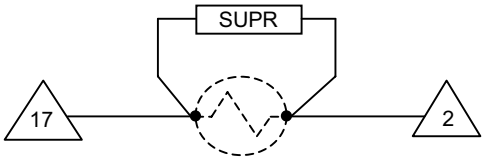


LD09863

Terminals 5 and 2 are located on terminal board 7 (TB7) in remote unit mounted junction box 3.

Steam Condensate Drain Valve (6SOL)

If applicable, this valve is shipped loose for field installation. Wiring will be supplied by factory and connected to unit. Connection at valve to be completed by qualified technician.



LD09862

Terminals 17 and 2 are located on the digital input board, TB3.

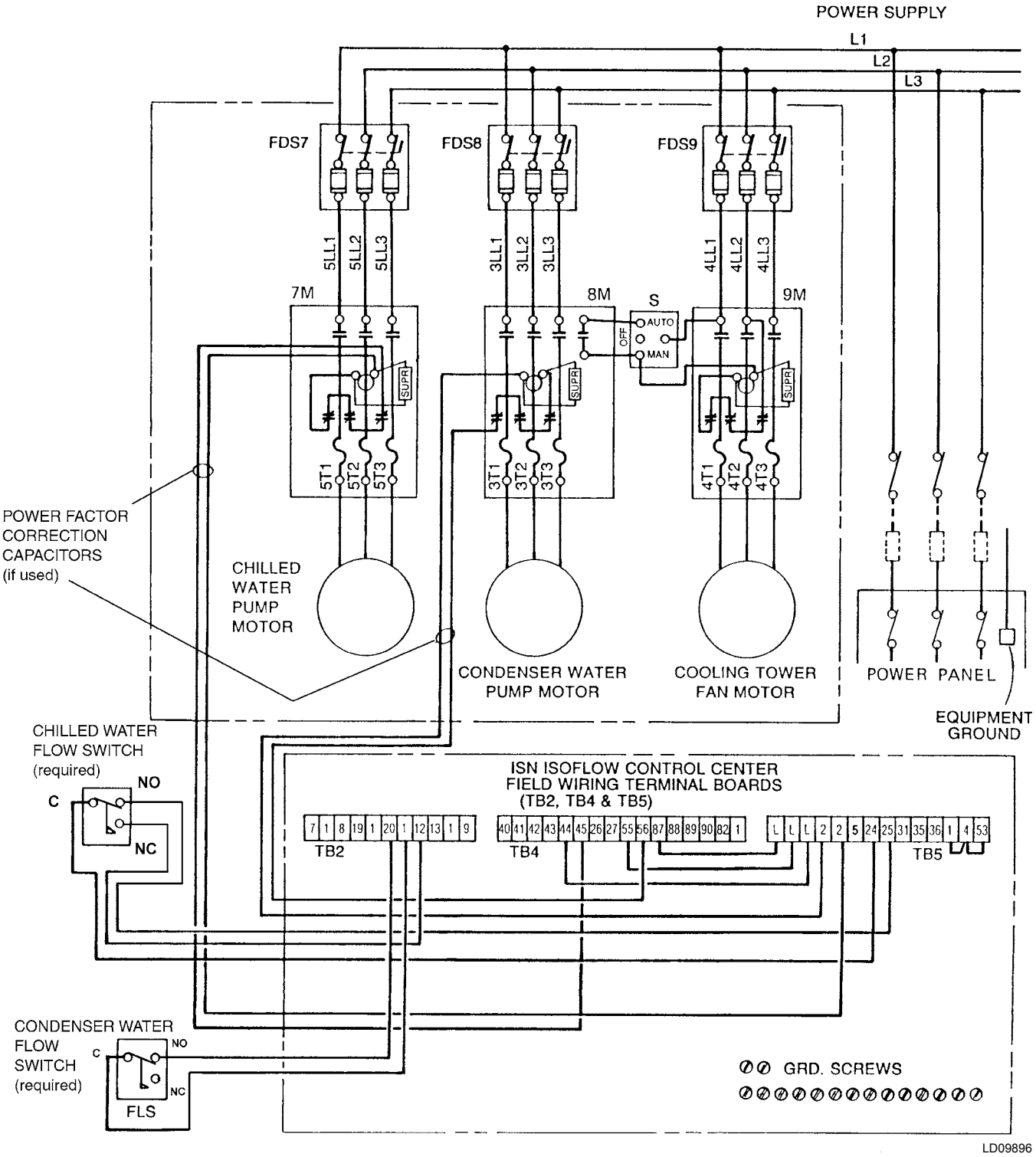
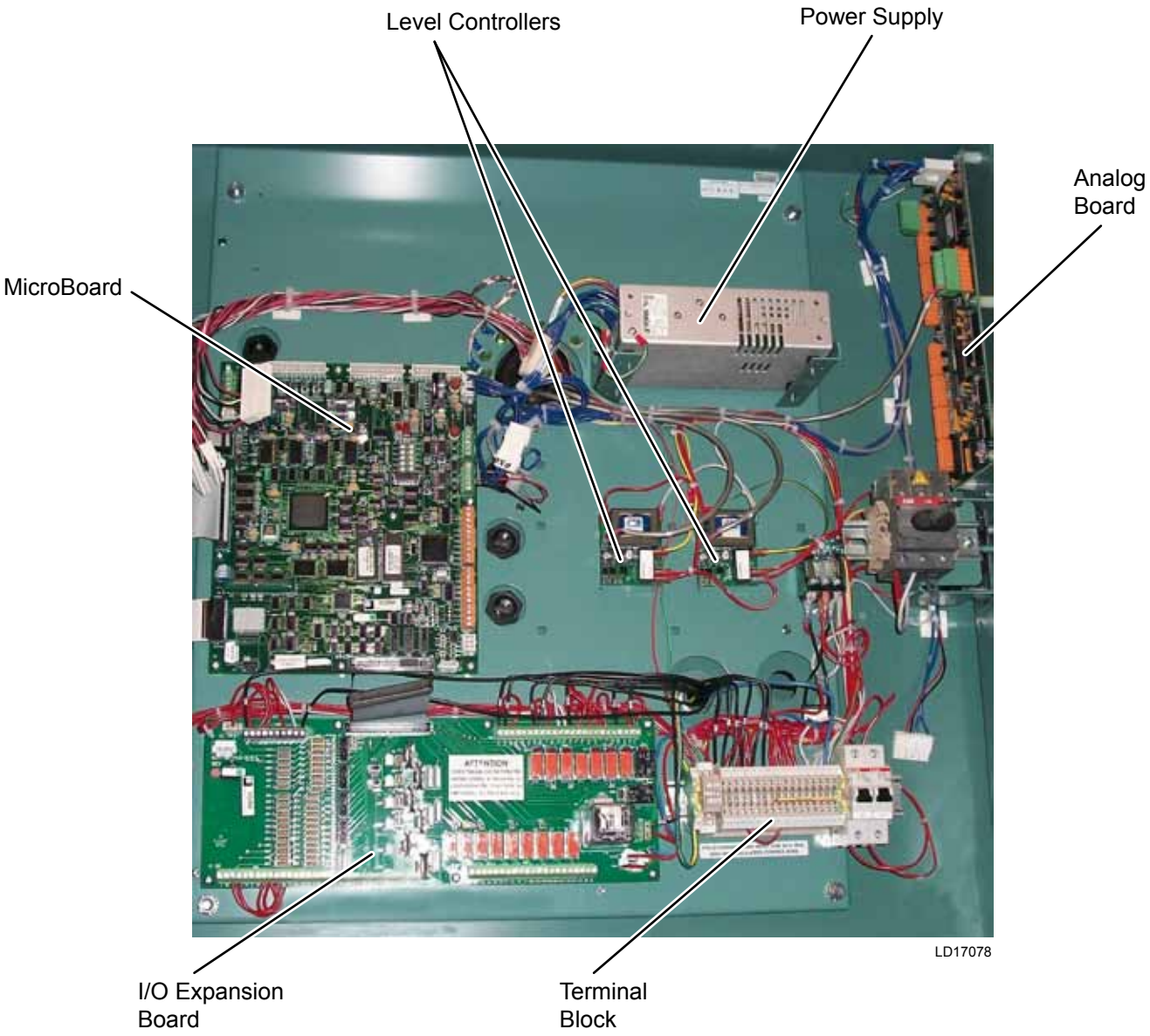


Diagram depicts the unit.
Ready to run with power applied and cond water pump on.

FIGURE 31 - SYSTEM WATER PUMP AND FLOW SWITCH INTERFACE DETAILS

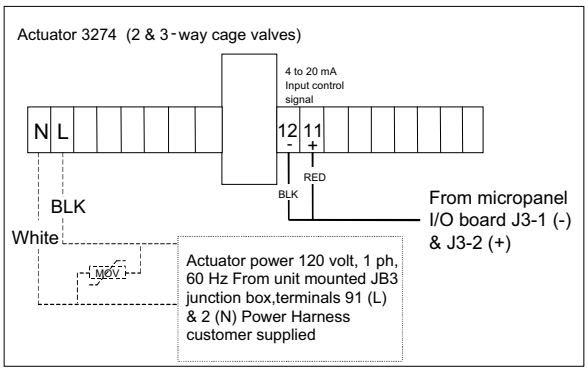
10



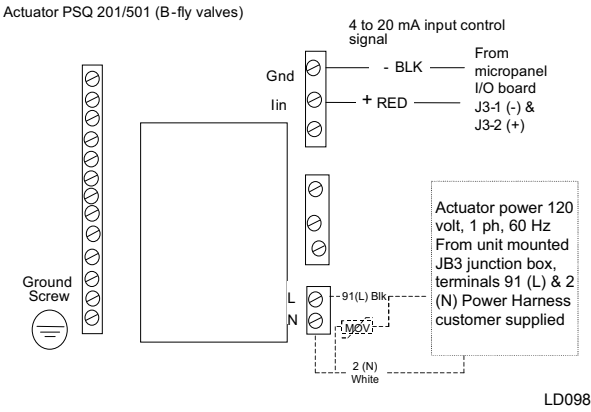
* TB7 is located in JB3 (remote unit mounted Junction box)

FIGURE 32 - YIA MICRO PANEL CONTROL CENTER COMPONENT LOCATIONS

Control Valve Connections



LD09864



LD09865

The above control valve connections are illustrated for power wiring purposes only. A qualified Johnson Controls Service Technician must complete control signal wiring.

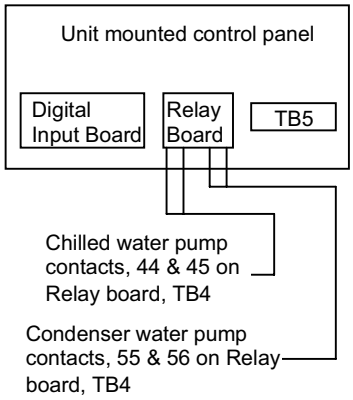
For the power wiring, Johnson Controls recommends the following: #18 AWG, AWG dia 0.049, UL or CSA (nom) 1620 with 16 strands, 600 volt rating, AWM/UL style 1015. Insulation with minimum temp rating 105 deg C, nominal thickness 2/64, color white for the wire #2 because it will be the neutral and black for the other wires. These wires should be routed using ½" metallic flexible conduit and appropriate fittings at each end. The length of this wire can be measured from the unit mounted JB3 junction box to the valve.

System Pump Control Wiring

For Johnson Controls recommendation on pump control, refer to *SECTION 5 - UNIT WATER PIPING*. The customer must supply all wiring. Contact rating is 5 amps resistive at 250 volts A.C. and 30 volts D.C., 2 amps inductive (0.4 PF) at 250 volts A.C. and 30 volts D.C.

Each 115VAC field-connected inductive load i.e., relay coil, motor starter, etc. must have a transient suppressor wired in parallel with its coil, physically located at the coil. A bag of transient suppressors can be found inside the unit panel.

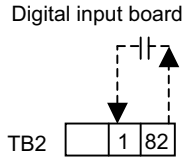
The wiring requirements for the control panel to control the pumps are below.



LD09866

For further details on the following wiring connections, refer to Form 155.16-PA1.

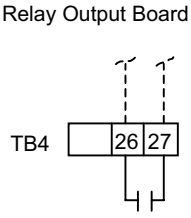
Remote Steam/Hot Water Control Valve Limit Setpoint With Pwm Signal



LD09867

To Energy management system (relay closure) 1 to 11 second Pulse-Width Modulated (PWM) signal with contacts rated 5 mA @ 115 VAC.

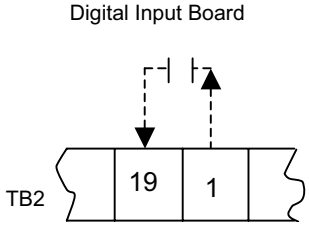
Remote Ready To Start Contacts



LD09868

To Energy management system. NO contacts (in control center) rated 2 amps inductive @ 250 VAC, 5 amps resistive @ 250 VAC.

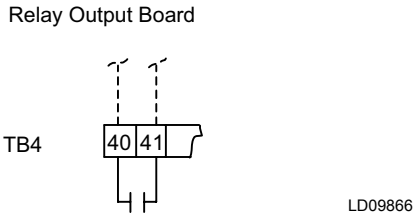
Remote Leaving Chilled Water Temperature Setpoint With PWM Signal



LD09866

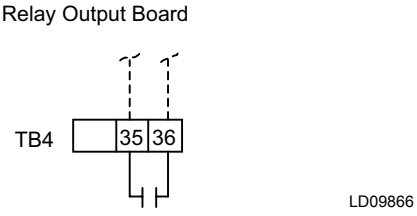
To energy management system (relay closure) 1 to 11 second pulse width modulated signal with contacts rated 5mA @ 115 VAC

Cycling Shutdown Contacts



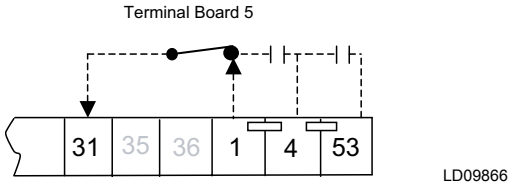
NO contacts (in control center) rated 2 amps inductive @ 250 VAC, 5 amps resistive @ 250 VAC.

Run Contacts



NO contacts (in control panel) rated 5 amps resistive @ 120 or 240 VAC

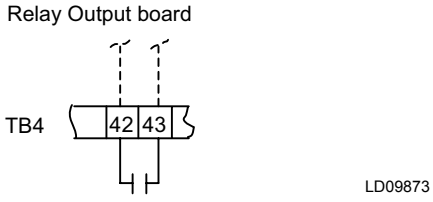
Auxiliary Safety Shutdown Contacts



All device contact ratings to be 5 mA @ 115 VAC.

