Model YK (Style G) Centrifugal Liquid Chiller

R-134a, R-513A, or R-1234ze Refrigerant, with OptiView Control Center for Electromechanical Starter, Solid State Starter, and Variable Speed Drive

Installation Guide

Issue Date: 2021-10-22

Form Number: 160.75-N1 (1021)

Supersedes: 160.75-N1 (919)

Johnson Controls

Contents

General safety guidelines

Important: Read before proceeding.

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, 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 rigging, installation, and operating or 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 rigging, installation, and operating or service personnel. It is expected that these individuals possess independent training that enables them to perform their assigned tasks properly and safely. It is essential that, before performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and 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:

DANGER

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

WARNING

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

CAUTION

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.

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

⚠ WARNING

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 or 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 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 or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls Knowledge Exchange website at https://docs.johnsoncontrols.com/chillers/.

It is the responsibility of rigging, lifting, and operating or service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating or service personnel 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.

Revision notes

Revisions made to this document are indicated in the following table. These revisions are to technical information, and any other changes in spelling, grammar, or formatting are not included.

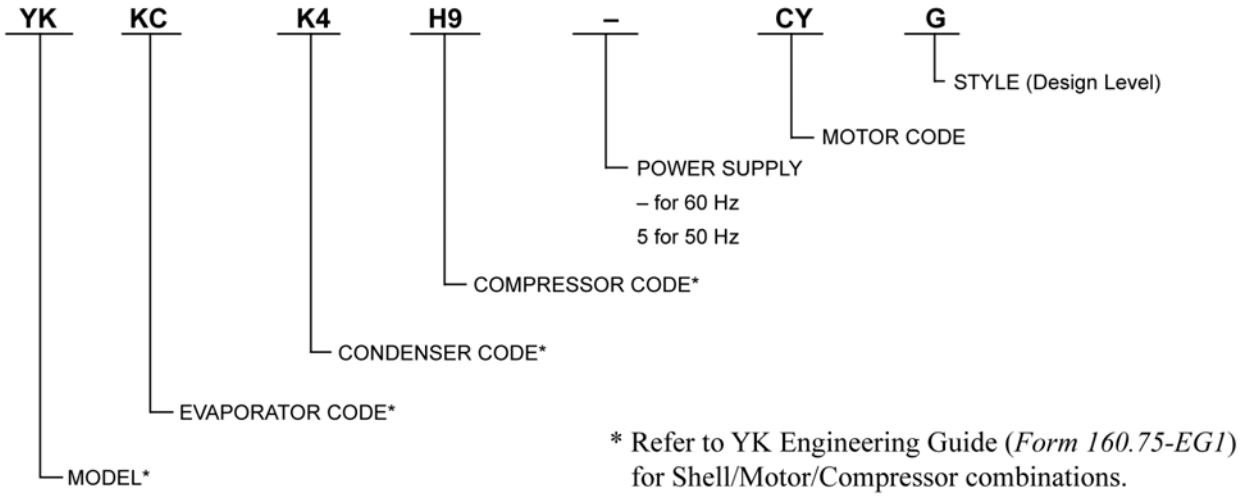
Affected pages	Description
1,9	Added R-1234ze refrigerant

Associated literature

Table 1: List of associated literature

Manual description	Form number
Installation checklist and start-up request	160.75-CL1
Unit start-up checklist	160.75-CL2
Installation and reassembly - unit	160.75-N3
Installation - MV VSD - 2300 VAC – 6600 VAC	160.00-N6
Installation - MV VSD - 10 kV – 13.8 kV	160.00-N8
Wiring Diagrams - field connections - unit-mounted SSS, MV SSS, or remote mounted MV SSS, MV EMS	160.75-PW1
Wiring diagrams - field connections - remote mounted MV SSS	160.75-PW2
Wiring diagrams - field connections - remote mounted MV VSD	160.75-PW3
Wiring diagrams - field connections - LV VSD	160.54-PW6
Wiring diagrams - OptiView Control Center and EMS	160.75-PW5
Wiring diagrams - OptiView Control Center and EMS with the LTC I/O Board	160.75-PW7
Wiring diagrams - OptiView Control Center and SSS, LV VSD, MV VSD	160.75-PW6
Wiring diagrams - OptiView Control Center and SSS, LV VSD, MV VSD with the LTC I/O board	160.75-PW8
Wiring diagrams - field control modifications	160.75-PW4
Unit operation and maintenance	160.75-O1
Operation OptiView panel	160.54-O1
Operation - variable speed drive - TM model	160.00-O1
Operation and maintenance - solid state starter (Mod "B")	160.00-O2
Operation - variable speed drive - VSD and LVD model	160.00-O4
Operation - variable speed drive - HYP model	160.00-O10
Operation - floor mounted MV SSS, manufactured before 2007	160.00-O5
Operation - floor mounted MV SSS, manufactured after 2007	160.00-O5.1
Operation - unit mounted MV SSS	160.00-O7
Operation - MV VSD - 2300 VAC – 6600 VAC	160.00-O6
Operation - MV VSD - 10 kV – 13.8 kV	160.00-O8
Service policy - shipping damage claims	50.15-NM

Nomenclature



Introduction

General

This manual describes the installation of a YORK YK Mod G Centrifugal Chiller. This unit can be shipped as a single factory assembled, piped, wired package, requiring minimum field labor to make chilled water connections, condenser water connections, refrigerant atmospheric relief connections, and electrical power connections. Refrigerant and oil charges are shipped separately unless optional condenser isolation valves are ordered.

Chillers can also be shipped dismantled when required by rigging conditions, but generally it is more economical to enlarge access openings to accommodate the factory assembled unit. Chillers shipped dismantled must be field assembled under the supervision of a Johnson Controls representative, otherwise installation will be as described in this instruction.

Field assembled units only

Use *Installation and Reassembly - Unit (Form 160.75-N3)* in conjunction with this installation guide. This instruction is provided with all units that are field assembled.

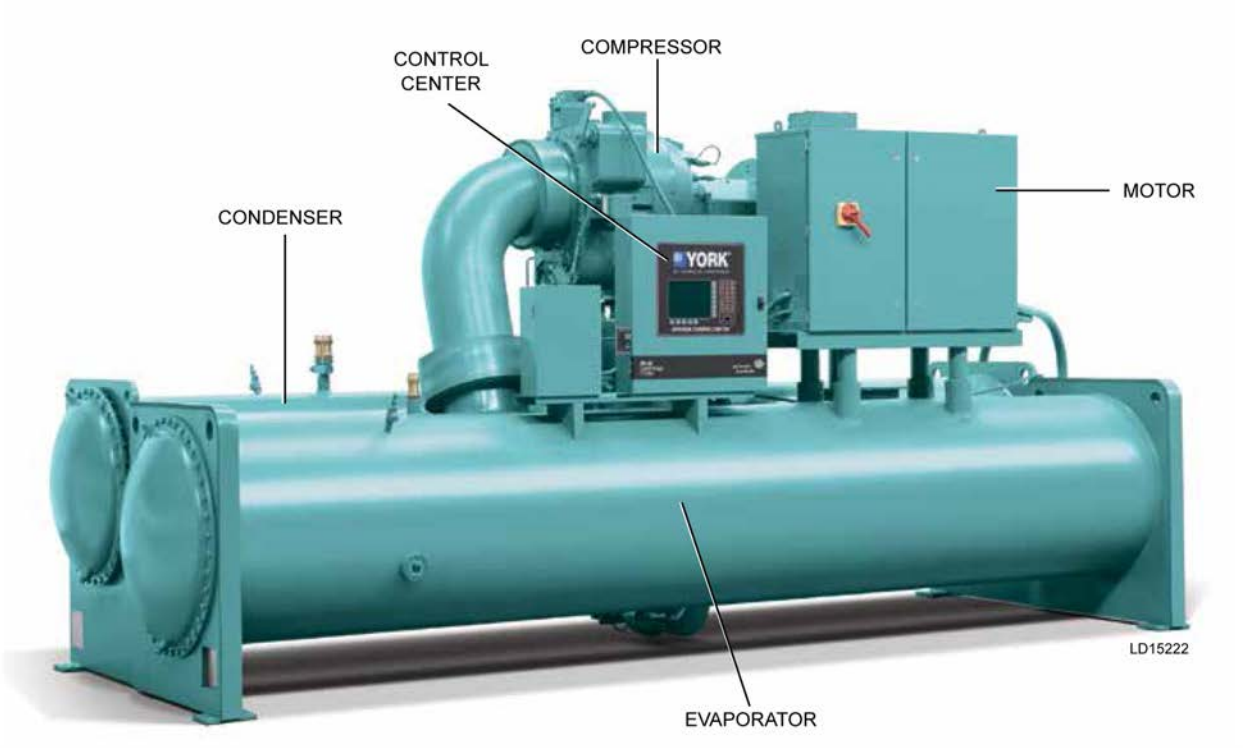
The services of a Johnson Controls representative are provided to check the installation, supervise the initial start-up and operation of all chillers installed in the Continental United States.