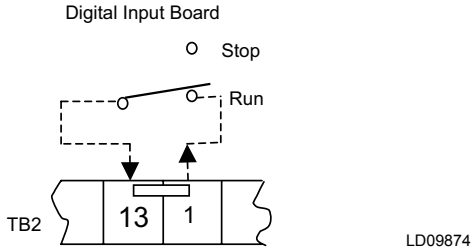
Remove jumpers between 1, 4 and 53 to employ safety devices.

Safety Shutdown Contacts



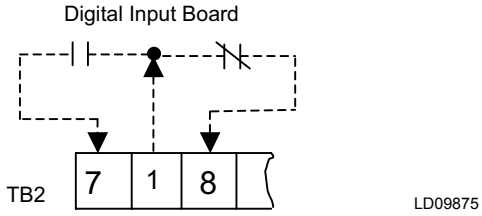
NO contacts (in control panel) rated 2 amps inductive @ 250 VAC, 5 amps resistive @ 250 VAC.

Remote/local Cycling Devices



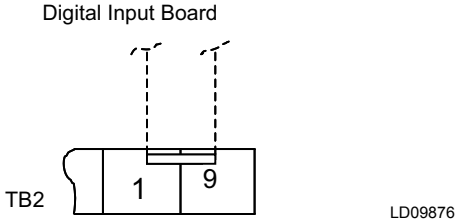
Remove jumper between 1 and 13 to employ cycling device. If a remote start/stop switch is employed it must be a maintained switch. Device contact rating to be 5 mA @ 115 VAC.

Remote Start/Stop contacts from Energy Management System



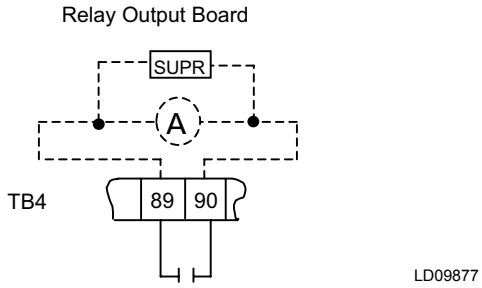
Contact rating to be 5 mA @ 115 VAC.

Multi-Unit Sequence



Contact rating to be 5 mA @ 115 VAC.
Remove jumper to activate multi-unit sequence.

Warning Contacts



Warning contacts in the control panel are rated 2 amps inductive @ 250 VAC, 5 amps resistive @ 250 VAC.

SECTION 11 - PROTECTION FROM CRYSTALLIZATION DURING POWER FAILURES

PROTECTION FROM CRYSTALLIZATION DURING POWER FAILURES

In the event of a power failure, an absorption chiller is susceptible to crystallization as it cools down.

Because of this, there are certain techniques that can be applied to the chiller to help avoid crystallization. Listed below are some of these techniques.

Eliminating Heat Input

This is especially important on steam-fired units. During a power failure, steam from the boiler will continue to flow to the chiller for an undetermined amount of time. If not stopped, the steam will continue to boil the water out of the solution in the generator, pushing the solution's concentration closer to the crystallization area on the PTX chart.

YORK Factory can provide one of two methods to reduce Heat Input, depending on the type of steam valve selected for the chillers application.

1. Johnson Controls will provide a fail-closed steam valve. The fail-closed steam valve has an internal spring, which will close the valve upon power failure. Fail-closed steam valves are only available in the cage-type design from the factory.
2. If the chiller has been selected for a butterfly-type control valve, Johnson Controls will supply a steam condensate drain solenoid valve. This NC valve will close upon power failure to keep the steam condensate from exiting the generator section.

The above options are not available for hot water fired units. Normally, during a power failure the hot water pump will lose power as well, stopping the flow of hot water to the unit.

Automatic shut-off valve Another method of stopping the heat into a steam machine is to install an automatic shut-off valve in the steam inlet line to the chiller's generator bundle. **The automatic shut-off valve is not supplied by the factory and must be purchased and installed by the customer or the installing contractor.** Please see *SECTION 7 - INLET STEAM PIPING* for details for piping and selection of this valve.

Basically, the customer supplied shut-off valve will remain open when current is applied to terminals 2 and 5 on terminal board 7, which is located in unit-mounted junction box 3. Upon loss of current, this NC valve will shut to assure zero steam flow into the chiller. This valve works in conjunction with the condensate drain solenoid valve, if the unit is so equipped.

Uninterruptible Power Supply (UPS) This device is a special factory option available at time of order submittal. A relay in the control panel will command the control valve to close using the UPS for power in the event that AC power is lost to the chiller.

If the unit has a factory supplied UPS, certain start-up, operation and maintenance procedures will be in effect. Please contact your local Johnson Controls Service Office for more details.

Unit Insulation

There are many reasons why insulation is used on units. Please see *SECTION 12 - INSULATION* for more information and details on the benefits of insulation.

Insulation on an absorption unit plays an additional role by helping to retain heat within the solution of the unit. Some areas of the chiller, such as small diameter solution piping will cool quicker than larger thermal mass areas such as the generator. By insulating these critical areas, the heat in the solution may be retained long enough for the power to be restored to the chiller before crystallization happens.

See *APPENDIX A* in the back of this document for recommended unit insulation areas and amounts.

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SECTION 12 - INSULATION

INSULATION

Insulation on a single-stage absorption chiller can offer many benefits, such as: Elimination of condensation on cold surfaces (this is especially true in warm, humid environments); protects personnel working on or around the absorption equipment from the high temperature surfaces; prevents or prolongs the unit from crystallizing during a power failure.

Hot Surface Insulation

Johnson Controls recommends using 2" (51 mm) thick, 3-pound density fiberglass insulation. The insulation may be covered with metallic jacketing or sealed with thermal mastique compound if desired. The main surfaces to receive this type of insulation are: solution-to-solution heat exchanger, piping between the solution-to-solution heat exchanger and generator, generator heads, and the steam/hot water piping. See *APPENDIX A* at the end of this document for detailed illustrations on which surfaces get cold insulation. As an option, the upper shell may be insulated to limit the amount of heat gain to the equipment room.

Glued insulation pins may be used for installing the fiberglass insulation to the hot areas of the unit. A high-temperature epoxy adhesive is available from various supply houses for this purpose. **DO NOT USE WELD PINS!**

Never weld to the unit shell or use weld pins for applying insulation. This action could penetrate the shell exterior and may jeopardize the integrity of the chiller. If in question contact the local Johnson Controls Service Office.

Cold Surface Insulation

Johnson Controls recommends using 3/4" (19 mm), closed-cell foam insulation. Cold surfaces to be insulated are evaporator shell and heads, refrigerant pump, evaporator refrigerant outlet box, miscellaneous piping between and around the refrigerant pump, and piping to the evaporator sprays.

The surface of the cold insulation must be sealed vapor tight to keep the glue intact and prevent sweating and mildew from forming underneath the insulation. All seams must also be sealed or covered with tape.

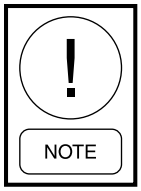
APPENDIX A at the end of this document for detailed schematics on which surfaces get cold side insulation.

Insulation Tips

Before applying any insulation to the unit, please read the following for important information.

Not adhering to any of the following statements may either void unit warranty, or cause damage the chiller.

Never insulate the unit's pump motors. The motor housings have air holes, for ventilation and cooling purposes. Blocking these holes will cause premature motor failure.

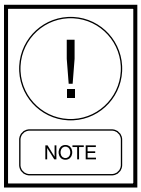


Do not apply any insulation to the unit until the unit has been completely started up and confirmed to be leak free.

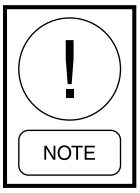
When insulating the unit, do not cover any sight glasses, hand valves, or water head bolts or nuts. These areas must be accessible for service and operation personnel. If insulation is desired in these areas, do not glue the insulation to the surface, in that way it can be easily removed for servicing the unit.

Factory Applied Chiller Insulation

As a special option, chiller refrigerant- side (anti-sweat) insulation can be furnished and installed at the factory if so desired. This option must be taken advantage of at the time of the original chiller order.

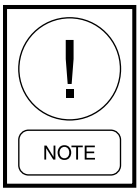


The factory supplied, refrigerant-side insulation option must be given consideration before ordering. This is due to the fact that additional field supplied and installed chiller insulation is a must after the unit is commissioned. Furthermore, factory installed insulation, due to it's vulnerable nature, is prone to damage during shipping, rigging and installation process.



Johnson Controls will not be responsible for damaged insulation due to negligence in shipping, rigging or installation of the chiller.

Specific applications and economic concerns may control the decision to have insulation applied at the factory. Evaporator water boxes and the customer's chilled water lines must be insulated in the field to keep condensation from dripping onto machine room equipment and floors. Usually, when this insulation is applied, the insulation contractor will also insulate the necessary components and piping on the chiller.



Refrigerant-side (anti-sweat) insulation is not offered as a field retrofit or an aftermarket product.

If the factory applied anti-sweat insulation option is ordered, the following chiller components will be insulation with closed-cell foam insulation from the factory.

- Evaporator spill box.
- Refrigerant pump suction line.
- Refrigerant pump housing.
- Refrigerant pump discharge line.
- Refrigerant spray header.
- Unloading solenoid (3SOL) line.
- Anti-freeze line.
- Intersection of Evaporator/Absorber shell (both sides). **NOT THE COMPLETE SHELL.**

Refer to *APPENDIX A* for insulation illustrations.

APPENDIX A
COMPONENT IDENTIFICATION

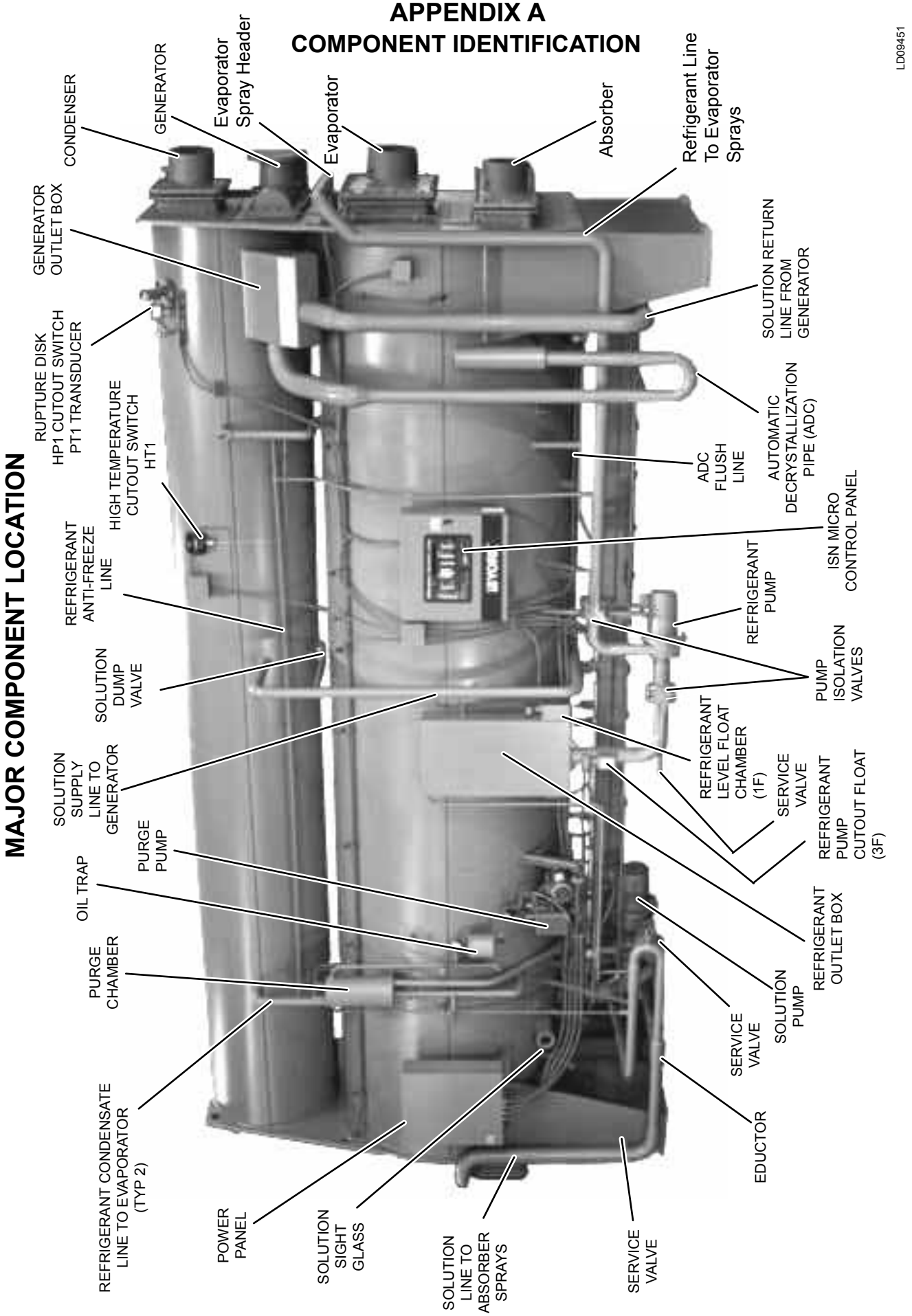


FIGURE 33 - MAJOR COMPONENT LOCATIONS FOR YIA CHILLERS

A

TABLE 9 - UNIT WEIGHTS (ENGLISH)

YIA Model	Operating Weight (lbs)[2]	Shipping Weight (lbs)	Rigging Weight (lbs)	Solution Weight (lbs)	Refrigerant Weight (lbs)	Water Weight in Abs/Cond/ Evap/Gen	Top Shell Rigging Weight (lbs)	Bottom Shell Rigging Weight (lbs)
1A1	11,424	8,900	8,700	1,501	167	856	2,225	6,675
1A2	12,808	9,800	9,700	1,782	250	976	2,450	7,350
2A3	14,120	10,800	10,600	1,916	284	1,120	2,700	8,100
2A4	15,583	11,700	11,500	2,318	317	1,248	2,925	8,775
2B1	17,896	13,400	13,300	2,600	400	1,496	3,350	10,050
3B2	19,963	14,800	14,600	3,002	434	1,728	3,700	11,100
3B3	21,857	16,200	16,000	3,270	484	1,904	4,050	12,150
4B4	23,891	17,600	17,400	3,685	534	2,072	4,400	13,200
4C1	25,185	18,500	18,200	3,819	434	2,432	4,625	13,875
5C2	27,962	20,200	19,900	4,502	475	2,784	5,050	15,150
5C3	30,300	21,800	21,500	4,918	542	3,040	5,450	16,350
6C4	33,080	23,500	23,200	5,601	642	3,336	5,875	17,625
7D1	38,827	28,700	28,400	5,601	734	3,792	7,175	21,525
7D2	43,446	32,200	31,900	6,285	826	4,136	8,050	24,150
8D3	48,138	35,700	35,400	6,968	926	4,544	8,925	26,775
8E1	54,223	39,000	38,600	8,603	1,076	5,544	9,750	29,250
9E2	60,976	43,400	43,000	10,238	1,235	6,104	10,850	32,550
10E3	67,210	48,500	48,100	16,653	1,401	6,656	12,125	36,375
12F1	80,775	59,700	44,400[1]	12,288	1,351	7,936	14,800	44,400
13F2	88,081	64,634	48,100[1]	13,789	1,502	8,656	16,034	48,100
14F3	93,797	67,967	50,600[1]	15,276	1,702	9,352	16,867	50,600

TABLE 10 - UNIT WEIGHTS (METRIC)

YIA Model	Operating Weight (kg)[2]	Shipping Weight (kg)	Rigging Weight (kg)	Solution Weight (kg)	Refrigerant Weight (kg)	Water Weight in Abs/Cond/ Evap/Gen	Top Shell Rigging Weight (kg)	Bottom Shell Rigging Weight (kg)
1A1	5,182	4,037	3,946	681	76	388	1,009	3,028
1A2	5,810	4,445	4,400	808	114	443	1,111	3,334
2A3	6,405	4,899	4,808	869	129	508	1,225	3,674
2A4	7,069	5,307	5,216	1,052	144	566	1,327	3,980
2B1	8,118	6,078	6,033	1,179	182	679	1,520	4,559
3B2	9,055	6,713	6,623	1,362	197	784	1,678	5,035
3B3	9,915	7,348	7,258	1,483	219	864	1,837	5,511
4B4	10,837	7,983	7,893	1,672	242	940	1,996	5,987
4C1	11,424	8,392	8,256	1,732	197	1,103	2,098	6,294
5C2	12,684	9,163	9,027	2,042	216	1,263	2,291	6,872
5C3	13,744	9,888	9,752	2,231	246	1,379	2,472	7,416
6C4	15,005	10,660	10,524	2,541	291	1,513	2,665	7,995
7D1	17,612	13,018	12,882	2,541	333	1,720	3,255	9,764
7D2	19,707	14,606	14,470	2,851	375	1,876	3,652	10,955
8D3	21,835	16,194	16,057	3,161	420	2,061	4,049	12,146
8E1	24,596	17,690	17,509	3,902	488	2,515	4,423	13,268
9E2	27,659	19,686	19,505	4,644	560	2,769	4,922	14,765
10E3	30,487	22,000	21,818	4,832	636	3,019	5,500	16,500
12F1	36,641	27,354	20,140[1]	5,574	613	3,600	6,714	20,140
13F2	39,953	29,591	21,818[1]	6,255	681	3,926	7,273	21,818
14F3	42,546	31,103	22,952[1]	6,929	772	4,242	7,651	22,952

NOTES:

[1] Bottom shell only.

[2] Operating weight = shipping weight + weight of refrigerant and solution + weight of chilled, tower and hot water in the tubes.

TABLE 11 - SHELL AND TUBE VOLUMES

CHILLER SHELL AND TUBE VOLUMES												
UNIT MODEL	SHELL SIDE				TUBE SIDE							
	GEN / COND		ABS / EVAP		ABSORBER		EVAPORATOR		GENERATOR		CONDENSER	
	GAL	LIT	GAL	LIT	GAL	LIT	GAL	LIT	GAL	LIT	GAL	LIT
1A1	175	662	543	2055	45	170	32	121	14	53	16	61
1A2	211	799	653	2472	52	197	36	136	16	61	18	68
2A3	249	943	764	2892	58	220	40	151	17	64	25	95
2A4	277	1049	875	3312	64	242	45	170	19	72	28	106
2B1	361	1366	1006	3808	81	307	55	208	23	87	28	106
3B2	405	1533	1152	4361	90	341	61	231	25	95	40	151
3B3	456	1726	1298	4913	99	375	67	254	28	106	44	167
4B4	508	1923	1444	5466	108	409	73	276	30	114	48	182
4C1	587	2222	1516	5739	130	492	88	333	37	140	49	185
5C2	646	2445	1701	6439	143	541	96	363	41	155	68	257
5C3	719	2722	1899	7188	156	591	105	397	44	167	75	284
6C4	810	3066	2136	8085	171	647	115	435	49	185	82	310
7D1	904	3422	2690	10182	193	731	134	507	56	212	91	344
7D2	1004	3800	2992	11326	210	795	146	553	61	231	100	379
8D3	1130	4277	3371	12760	232	878	160	606	66	250	110	416
8E1	1264	4785	3756	14218	278	1052	192	727	82	310	141	534
9E2	1423	5386	4230	16012	306	1158	211	799	90	341	156	591
10E3	1582	5988	4705	17810	334	1264	230	871	97	367	171	647
12F1	1911	7234	5137	19445	395	1495	269	1018	124	469	204	772
13F2	2125	8044	5730	21690	431	1631	293	1109	135	511	223	844
14F3	2340	8858	6311	23889	467	1768	315	1192	145	549	242	916

ELECTRICAL RATINGS

TABLE 12 - ELECTRICAL RATINGS

Model	Voltage Code	Voltage (V-Ph-Hz)	Wire Ampacity (amps)	Non-Fused Disconnect Switch (amps)	Max Dual Element Fuse amperage (customer supplied)	Solution Pump	Refrigerant Pump	Purge Pump	Total unit KW	Unit Total Amps
1A1	-17	200/208-3-60	35.2	100	45	12.5	12.5	2.1	5.9	32.10
	-28	230-3-60	33.5	100	45	12.0	12.0	2.2	5.9	30.50
	-50	380-3-50	18.3	100	20	6.5	6.5	1.1	5.9	16.70
	-50	400-3-50	17.7	100	20	6.3	6.3	1.1	5.9	16.15
	-46	460-3-60	16.8	100	20	6.0	6.0	1.1	5.9	15.30
	-57	575-3-60	13.7	100	15	4.9	4.9	1.0	5.9	12.50
1A2	-17	200/208-3-60	35.2	100	45	12.5	12.5	2.1	5.9	32.10
	-28	230-3-60	33.5	100	45	12.0	12.0	2.2	5.9	30.50
	-50	380-3-50	18.3	100	20	6.5	6.5	1.1	5.9	16.70
	-50	400-3-50	17.7	100	20	6.3	6.3	1.1	5.9	16.15
	-46	460-3-60	16.8	100	20	6.0	6.0	1.1	5.9	15.30
	-57	575-3-60	13.7	100	15	4.9	4.9	1.0	5.9	12.50
2A3	-17	200/208-3-60	35.2	100	45	12.5	12.5	2.1	5.9	32.10
	-28	230-3-60	33.5	100	45	12.0	12.0	2.2	5.9	30.50
	-50	380-3-50	18.3	100	20	6.5	6.5	1.1	5.9	16.70
	-50	400-3-50	17.7	100	20	6.3	6.3	1.1	5.9	16.15
	-46	460-3-60	16.8	100	20	6.0	6.0	1.1	5.9	15.30
	-57	575-3-60	13.7	100	15	4.9	4.9	1.0	5.9	12.50
2A4	-17	200/208-3-60	35.2	100	45	12.5	12.5	2.1	5.9	32.10
	-28	230-3-60	33.5	100	45	12.0	12.0	2.2	5.9	30.50
	-50	380-3-50	18.3	100	20	6.5	6.5	1.1	5.9	16.70
	-50	400-3-50	17.7	100	20	6.3	6.3	1.1	5.9	16.15
	-46	460-3-60	16.8	100	20	6.0	6.0	1.1	5.9	15.30
	-57	575-3-60	13.7	100	15	4.9	4.9	1.0	5.9	12.50
2B1	-17	200/208-3-60	35.2	100	45	12.5	12.5	2.1	5.9	32.10
	-28	230-3-60	33.5	100	45	12.0	12.0	2.2	5.9	30.50
	-50	380-3-50	18.3	100	20	6.5	6.5	1.1	5.9	16.70
	-50	400-3-50	17.7	100	20	6.3	6.3	1.1	5.9	16.15
	-46	460-3-60	16.8	100	20	6.0	6.0	1.1	5.9	15.30
	-57	575-3-60	13.7	100	15	4.9	4.9	1.0	5.9	12.50
3B2	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	18.3	100	20	6.5	6.5	1.1	7.3	16.70
	-50	400-3-50	17.7	100	20	6.3	6.3	1.1	7.3	16.15
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	7.3	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	7.3	15.40
3B3	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	22.1	100	30	9.5	6.5	1.1	7.3	19.70
	-50	400-3-50	22.9	100	30	10.4	6.3	1.1	7.3	20.25
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	7.3	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	7.3	15.40

NOTES:

1. Table is appropriate for both Hot Water and Steam Units.
2. All purge pump electrical ratings are for the Welch model 1402.
3. A YORK supplied 100 amp, non-fused, unit disconnect switch is located in the power panel of all chiller models.

TABLE 12 – ELECTRICAL RATINGS (CONT'D)

Model	Voltage Code	Voltage (V-Ph-Hz)	Wire Ampacity (amps)	Non-Fused Disconnect Switch (amps)	Max Dual Element Fuse amperage (customer supplied)	Solution Pump	Refrigerant Pump	Purge Pump	Total unit KW	Unit Total Amps
4B4	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	22.1	100	30	9.5	6.5	1.1	7.3	19.70
	-50	400-3-50	22.9	100	30	10.4	6.3	1.1	7.3	20.25
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	7.3	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	7.3	15.40
4C1	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	22.1	100	30	9.5	6.5	1.1	7.3	19.70
	-50	400-3-50	22.9	100	30	10.4	6.3	1.1	7.3	20.25
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	7.3	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	7.3	15.40
5C2	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	24.0	100	30	11.0	6.5	1.1	7.3	21.20
	-50	400-3-50	23.2	100	30	10.7	6.3	1.1	7.3	20.55
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	7.3	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	7.3	15.40
5C3	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	24.0	100	30	11.0	6.5	1.1	7.3	21.20
	-50	400-3-50	23.2	100	30	10.7	6.3	1.1	7.3	20.55
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	7.3	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	7.3	15.40
6C4	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	27.7	100	40	14.0	6.5	1.1	7.3	24.20
	-50	400-3-50	27.7	100	40	14.3	6.3	1.1	7.3	24.15
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	9.2	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	9.2	15.40
7D1	-17	200/208-3-60	44.6	100	60	20.0	12.5	2.1	7.3	39.60
	-28	230-3-60	42.3	100	60	19.0	12.0	2.2	7.3	37.50
	-50	380-3-50	27.7	100	40	14.0	6.5	1.1	7.3	24.20
	-50	400-3-50	27.7	100	40	14.3	6.3	1.1	7.3	24.15
	-46	460-3-60	21.2	100	30	9.5	6.0	1.1	9.2	18.80
	-57	575-3-60	17.4	100	25	7.8	4.9	1.0	9.2	15.40
7D2	-17	200/208-3-60	60.9	100	90	33.0	12.5	2.1	9.2	52.60
	-28	230-3-60	56.0	100	80	30.0	12.0	2.2	9.2	48.50
	-50	380-3-50	27.7	100	40	14.0	6.5	1.1	9.2	24.20
	-50	400-3-50	27.7	100	40	14.3	6.3	1.1	9.2	24.15
	-46	460-3-60	28.1	100	40	15.0	6.0	1.1	9.2	24.30
	-57	575-3-60	22.6	100	30	12.0	4.9	1.0	9.2	19.60

NOTES:

1. Table is appropriate for both Hot Water and Steam Units.
2. All purge pump electrical ratings are for the Welch model 1402.
3. A YORK supplied 100 amp, non-fused, unit disconnect switch is located in the power panel of all chiller models.

TABLE 12 – ELECTRICAL RATINGS (CONT'D)

Model	Voltage Code	Voltage (V-Ph-Hz)	Wire Ampacity (amps)	Non-Fused Disconnect Switch (amps)	Max Dual Element Fuse amperage (customer supplied)	Solution Pump	Refrigerant Pump	Purge Pump	Total unit KW	Unit Total Amps
8D3	-17	200/208-3-60	60.9	100	90	33.0	12.5	2.1	9.2	52.60
	-28	230-3-60	56.0	100	80	30.0	12.0	2.2	9.2	48.50
	-50	380-3-50	27.7	100	40	14.0	6.5	1.1	9.2	24.20
	-50	400-3-50	27.7	100	40	14.3	6.3	1.1	9.2	24.15
	-46	460-3-60	28.1	100	40	15.0	6.0	1.1	9.2	24.30
	-57	575-3-60	22.6	100	30	12.0	4.9	1.0	9.2	19.60
8E1	-17	200/208-3-60	60.9	100	90	33.0	12.5	2.1	9.2	52.60
	-28	230-3-60	56.0	100	80	30.0	12.0	2.2	9.2	48.50
	-50	380-3-50	30.7	100	40	14.0	9.5	1.1	9.2	27.20
	-50	400-3-50	31.8	100	45	14.3	10.4	1.1	9.2	28.25
	-46	460-3-60	28.1	100	40	15.0	6.0	1.1	10.7	24.30
	-57	575-3-60	22.6	100	30	12.0	4.9	1.0	10.7	19.60
9E2	-17	200/208-3-60	79.0	100	110	40.7	21.0	2.1	10.7	68.80
	-28	230-3-60	71.5	100	100	36.8	19.0	2.2	10.7	62.30
	-50	380-3-50	35.2	100	45	14.0	14.0	1.1	10.7	31.70
	-50	400-3-50	35.7	100	50	14.3	14.3	1.1	12.6	32.15
	-46	460-3-60	35.8	100	50	18.4	9.5	1.1	12.6	31.20
	-57	575-3-60	29.3	100	40	15.0	7.8	1.0	12.6	25.50
10E3	-17	200/208-3-60	91.0	100	125	40.7	33.0	2.1	12.6	80.80
	-28	230-3-60	82.5	100	110	36.8	30.0	2.2	12.6	73.30
	-50	380-3-50	35.2	100	45	14.0	14.0	1.1	12.6	31.70
	-50	400-3-50	35.7	100	50	14.3	14.3	1.1	14.4	32.15
	-46	460-3-60	41.3	100	50	18.4	15.0	1.1	12.6	36.70
	-57	575-3-60	33.5	100	45	15.0	12.0	1.0	12.6	29.70
12F1	-17	200/208-3-60	81.4	100	110	33.0	33.0	2.1	12.6	73.10
	-28	230-3-60	74.0	100	100	30.0	30.0	2.2	12.6	66.50
	-50	380-3-50	35.2	100	45	14.0	14.0	1.1	12.6	31.70
	-50	400-3-50	35.7	100	50	14.3	14.3	1.1	12.6	32.15
	-46	460-3-60	37.1	100	50	15.0	15.0	1.1	12.6	33.30
	-57	575-3-60	29.7	100	40	12.0	12.0	1.0	12.6	26.70
13F2	-17	200/208-3-60	91.0	100	125	40.7	33.0	2.1	12.6	80.80
	-28	230-3-60	82.5	100	110	36.8	30.0	2.2	12.6	73.30
	-50	380-3-50	35.2	100	45	14.0	14.0	1.1	12.6	31.70
	-50	400-3-50	35.7	100	50	14.3	14.3	1.1	14.4	32.15
	-46	460-3-60	41.3	100	50	18.4	15.0	1.1	12.6	36.70
	-57	575-3-60	33.5	100	45	15.0	12.0	1.0	12.6	29.70
14F3	-17	200/208-3-60	91.0	100	125	40.7	33.0	2.1	12.6	80.80
	-28	230-3-60	83.2	100	110	36.8	30.0	2.2	12.6	74.00
	-50	380-3-50	35.2	100	45	14.0	14.0	1.1	12.6	31.70
	-50	400-3-50	35.7	100	50	14.3	14.3	1.1	14.4	32.15
	-46	460-3-60	41.3	100	50	18.4	15.0	1.1	12.6	36.70
	-57	575-3-60	33.5	100	45	15.0	12.0	1.0	12.6	29.70

NOTES:

1. Table is appropriate for both Hot Water and Steam Units.
2. All purge pump electrical ratings are for the Welch model 1402.
3. A YORK supplied 100 amp, non-fused, unit disconnect switch is located in the power panel of all chiller models.