⚠ CAUTION

The Johnson Controls Warranty may be voided if the following restrictions are not adhered to:

1. No valves or connections should be opened under any circumstances because such action will result in loss of the factory nitrogen charge.
2. Do not dismantle or open the chiller for any reason except under the supervision of a Johnson Controls representative.
3. When units are shipped dismantled, notify the nearest Johnson Controls office in ample time for a Johnson Controls representative to supervise rigging the unit to its operating position and the assembly of components.
4. Do not make final power supply connections to the compressor motor or control center.
5. Do not charge the compressor with oil.
6. Do not charge the unit with refrigerant.
7. Do not attempt to start the system.
8. Do not run hot water, 110°F (43°C) max, or steam through the evaporator or condenser at any time.

Figure 1: Model YK Chiller



Shipment

The chiller can be ordered and shipped in one of six forms.

When more than one chiller is involved, the major parts of each unit are marked to prevent mixing assemblies. Piping and wiring drawings are provided by Johnson Controls.

Form 1 - Factory assembled unit, with motor, refrigerant, and oil charges

The unit is shipped as one major assembly.

The motor and compressor assembly come mounted, with all necessary interconnecting piping assembled.

The OptiView™ control center is mounted on the unit.

Complete unit factory leak tested, evacuated and charged with R-134a, R-513A or R-1234ze.

An optional solid state starter or variable speed drive can be factory mounted and wired.

Miscellaneous packaging of four vibration isolation pads, or optional spring isolators and brackets. K7 units are shipped with eight vibration isolation pads.

Form 2 - Factory assembled unit, with motor only

The unit is shipped as one major assembly.

The motor and compressor assembly come mounted, with all necessary interconnecting piping assembled.

The OptiView™ control center is mounted on the unit.

Complete unit factory leak tested, evacuated and charged with holding charge of nitrogen.

An optional solid state starter or variable speed drive can be factory mounted and wired.

Miscellaneous packaging of four vibration isolation pads, or optional spring isolators. K7 units are shipped with eight vibration isolation pads.

Form 3 - Driveline seperated from shells

The unit is shipped as two major assemblies:

- Chiller unit
- Compressor and motor

The unit is first factory assembled, refrigerant piped, wired and leak tested, then dismantled for shipment. The evaporator and condenser assembly is not skidded.

All wiring integral with the compressor is left on it, and all conduit is left on the shell. All openings on the compressor and shell are closed and charged with dry nitrogen to a pressure of 2 to 3 psig (115 to 122 kPa).

Miscellaneous packaging of control center, tubing, water temperature controls, wiring, isolators, and similar items. The unit is shipped with a nitrogen charge. Refrigerant charge shipped seperately.

ⓘ **Note:** Units shipped dismantled must be re-assembled by, or under the supervision of, a Johnson Controls representative. Refer to *Installation and Reassembly - Unit (Form 160.75-N3)*.

Form 7 - Split shells

The unit is shipped as three major assemblies:

- Compressor and motor
- Evaporator and condenser, shells are split

The unit is first factory assembled, refrigerant piped, wired and leak tested, then dismantled for shipment.

The compressor and motor assembly is removed from the shells and skidded.

Evaporator and condenser shells are separated at tube sheets and are not skidded. Refrigerant lines between the shells are flanged and capped, requiring no welding.

All wiring integral with compressor is left on it, and all conduit is left on shell. All wiring harnesses on the shells are removed. All openings on the compressor and the shell are closed and charged with dry nitrogen to a pressure of 2 to 3 psig (115 to 122 kPa).

Miscellaneous packaging of control center, tubing, water temperature controls, wiring, isolators, and similar items. The unit is shipped with a nitrogen charge. Refrigerant charge shipped seperately.

ⓘ **Note:** Units shipped dismantled must be re-assembled by, or under the supervision of, a Johnson Controls representative. Refer to *Installation and Reassembly - Unit (Form 160.75-N3)*.