TABLE 13 - UNIT CHARGE QUANTITIES

MODEL UNIT	NOMINAL TONNAGE	SOLUTION CHARGE[4]					REFRIGERANT CHARGE			UNIT ALCOHOL CHARGE
		CHARGE SHIPPED			UNIT CHARGE[3]		CHARGE SHIPPED		UNIT CHARGE[3]	
		DRUMS[1]	POUNDS	GALLONS	POUNDS	GALLONS	DRUMS[2]	GALLONS	GALLONS	QUARTS
1A1	120	4	1,608	120	1,474	112	1	55	20	1-1/2
1A2	155	5	2,010	150	1,742	133	1	55	30	1-1/2
2A3	172	5	2,010	150	1,876	143	1	55	34	1-1/2
2A4	205	6	2,412	180	2,278	173	1	55	38	1-1/2
281	235	7	2,814	210	2,546	194	1	55	48	2
382	273	8	3,216	240	2,948	224	1	55	52	2
383	311	9	3,216	270	3,216	244	2	110	58	2
484	334	10	3,618	300	3,618	275	2	110	64	2
4C1	363	10	4,020	300	3,752	285	1	55	52	3
SC2	410	12	4,422	360	4,422	336	2	110	57	3
SC3	446	13	4,824	390	4,824	367	2	110	65	3
6C4	518	14	5,628	420	5,494	418	2	110	77	3
701	565	14	5,628	420	5,494	418	2	110	88	4
702	617	16	6,432	480	6,164	469	2	110	99	4
803	704	18	6,834	540	6,834	520	3	165	111	4
8E1	794	22	8,442	660	8,442	642	3	165	129	5
9E2	908	26	9,648	780	.9,514	764	3	165	148	5
10E3	960	27	10,452	810	10,452	795	3	165	168	5
12F1	1148	31	12,060	930	12,060	917	3	165	162	6
13F2	1235	35	13,668	1050	13,534	1029	4	220	180	6
14F3	1377	38	15,276	1140	15,008	1140	4	220	204	6

NOTES:

1. Solution drums are 30 gallon capacity.
2. Refrigerant drums are 55 gallon capacity.
3. The unit charge given in the table Is typical only at unit start-up. Final trimming of solution and refrigerant may require more or less from the start-up amount.
4. Solution quantities are based on ADVAGuard 750 @ 53% base concentration weight.
5. 1 gal. water = 8.334 lbs.

A

INSULATION DATA

TABLE 14 - APPROXIMATE INSULATION FOR HOT AND COLD SURFACES – ENGLISH MEASURE

MODEL YIA	COLD SURFACES			HOT SURFACES		MODEL YIA	COLD SURFACES			HOT SURFACES	
	EVAP. HEADS & END SHEETS SQ. FT.	REFRIG OUTLET BOX & PUMP SQ. FT.	REFRIG SUCTION & DISCHARGE LINES – TUBULAR INSUL DIA. INCH/LIN FT.	UPPER SHELL SQ. FT.	GEN. HEADS SQ. FT.		EVAP HEADS & END SHEETS SQ. FT.	REFRIG OUTLET BOX & PUMP SQ. FT.	REFRIG. SUCTION & DISCHARGE LINES – TUBULAR DIA. INCH/LIN FT	UPPER SHELL SQ. FT	GEN. HEADS SQ. FT.
1A1	16	16	2/11, 4/4	70	2	6C4	26	18	2-1/2 / 14, 3/4, 4/6	185	4
1A2	16	16	2/12, 4/3	70	2	7D1	39	31	3/17, 4/6	180	7
2A3	16	16	2/12, 4/3	81	2	7D2	39	31	3/18, 4/6	200	7
2A4	16	16	2/13, 4/3	93	2	8D3	39	31	3/19, 4/6	225	7
2B1	19	17	2/9, 2-1/2 / 4, 4/4	95	3	8E1	55	43	3/22, 4/8	225	8
3B2	19	17	2/10, 2-1/2 / 4, 4/4	110	3	9E2	55	43	3/24, 4/8	255	8
3B3	19	17	2/11, 2-1/2 / 4, 4/4	125	3	10E3	55	43	3/24, 4/8	285	8
4B4	19	18	2/12, 2-1/2 / 4, 4/4	136	3	12F1	67	44	3/21, 4/8, 6/6	290	10
4C1	26	18	2-1/2 / 11, 3/4, 4/6	132	4	13F2	67	44	3/23, 4/8, 6/6	320	10
5C2	26	18	2/12, 3/4, 4/6	148	4	14F3	67	44	3/24, 4/8, 6/6	355	10
5C3	26	18	2-1/2 / 13, 3/4, 4/6	165	4						

TABLE 15 - APPROXIMATE INSULATION FOR HOT AND COLD SURFACES – METRIC MEASURE

MODEL YIA	COLD SURFACES			HOT SURFACES		MODEL YIA	COLD SURFACES			HOT SURFACES	
	EVAP. HEADS & END SHEETS m^2	REFRIG OUTLET BOX & PUMP m^2	REFRIG SUCTION & DISCHARGE LINES – TUBULAR INSUL DIA. CM/LIN. m	UPPER SHELL m^2	GEN. HEADS m^2		EVAP. HEADS & END SHEETS m^2	REFRIG OUTLET BOX & PUMP m^2	REFRIG SUCTION & DISCHARGE LINES – TUBULAR DIA. CM/LIN. m	UPPER SHELL m^2	GEN. HEADS m^2
1A1	1.5	1.5	5/3.4, 10/1.2	6.5	0.2	6C4	2.4	1.7	6.5/4.3, 7.5/1.2, 10/1.8	17.1	0.4
1A2	1.5	1.5	5/3.7, 10/0.9	6.5	0.2	7D1	3.6	2.9	7.5/5.2, 10/1.8	16.7	0.7
2A3	1.5	1.5	5/3.7, 10/0.9	7.5	0.2	7D2	3.6	2.9	7.5/5.5, 10/1.8	18.6	0.7
2A4	1.5	1.5	5/4.0, 10/0.9	8.6	0.2	8D3	3.6	2.9	7.5/5.8, 10/1.8	21.0	0.7
2B1	1.8	1.6	5/2.7, 6.5/1.2, 10/1.2	8.8	0.3	8E1	5.1	4.0	7.5/6.7, 10/2.4	21.0	0.7
3B2	1.8	1.6	5/3.0, 6.5/1.2, 10/1.2	10.2	0.3	9E2	5.1	4.0	7.5/7.3, 10/2.4	21.0	0.7
3B3	1.8	1.6	5/3.4, 6.5/1.2, 10/1.2	11.6	0.3	10E3	5.1	4.0	7.5/7.3, 10/2.4	26.5	0.7
4B4	1.8	1.7	5/3.7, 6.5/1.2, 10/1.2	12.6	0.3	12F1	6.2	4.1	7.5/6.4, 10/2.4,	27.0	0.9
4C1	2.4	1.7	6.5/3.4, 7.5/1.2, 10/1.8	12.2	0.4	13F2	6.2	4.1	7.5/7.0, 10/2.4,	29.8	0.9
5C2	2.4	1.7	5/3.7, 7.5/1.2, 10/1.8	13.7	0.4	14F3	6.2	4.1	7.5/7.3, 10/2.4,	33.0	0.9
5C3	2.4	1.7	6.5/4.0, 7.5/1.2, 10/1.8	15.3	0.4						

NOTES:

1. Evaporator shell insulation is only required if evaporator shell surface sweats.
2. Some of the cold surface insulation may be purchased as an extra option from the factory. Refer to Figure 34 for the proper locations.

TABLE 16 - EVAPORATOR SHELL APPROXIMATE INSULATION SIZES (ENGLISH)

MODEL UNIT	INSULATION WIDTH	SQUARE FEET
1A1	10"	17
1A2	10"	20
2A3	10"	24
2A4	10"	27
2B1	12"	28
3B2	12"	32
3B3	12"	36
4B4	12"	40
4C1	14"	38
5C2	14"	42
5C3	14"	47
6C4	14"	53
7D1	16"	48
7D2	16"	54
8D3	16"	60
8E1	18"	60
9E2	18"	68
10E3	18"	75
12F1	20"	75
13F2	20"	84
14F3	20"	92

TABLE 17 - EVAPORATOR SHELL APPROXIMATE INSULATION SIZES (METRIC)

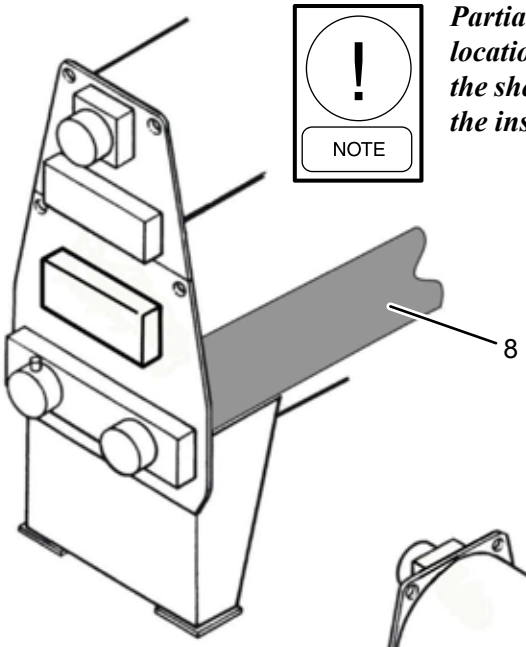
MODEL UNIT	INSULATION WIDTH (CM)	SQUARE METERS
1A1	26	1.58
1A2	26	1.85
2A3	26	2.23
2A4	26	2.50
2B1	31	2.60
3B2	31	3.00
3B3	31	3.34
4B4	31	3.72
4C1	36	3.53
5C2	36	3.90
5C3	36	4.37
6C4	36	4.92
7D1	41	4.46
7D2	41	5.02
8D3	41	5.57
8E1	46	5.57
9E2	46	6.32
10E3	46	7.00
12F1	51	7.00
13F2	51	7.80
14F3	51	8.55

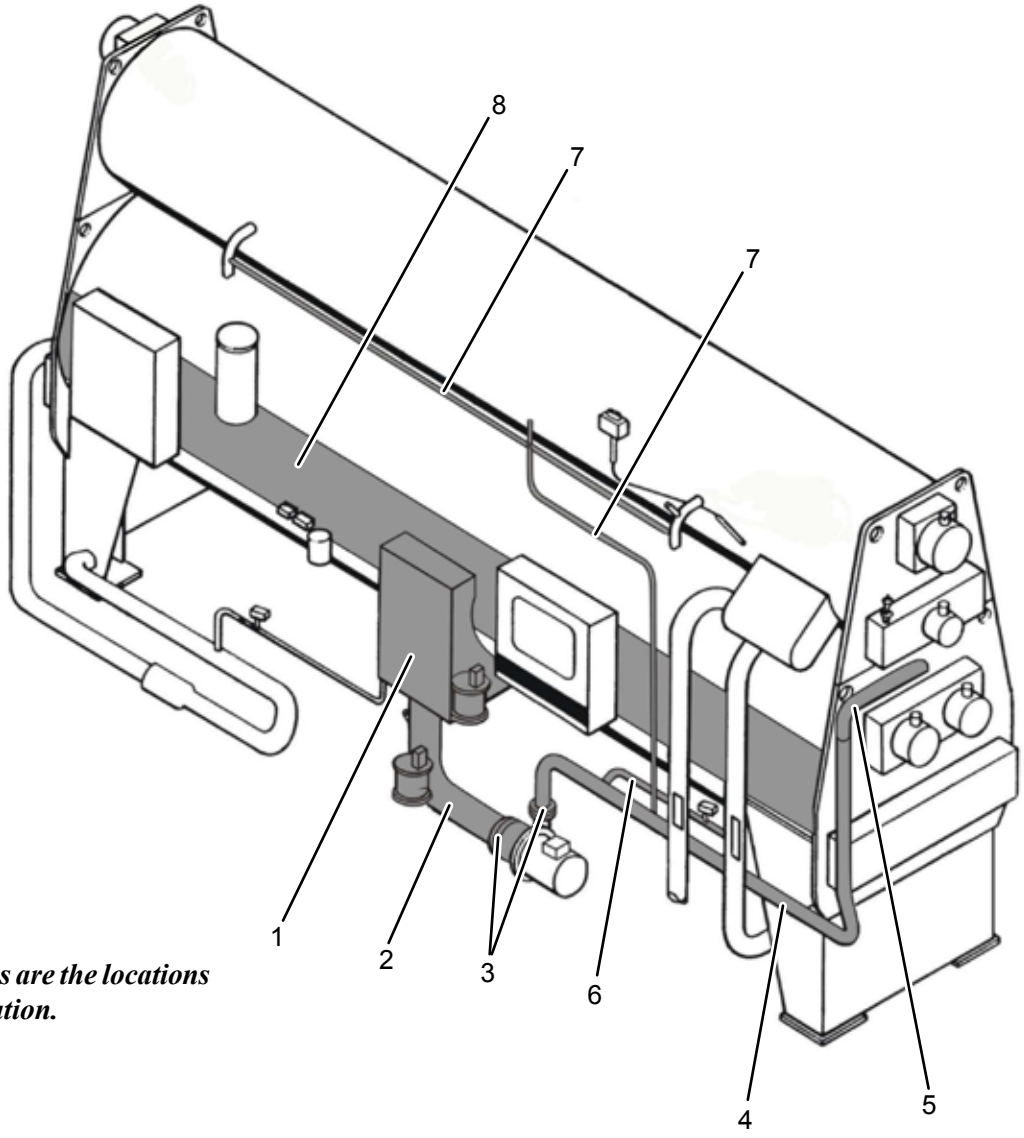
NOTE

Partial insulation shown for location. The entire length of the shell must be covered with the insulation.

INSULATION LOCATIONS:

1. Evaporator Split Box
2. Refrigerant Pump Suction Line
3. Refrigerant Pump Housing
4. Refrigerant Pump Discharge Line
5. Refrigerant Spray Header
6. Unloading Solenoid Line
7. Anti-Freeze Line
8. Evaporator Shell Insulation





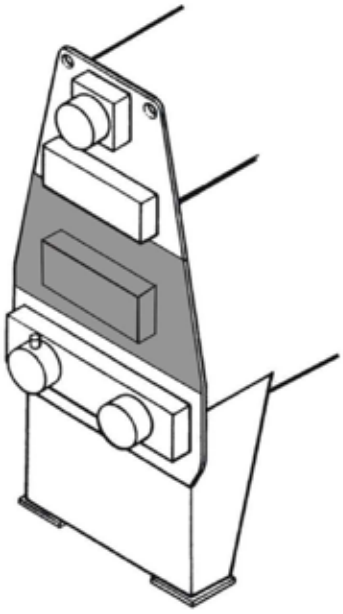
NOTE

Shaded areas are the locations of the insulation.

LD10077

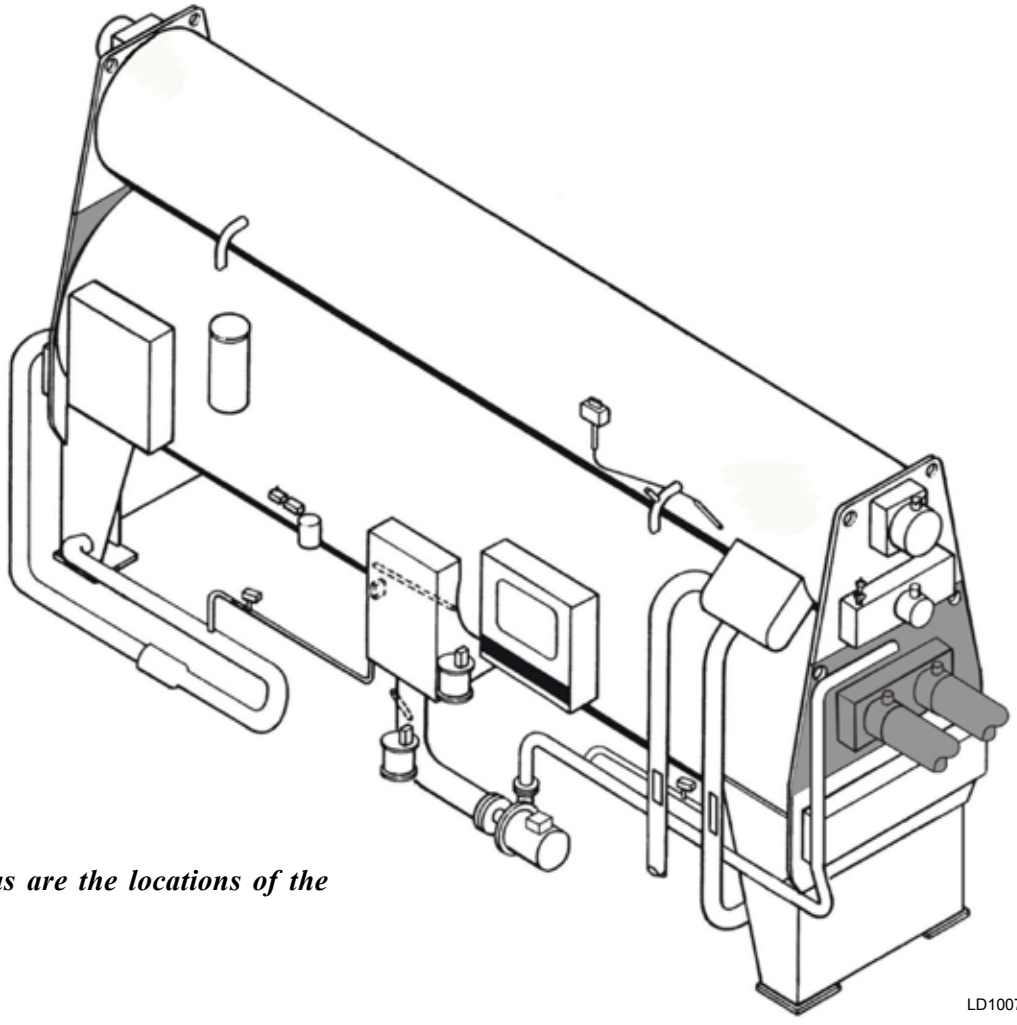
FIGURE 34 - REFRIGERANT SIDE INSULATION (FACTORY SUPPLIED OPTION)

COLD SIDE INSULATION
(FIELD SUPPLIED AND INSTALLED)



NOTE

Cold Side Insulation must be applied in addition to the Refrigerant Side Insulation as shown on Figure 36.



NOTE

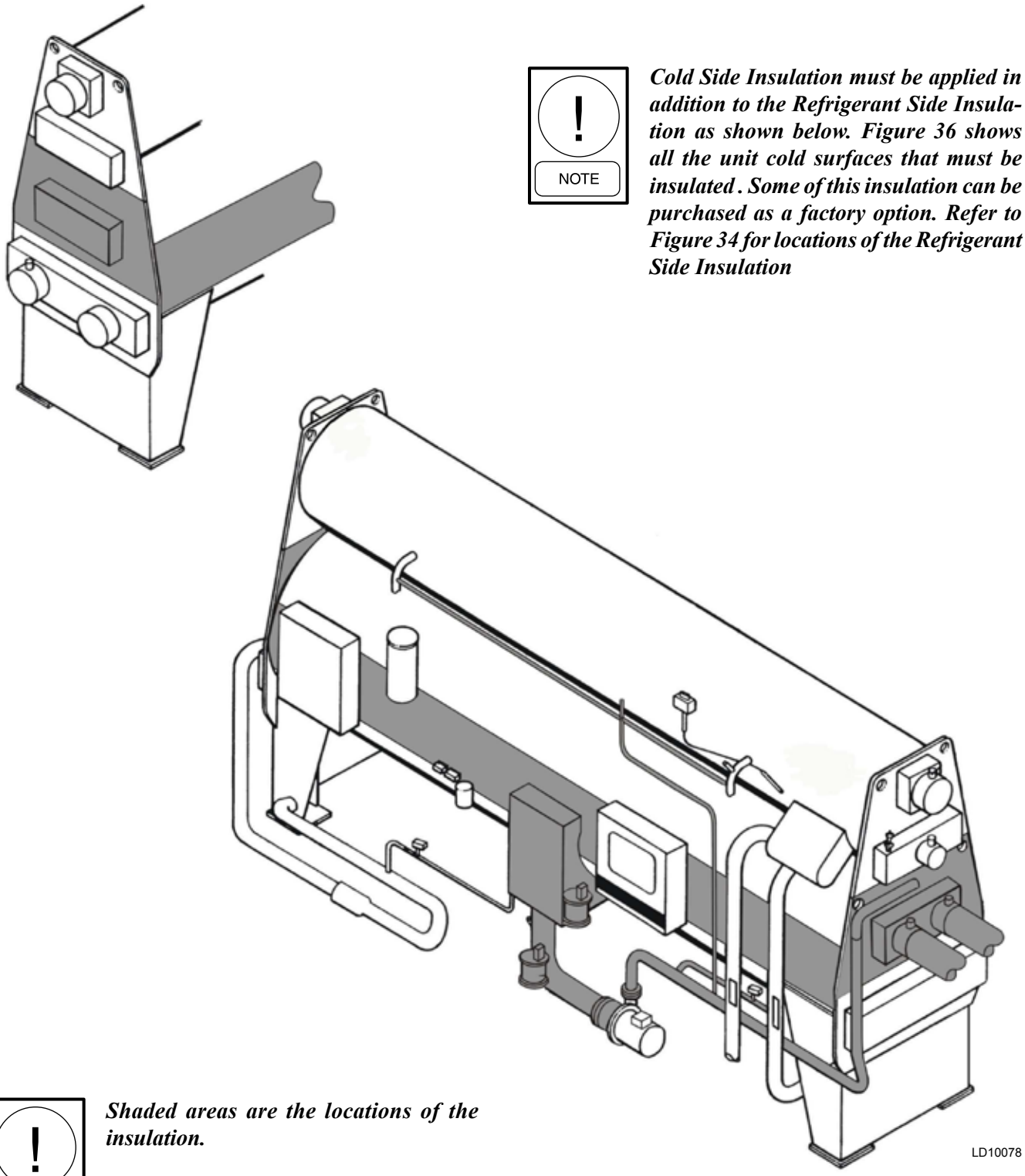
Shaded areas are the locations of the insulation.

LD10078

A

FIGURE 35 - COLD SIDE INSULATION (FIELD SUPPLIED AND INSTALLED)

REFRIGERANT SIDE AND COLD SIDE INSULATION



NOTE

Cold Side Insulation must be applied in addition to the Refrigerant Side Insulation as shown below. Figure 36 shows all the unit cold surfaces that must be insulated . Some of this insulation can be purchased as a factory option. Refer to Figure 34 for locations of the Refrigerant Side Insulation

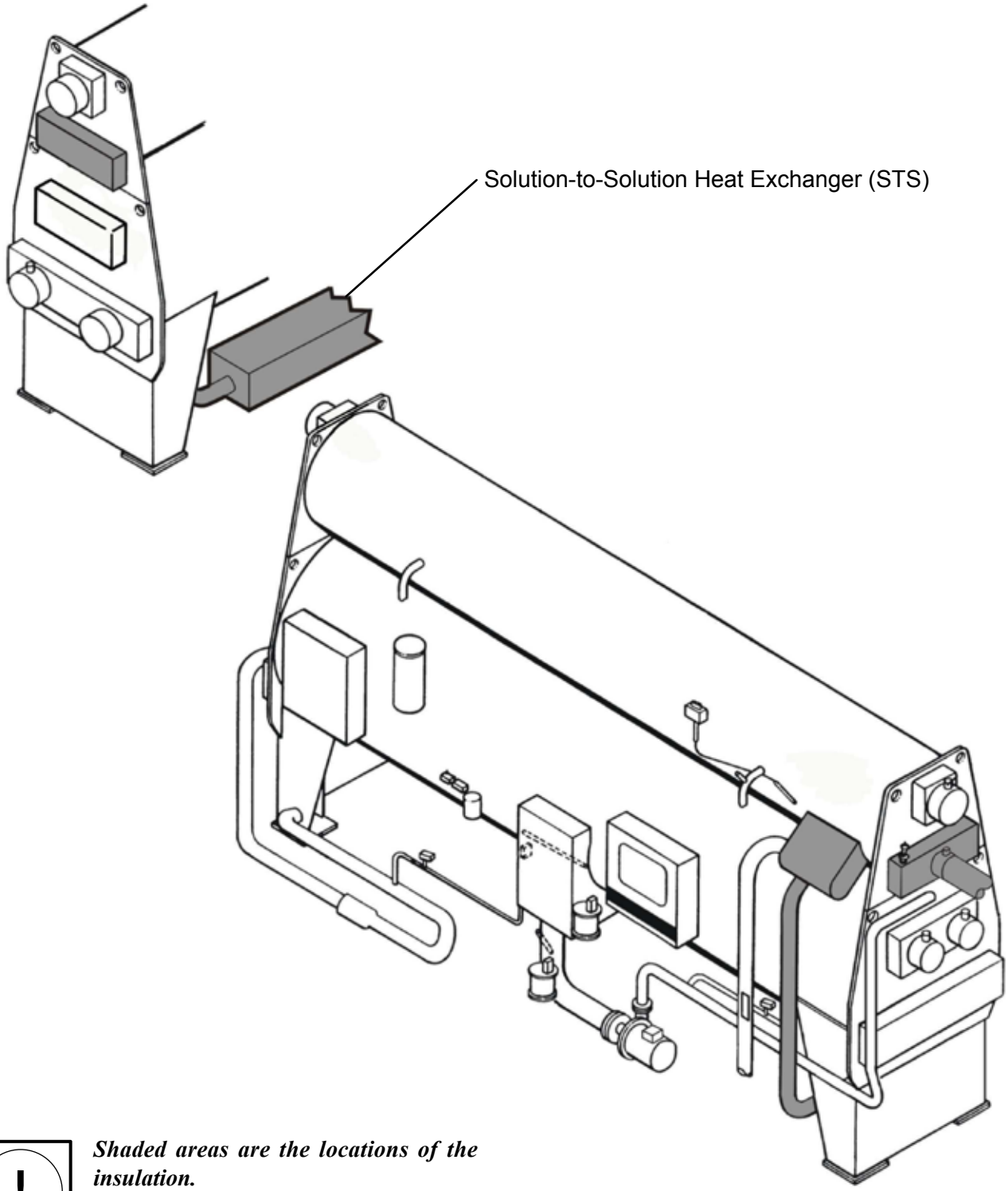
NOTE

Shaded areas are the locations of the insulation.

LD10078

FIGURE 36 - REFRIGERANT SIDE AND COLD SIDE INSULATION

HOT SURFACES INSULATION (FIELD SUPPLIED AND INSTALLED)



NOTE

Shaded areas are the locations of the insulation.

LD10079

FIGURE 37 - HOT SURFACES INSULATION (FIELD SUPPLIED)

A

NOTES:

1.- 5 (FIVE) PIECES ARE SHIPPED LOOSE FOR MODELS 1A1 & 1A2
7 (SEVEN) PIECES ARE SHIPPED LOOSE FOR MODELS 2A3 & 2A4.
1 (ONE) REDUCTION No. 023-02462-000
1 (ONE) REDUCTION No. 023-02459-000
1 (ONE) PIPE 10" LENGTH No. 066R11530-000 2A3 & 2A4.
1 (ONE) PIPE 10" LENGTH No. 066R11526-000 2A3 & 2A4.
1 (ONE) PIPE 10" LENGTH No. 066R11530-000 1A1 & 1A2.
1 (ONE) SCREWS & NUTS PACKET FOR ASSEMBLING THE ANGLES (SUPPORTS OF THE SHELL) No. 021-01518-000 & 021-14232-000.
1 (ONE) PIPE 7" LENGTH No. 066R12499-000 1A1 & 1A2.
2 (TWO) PIPES 7" LENGTH No. 066R12499-000 2A3 & 2A4.

2.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.

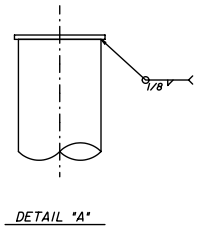
3.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.

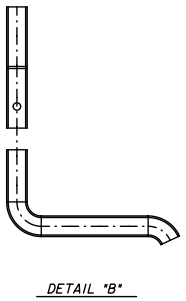
4.- GRIND OFF PIPE CAPS (DO NOT CUT INTO PIPE).

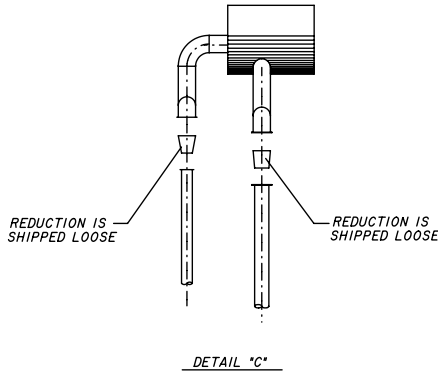
5.- BEVEL BOTH SIDES OF JOINTS (75°).

6.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC. IS ALLOWED TO ENTER PIPING)

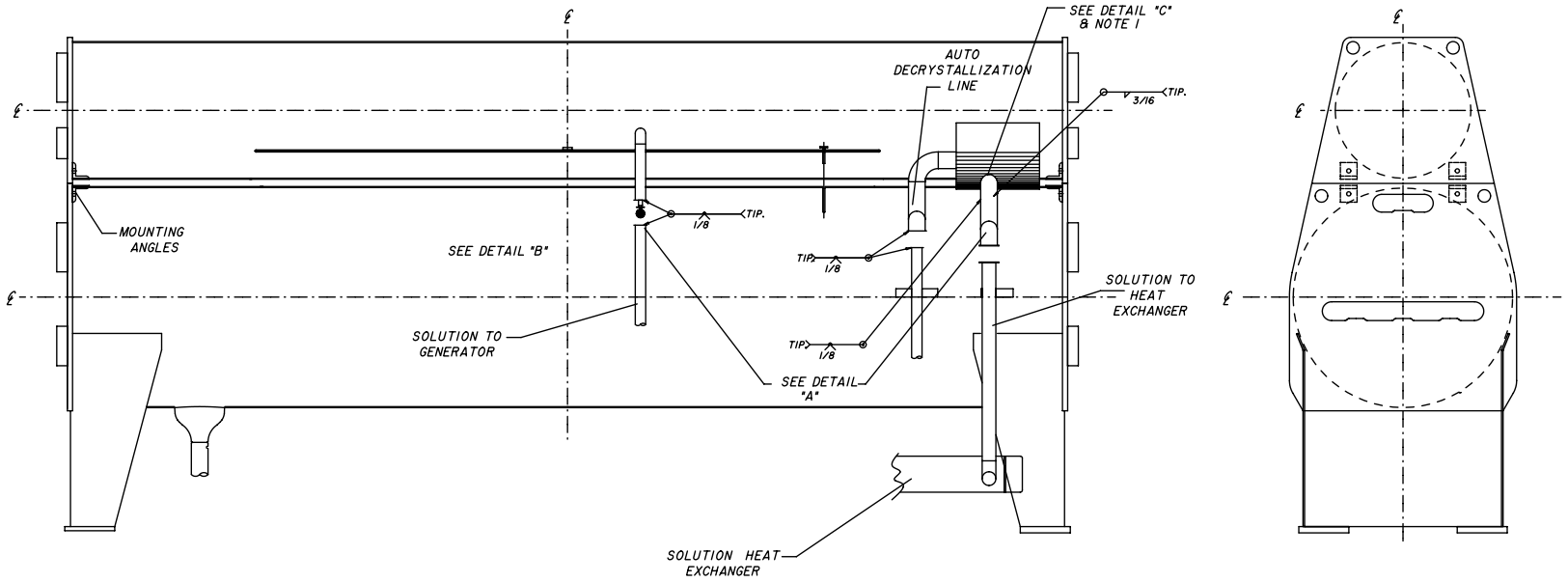
7.- INSTALLATION INSTRUCTIONS AND PRODUCT DRAWING MUST BE REFERRED TO WHEN MAKING FIELD ASSEMBLY.







UNIT ASSEMBLY



LD10075

FIGURE 38 - UNIT ASSEMBLY FOR MODELS 1A1 AND 1A2

NOTES:

1.- 5 (FIVE) PIECES ARE SHIPPED LOOSE FOR MODELS 1A1 & 1A2
7 (SEVEN) PIECES ARE SHIPPED LOOSE FOR MODELS 2A3 & 2A4.
1 (ONE) REDUCTION No. 023-02462-000
1 (ONE) REDUCTION No. 023-02459-000
1 (ONE) PIPE 10" LENGTH No. 066RI1530-000 2A3 & 2A4.
1 (ONE) PIPE 10" LENGTH No. 066RI1526-000 2A3 & 2A4.
1 (ONE) PIPE 10" LENGTH No. 066RI1530-000 1A1 & 1A2.
1 (ONE) SCREWS & NUTS PACKET FOR ASSEMBLING THE ANGLES (SUPPORTS OF THE SHELL) No. 021-01518-000 & 021-14232-000.
1 (ONE) PIPE 7" LENGTH No. 066RI2499-000 1A1 & 1A2.
2 (TWO) PIPES 7" LENGTH No. 066RI2499-000 2A3 & 2A4.

2.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.

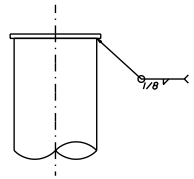
3.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.

4.- GRIND OFF PIPE CAPS (DO NOT CUT INTO PIPE).

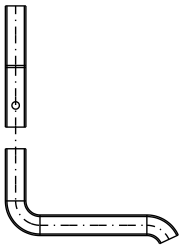
5.- BEVEL BOTH SIDES OF JOINTS (75°).

6.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC. IS ALLOWED TO ENTER PIPING)

7.- INSTALLATION INSTRUCTIONS AND PRODUCT DRAWING MUST BE REFERRED TO WHEN MAKING FIELD ASSEMBLY.



DETAIL "A"



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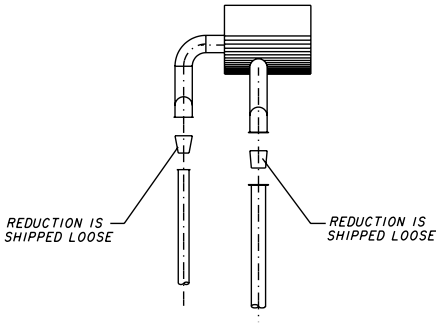
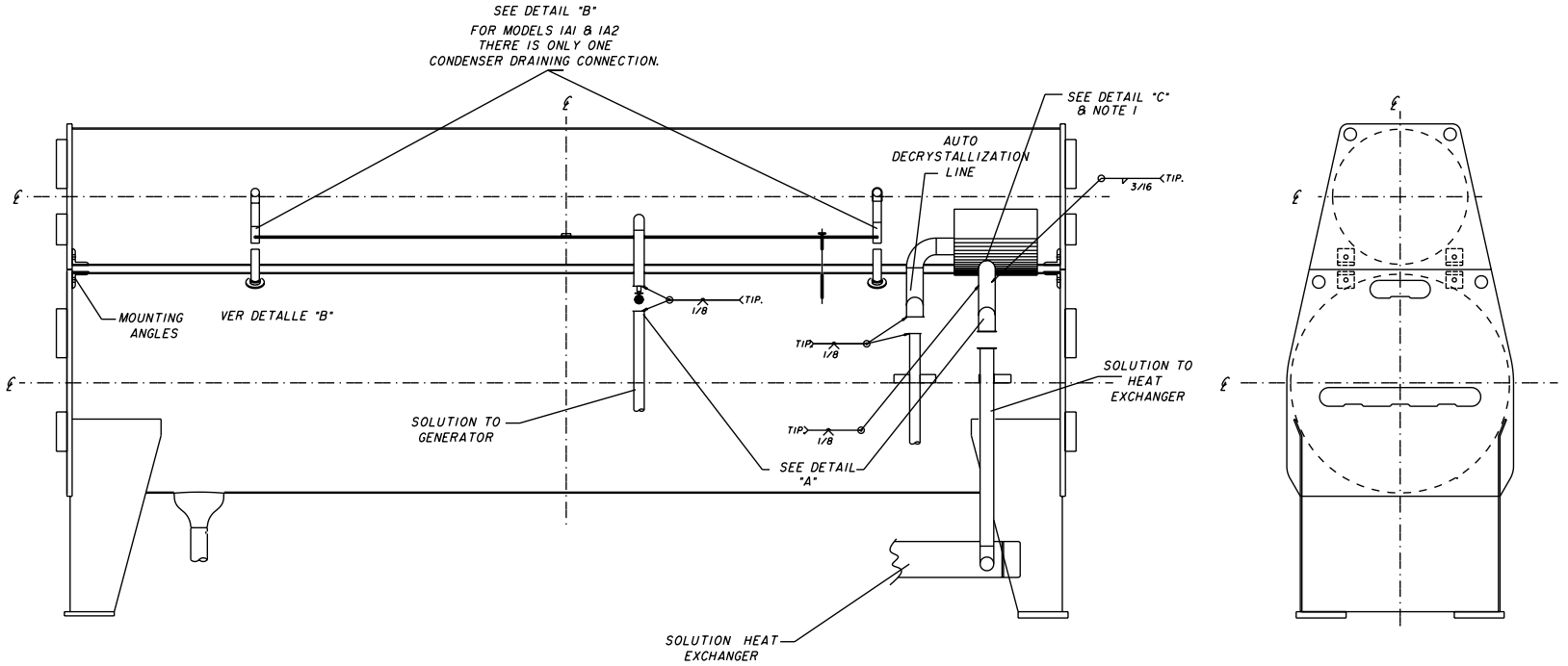


DETAIL "C"



LD04712

FIGURE 39 - UNIT ASSEMBLY FOR MODELS 2A3 AND 2A4

NOTES:

1.- 7 (SEVEN) PIECES ARE SHIPPED LOOSE
- 1 (ONE) REDUCTION No. 023-09892-000.
- 1 (ONE) PIPE 10" LENGTH No. 066RII1537-000
- 1 (ONE) PIPE 10" LENGTH No. 066RII1526-000.
- 1 (ONE) SCREWS & NUTS PACKET FOR ASSEMBLING THE ANGLES (SUPPORTS OF THE SHELL) No. 021-01598-000 & 021-III54-000
- 2 (TWO) PIPES 7" LENGTH No. 066RI2499-000.
- 1 (ONE) PIPE 6" LENGTH No. 066RI2612-000.

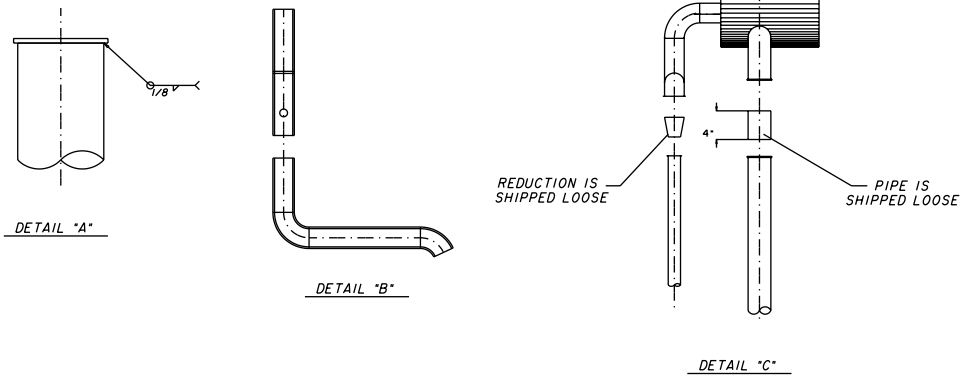
2.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.

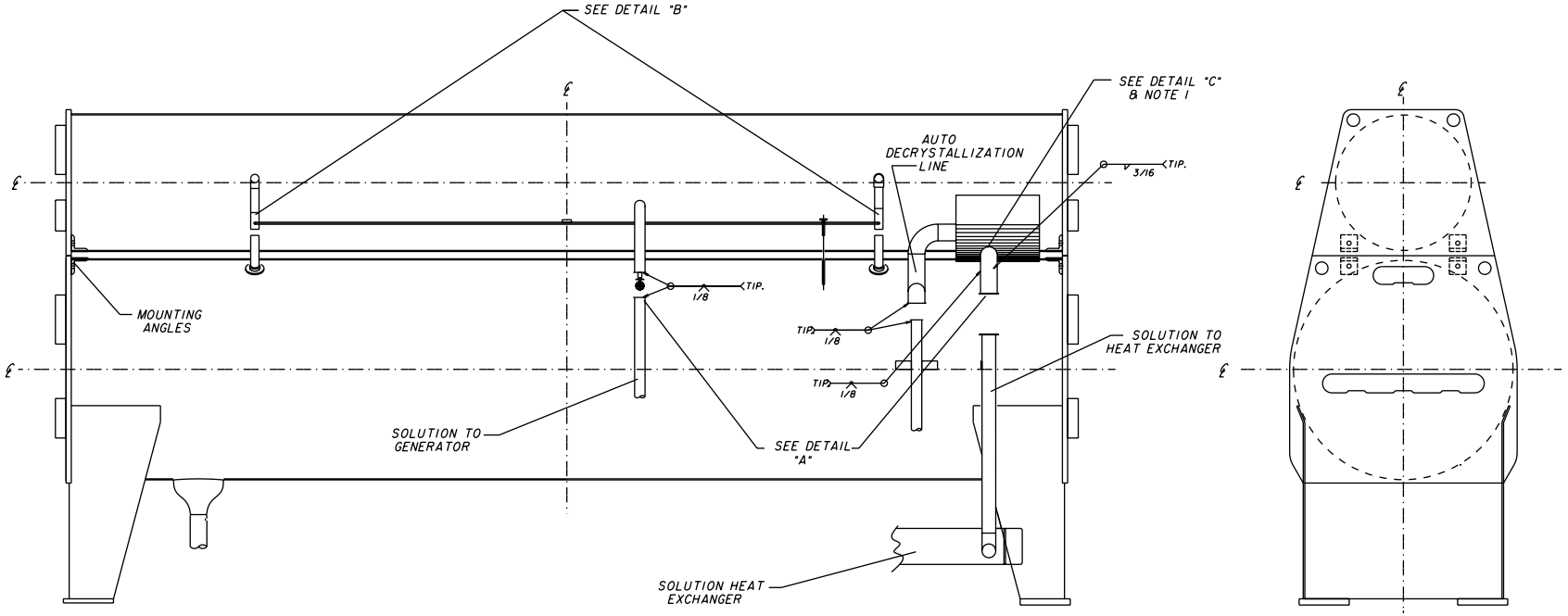
3.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.

4.- GRIND OFF PIPE CAPS (DO NOT CUT INTO PIPE).

5.- BEVEL BOTH SIDES OF JOINTS (75°).

6.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC. IS ALLOWED TO ENTER PIPING)





LD04713

FIGURE 40 - UNIT ASSEMBLY FOR MODELS 2B1 THRU 4B4

NOTES:

1.- 7 (SEVEN) PIECES ARE SHIPPED LOOSE.
- 1 (ONE) REDUCTION No. 023-02490-000.
- 1 (ONE) PIPE 10" LENGTH No. 066R11545-000.
- 1 (ONE) PIPE 10" LENGTH No. 066R11526-000.
- 1 (ONE) SCREWS & NUTS PACKET FOR ASSEMBLING THE ANGLES (SUPPORTS OF THE SHELL) No. 021-01598-000 & 021-11154-000.
- 2 (TWO) PIPES 7" LENGTH No. 066R12500-000.
- 1 (ONE) PIPE 5" LENGTH No. 066R12613-000.

2.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.

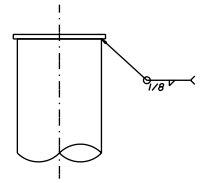
3.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.

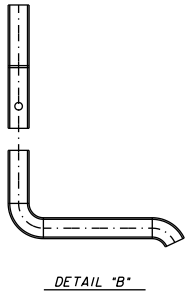
4.- GRIND OFF PIPE CAPS (DO NOT CUT INTO PIPE).

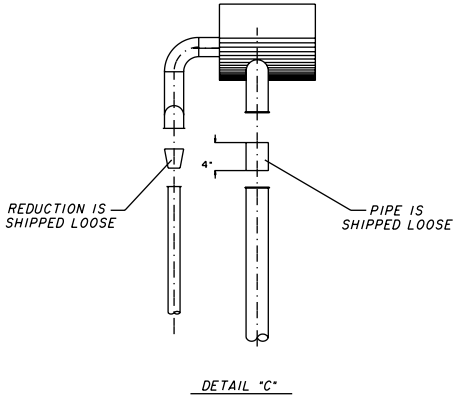
5.- BEVEL BOTH SIDES OF JOINTS (75°).

6.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC. IS ALLOWED TO ENTER PIPING)

7.- INSTALLATION INSTRUCTIONS AND PRODUCT DRAWING MUST BE REFERRED TO WHEN MAKING FIELD ASSEMBLY.







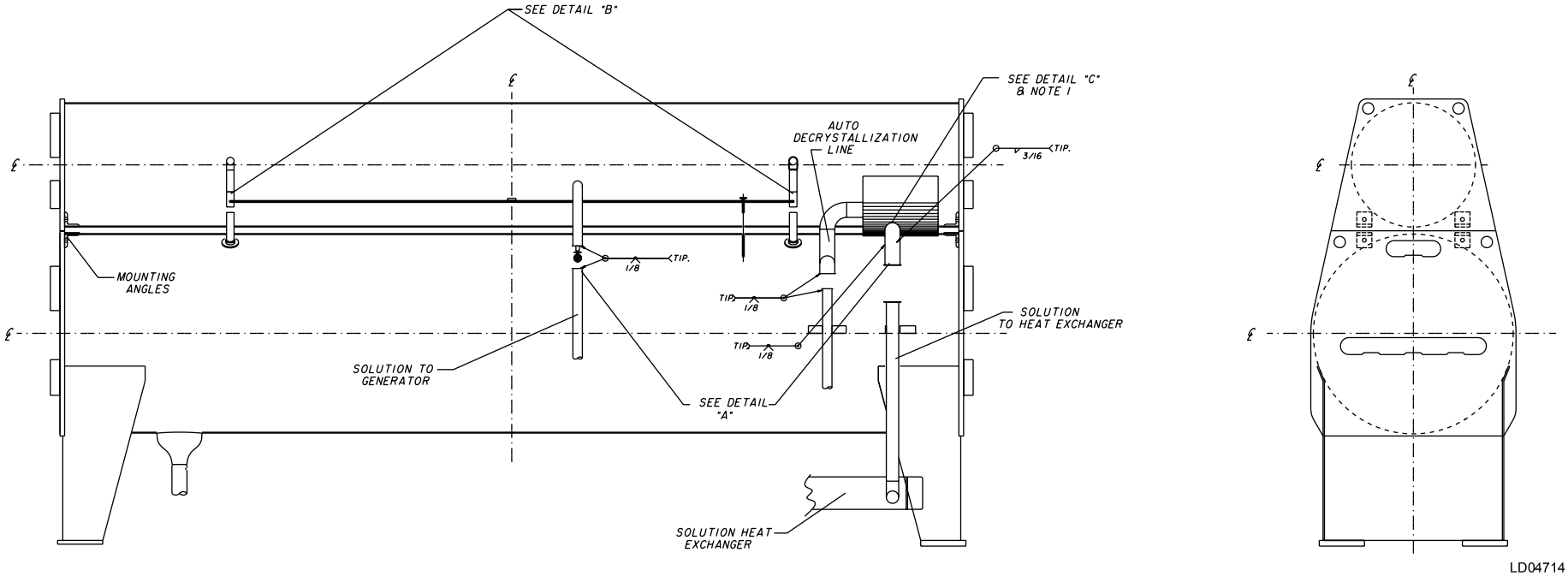


FIGURE 41 - UNIT ASSEMBLY FOR MODELS 4C1 THRU 6C4

NOTES:

1.- 8 (EIGHT) PIECES ARE SHIPPED LOOSE.
- 1 (ONE) REDUCTION No. 023-02507-000.
- 1 (ONE) ELBOW No. 023-02475-000.
- 1 (ONE) PIPE 10" LENGTH No. 066R11545-000.
- 1 (ONE) PIPE 10" LENGTH No. 066R11526-000.
- 1 (ONE) REDUCTION No. 023-02510-000.
- 1 (ONE) SCREWS & NUTS PACKET FOR ASSEMBLING THE ANGLES (SUPPORTS OF THE SHELL) No. 021-02097-000 & 021-00504-000.
- 2 (TWO) PIPES 7" LENGTH No. 066R12500-000.

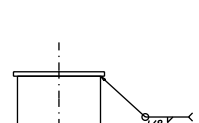
2.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.

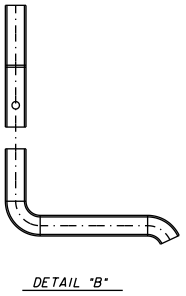
3.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.

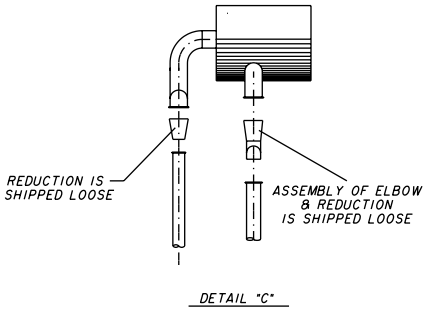
4.- GRIND OFF PIPE CAPS (DO NOT CUT INTO PIPE).

5.- BEVEL BOTH SIDES OF JOINTS (75°).

6.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC. IS ALLOWED TO ENTER PIPING)







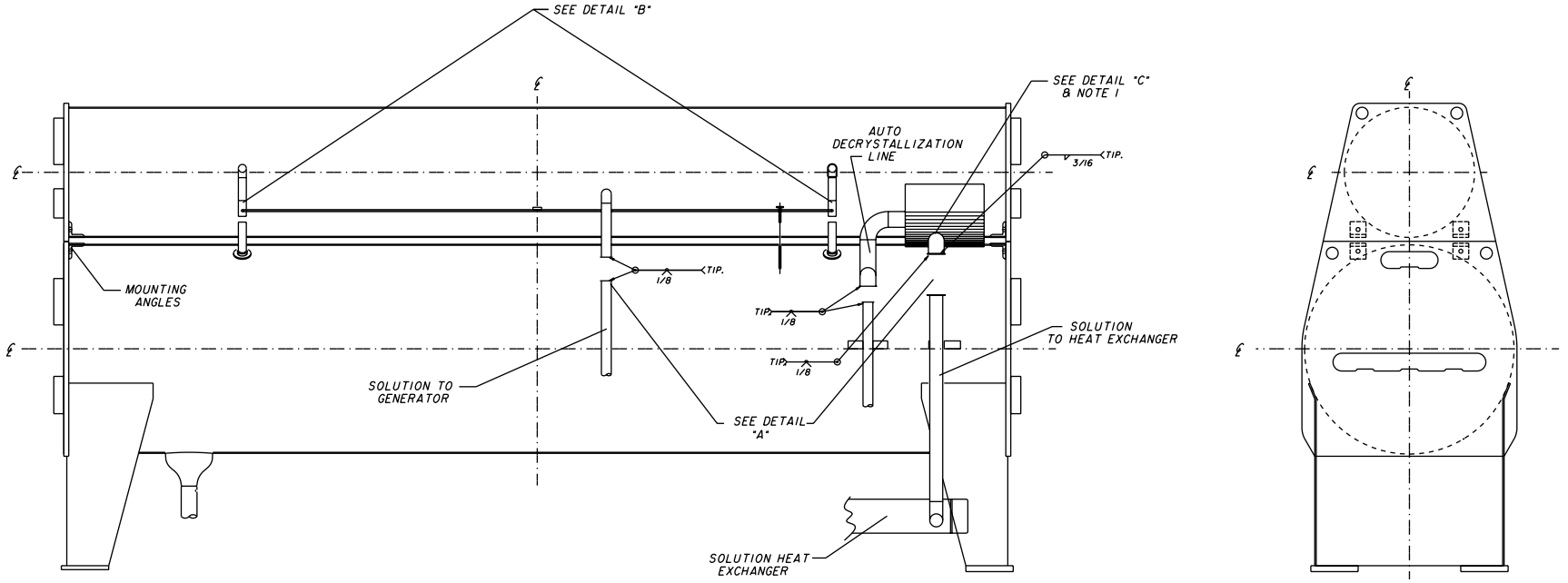
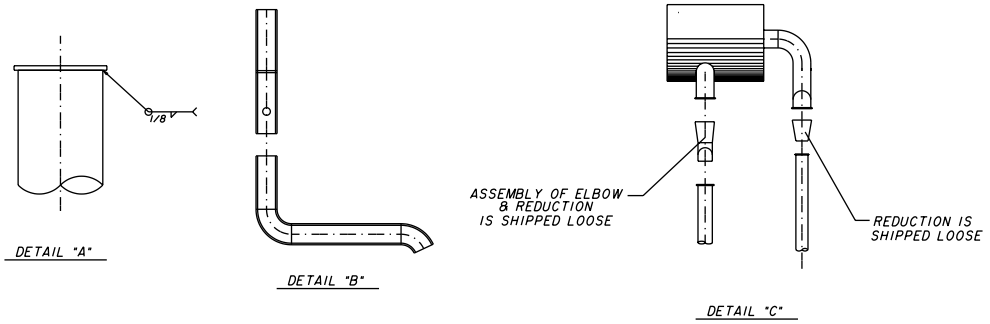


FIGURE 42 - UNIT ASSEMBLY FOR MODELS 7D1 THRU 8D3

LD04715

NOTES:

1.- 8 (EIGHT) PIECES ARE SHIPPED LOOSE.
    1 (ONE) REDUCTION No. 023-02509-000.
    1 (ONE) REDUCTION No. 023-02527-000.
    1 (ONE) ELBOW No. 023-02495-000.
    1 (ONE) PIPE 10" LENGTH No. 066R11526-000.
    1 (ONE) PIPE 10" LENGTH No. 066R11527-000.
    2 (TWO) PIPES 8" LENGTH No. 067-82917-000.
    1 (ONE) SCREWS & NUTS PACKET FOR ASSEMBLING THE ANGLES
    (SUPPORTS OF THE SHELL) No. 021-02097-000 & 021-00504-000.
2.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.
3.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.
4.- GRIND OFF PIPE CAPS (DO NOT CUT INTO PIPE).
5.- BEVEL BOTH SIDES OF JOINTS (75°).
6.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC.
    IS ALLOWED TO ENTER PIPING)



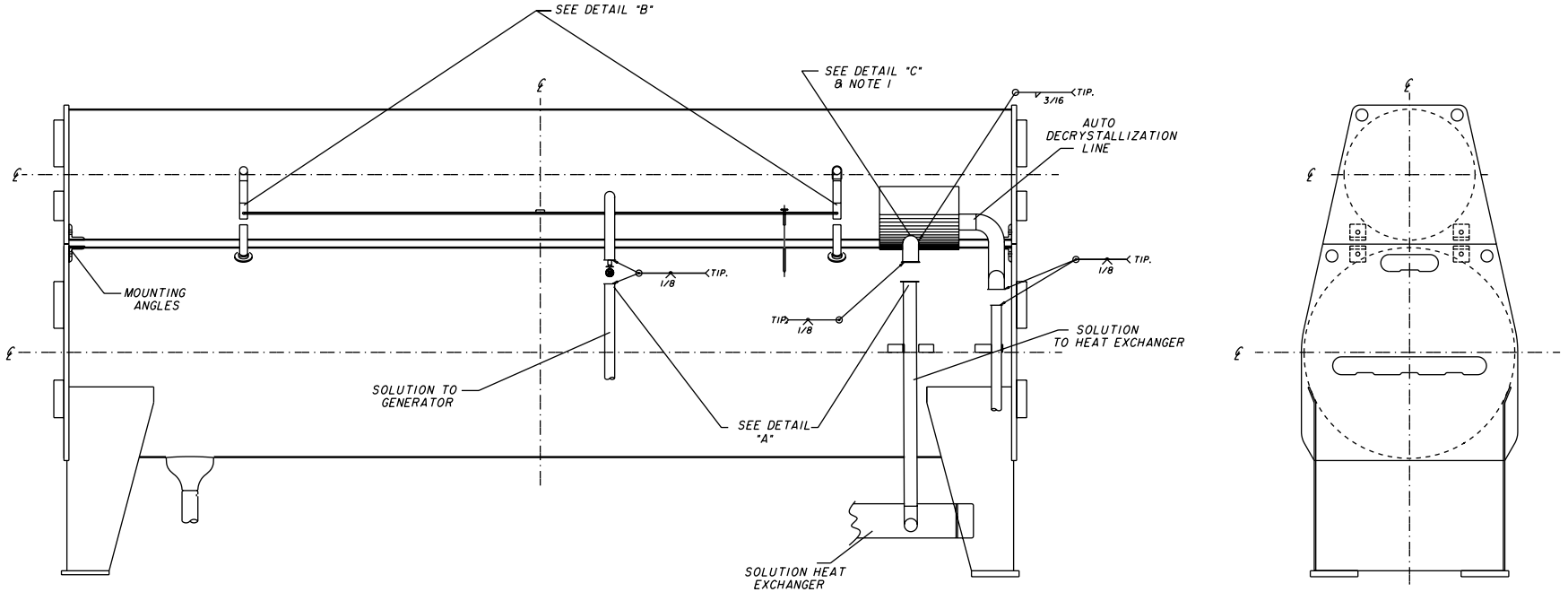
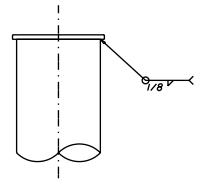
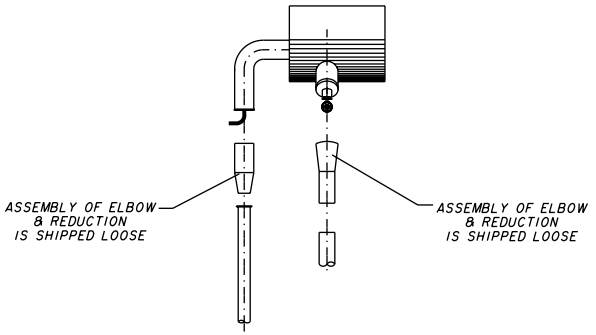


FIGURE 43 - UNIT ASSEMBLY FOR MODELS 8E1 THRU 10E3

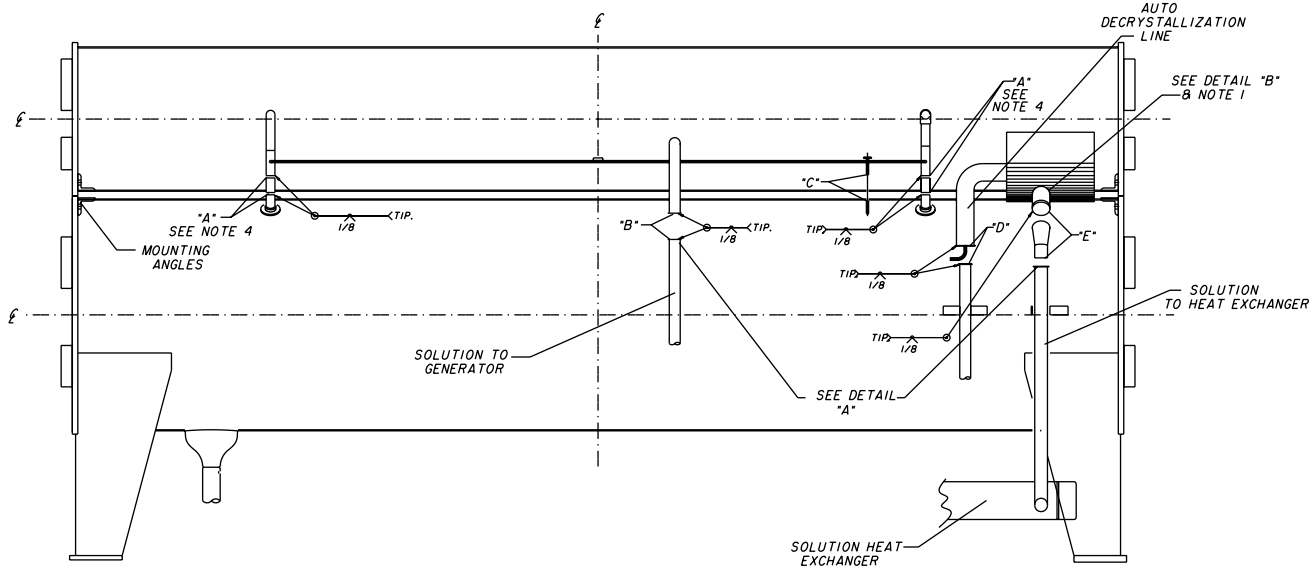
NOTES:
1.- USE BOLTS & NUTS, PROVIDED IN MOUNTING ANGLES, TO ASSEMBLE SHELLS.
2.- PANELS AND OTHER ELECTRICAL INSTALLATIONS MAY HAVE TO BE REMOVED IF SPACE IS LIMITED.
3.- GRIND OFF PIPE CAPS AT A, B, C, D & E (DO NOT CUT INTO PIPE).
4.- BEVEL BOTH SIDE OF JOINTS AT "A", 75°.
5.- WELD ALL JOINTS (CARE SHOULD BE EXERCISED SO THAT NO DIRT, SCALE, GREASE, ETC. IS ALLOWED TO ENTER PIPING)
6.- INSTALLATION INSTRUCTIONS AND PRODUCT DRAWING MUST BE REFERRED TO WHEN MAKING FIELD ASSEMBLY.
7.- 8 (EIGHT) FILL PIECES. TWO (2) REDUCERS, TWO (2) ELBOWS & FOUR (4) PIPES ARE SHIPPED LOOSE.

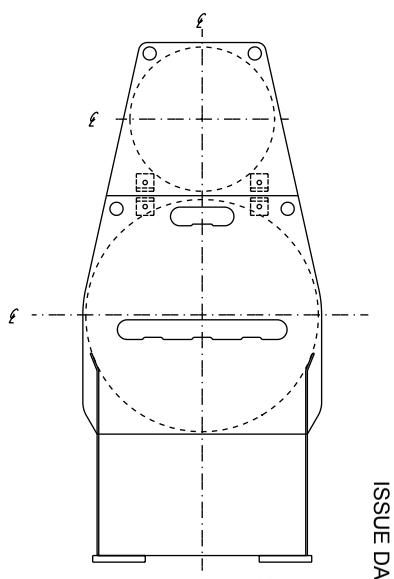


DETAIL "A"



DETAIL "B"





LD04717

FIGURE 44 - UNIT ASSEMBLY FOR MODELS 12F1 THRU 14F3

APPENDIX B

RECEIVING INSPECTION CHECKLIST

Quality Control Receiving Inspection Checklist
Large Tonnage Liquid Chillers

Name of Inspector: _____ JCI District: _____ Date: _____

Job Name : _____

JCI Order # _____ Unit Serial # _____ Unit Model # _____

Ambient Temperature _____ °F (°C)

A. Unit Specification Check

Verify that the unit delivered matches the order specifications.

B. Holding Charge Verification (Read directly from pressure gauge)

Internal pressure in unit checked and recorded.

Vapor Compression:
_____ PSIG (Factory Charged Units) R-_____.
_____ PSIG (Uncharged Units) N_2

Absorption:
_____ PSIG (Uncharged Units) N_2
_____ mm Hg Abs (vacuum)

Internal Pressure in components verified (Split Shipped Units).

Vapor Compression:
Compressor _____ PSIG N_2
Condenser Shell _____ PSIG N_2
Evaporator Shell _____ PSIG N_2

Single-Stage Absorption:
Generator/Cond. Shell _____ PSIG N_2
Evap./Abs. Shell _____ PSIG N_2

Two-Stage Absorption:
Generator/Cond. Shell _____ PSIG N_2
Main Shell _____ PSIG N_2
Hot Water Hxer. _____ PSIG N_2

If the pressure in the unit or component has dropped to atmosphere (0 PSIG), contact JCI PTS immediately. Once the leak is found and repaired, the unit or component should be evacuated followed by the addition of a 4 PSIG holding charge.

Leak Test Necessary? Yes No

If yes, indicate location and probable cause of leak(s) below:

_____

_____

_____

_____

_____

_____

B

RECEIVING INSPECTION CHECKLIST (CONT'D)

C. Visual Inspection of unit

Record damage or deficiencies below:

_____

_____

_____

_____

_____

D. Inspection of ship loose items

☐ All items listed on packing slip present in ship loose crate(s)

☐ Visually check for damage to ship loose components.

Record damaged or missing ship loose items below.

Part Number	Missing	Damaged
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

Note: Shipping damage or missing ship loose items.

Any shipping damage or missing items must be noted at the time of this inspection so that appropriate repairs made and or claims can be processed.

Johnson Controls will not be liable for the loss or damage of any part(s) or material(s) whether the part(s) of the original equipment or part of the ship loose items on the order after the date of this receiving inspection.

E. Customer Training

☐ Customer provided with appropriate installation literature and name of local Johnson Controls contact.

☐ Customer instructed on proper storage and handling procedures.

Customer Signature _____ Date _____

Company Name: _____

Address: _____

City: _____ State: _____ Zip Code _____

Inspector's Signature _____ Date _____

Comments:

_____

_____

_____

_____

_____

Johnson Controls	MODEL - YIA	
INSTALLATION CHECKLIST	Supersedes: 155.16-CL1 (509)	Form 155.16-CL1 (113)

INSTALLATION CHECKLIST AND REQUEST FOR AUTHORIZED STARTUP ENGINEER

CUSTOMER: _____ JOB NAME: _____

ADDRESS: _____ LOCATION: _____

PHONE: _____ CUSTOMER ORDER NO: _____

JCI TEL NO: _____ JCI ORDER NO: _____ JCI CONTRACT NO: _____

CHILLER MODEL NO: _____ **UNIT SERIAL NO**: _____

The work (as checked below) is in process and will be completed by: _____ / _____ / _____
Month Day Year

The following work must be completed in accordance with installation instructions:

A. GENERAL

1. All major pieces, boxes and crates are recieved ..... ☐
2. No visible signs of damage ..... ☐
3. With a local YORK / Johnson Controls Service Representative present, open all containers and check for contents against packing list ..... ☐
4. All damage or sign of possible damage have been reported to the transportation company ..... ☐
5. Unit mounted on a floor level to 1/4" ..... ☐
6. Unit located in accordance with the minimum clearance dimensions as recommended ..... ☐
7. Isolation pads under all four feet, as required ..... ☐
8. If shipped in two sections, unit assembled under YORK / Johnson Controls supervision ..... ☐
9. Unit installed in an area protected from weather and maintained at a temperature above freezing .... ☐

B. PIPING

1. Condenser water piping installed between condenser, pumps and cooling tower (Include Cross-over Line) ..... ☐
2. Chilled water piping installed between cooler, pumps and cooling coils ..... ☐
3. Steam or hot water piping installed between unit and source of supply ..... ☐
4. Condensate traps and removal system installed ..... ☐
5. Make-up and fill lines installed to cooling tower and chilled water system ..... ☐
6. All thermometer wells and gauge connections installed in chilled and condenser water lines - trimmed as necessary ..... ☐
7. Check all water piping checking for strain – Piping shouldnot spring when connections are broken at unit ..... ☐
8. Water piping leak tested and flushed, and water strainers cleaned after flushing ..... ☐
9. Piping systems filled with water and trapped air vented ..... ☐
10. Chilled and condenser water, hot water or steam flow available to meet unit design requirements. ..... ☐
11. Pressure relief devices if used are vented per all applicable codes ..... ☐

C. ELECTRICAL WIRING

1. Main and control power supply available ..... ☐
2. Wiring completed from main power supply to power panel – but not cut to final length or connected to panel ..... ☐
3. External control wiring completed from Control Center to flow switch(es), pump motor starters, etc. in accordance with Wiring Diagram (155.16-W4) .... ☐
4. Power available and wiring completed to the following starters and motors:

NOTE: Do not check unit pump motors rotation.

a. Chilled water pumps ..... ☐
b. Condenser water pumps ..... ☐
c. Cooling tower fan (if used) ..... ☐

5. Meg-ohm meter available for checking motor windings ..... ☐

B

D. TESTING EVACUATING AND CHARGING

(Under YORK/Johnson Controls Supervision Only.)

1. R-22 available for testing (field reassembled units only) ..... ☐
2. Dry Nitrogen available for testing (field reassembled units only) ..... ☐
3. YORK Lithium Bromide charge available for charging ..... ☐
4. 2-Ethyl / Hexanol additive is at the job site ..... ☐

Owner's operating personnel:

Name: _____

Phone Number: _____

Name: _____

Phone Number: _____

Name: _____

Phone Number: _____

E. CONDITIONS

1. YORK purge pump oil available on job ..... ☐
2. Cooling load available for testing and operating the unit ..... ☐
3. Personnel available for final wiring connections ..... ☐
4. Personnel available for start-up and testing..... ☐
5. Owner's operating personnel available for instruction..... ☐

CONTRACTOR'S RESPONSIBILITIES AND INSTRUCTIONS TO USE FORM

This installation checklist provides a quick way to check if all necessary installation work was completed in accordance with all applicable installation instructions in Form 155.16-N3, and when completed, acts as a request for Johnson Controls to furnish start-up supervision.

Complete this form as follows:

1. Fill out the top of the page.
2. Check off each item as required. Cross out (x) items that do not apply.
3. Enter names, initials, and date of the operating personnel who completed the checklist.
4. **Bottom of Form:** Enter the date that the Johnson Controls start-up technician should be at the job site and the name(s) of the supervisor(s) to be contacted.
5. Retain one copy in files and send one copy to customer.

With reference to the terms of the above contract, we are requesting the presence of your JCI Authorized Representative at the job site on _____ / _____ / _____ to start the system and instruct operating personnel. Have the JCI representative contact: _____

Month Day Year Name/Phone

We understand that the services of the Johnson Controls Authorized Representative will be furnished in accordance with the contract for a period of time of not more than _____ consecutive normal working hours, and we agree that a charge of _____ per diem plus travel expenses will be made to Johnson Controls if services are required for longer than _____ consecutive normal hours or if repeated calls are required, through no fault of Johnson Controls.

Customer/Contractor Signature: _____

Title: _____

Form Completed by: _____

Johnson Controls

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 18 - SI METRIC CONVERSION

MEASUREMENT	MULTIPLY ENGLISH UNIT	BY FACTOR	TO OBTAIN METRIC UNIT
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Horsepower	0.7457	Kilowatts (kW)
Flow Rate	Gallons / Minute (gpm)	0.0631	Liters / Second (l/s)
Length	Feet (ft)	0.3048	Meters (m)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lbs)	0.4538	Kilograms (kg)
Velocity	Feet / Second (fps)	0.3048	Meters / Second (m/s)
Pressure Drop	Feet of Water (ft)	2.989	Kilopascals (kPa)
	Pounds / Square Inch (psi)	6.895	Kilopascals (kPa)

TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

Example: (45.0°F - 32°) x 0.5556 = 27.2°C

To convert a temperature range (i.e., a range of 10°F) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

Example: 10.0°F range x 0.5556 = 5.6 °C range

P.O. Box 1592, York, Pennsylvania USA 17405-1592
800-861-1001
www.johnsoncontrols.com

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