Form 9 - Unit separate from variable speed drive

The unit is shipped as two major assemblies:

- Chiller unit
- Variable speed drive

The unit is first factory assembled, refrigerant piped, wired and leak tested, then dismantled for shipment. Evaporatora and condenser assembly is not skidded.

All wiring integral with compressor is left on it, and all conduit is left on shell. All openings on compressor, and shell are closed and charged with dry nitrogen to a pressure of 2 to 3 psig (115 to 122 kPa).

Miscellaneous packaging of tubing, water temperature controls, wiring, isolators, and similar items. The unit is shipped with a nitrogen charge. Refrigerant shipped separately in appropriate cylinders. See Figure 2.

Form 10 - Unit separate from variable speed drive

The unit is shipped as two major assemblies:

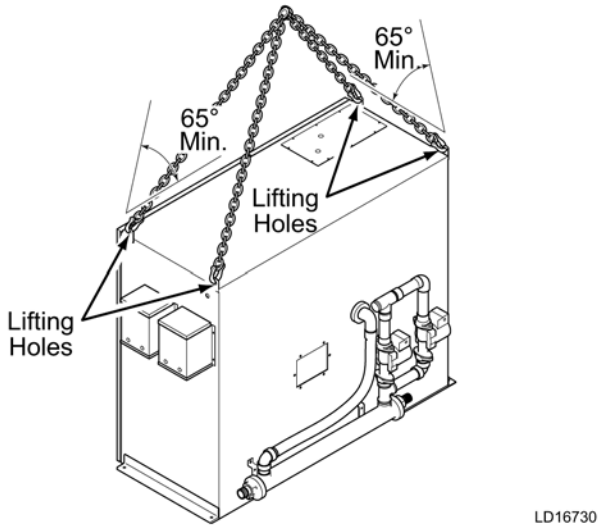
- Chiller unit
- Variable speed drive

The unit is first factory assembled, refrigerant piped, wired and leak tested, then dismantled for shipment. The evaporator and condenser assembly is not skidded.

All wiring integral with compressor is left on it, and all conduit is left on the shell.

Miscellaneous packaging of tubing, water temperature controls, wiring, isolators, and similar items. The unit is shipped with refrigerant charge. See Figure 2.

Figure 2: Variable speed drive rigging



Inspection - damage - shortage

The unit shipment should be checked on arrival to see that all major pieces, boxes, and crates are received. Each unit should be checked on the trailer or rail car when received, before unloading, for any visible signs of damage. Any damage or signs of possible damage must be reported to the transportation company immediately for their inspection. Johnson Controls will not be responsible for any damage in shipment, at job site, or loss of parts. Refer to *Shipping Damage Claims, Form 50.15-NM*.

When the unit is received at the job site all containers should be opened and contents checked against the packing list. Any material shortage should be reported to Johnson Controls immediately. Refer to *Shipping Damage Claims, Form 50.15-NM*.

Chiller data plate

A unit data plate is mounted on the control center assembly of each unit, giving the unit model number, design working pressure, water passes, refrigerant charge, serial numbers, and motor power characteristics and connection diagrams.

Additional information can be found on the motor data plate. This information should be included when contacting the factory about any problem relating to the motor.

Long-term storage

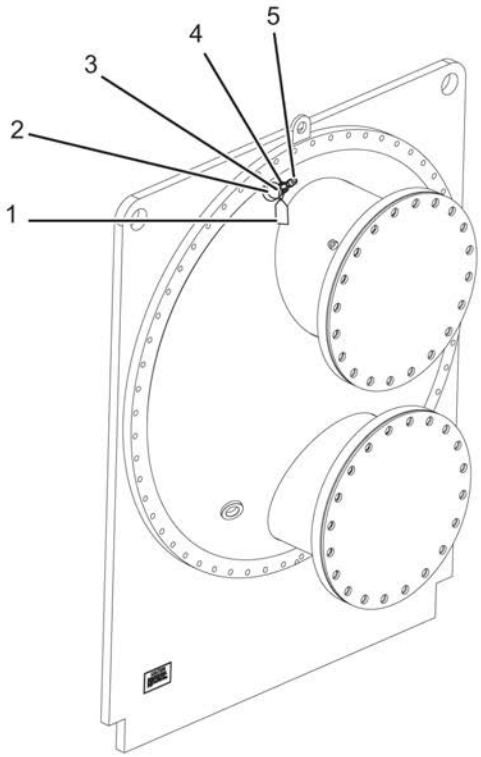
About this task:
To protect the waterbox of pressure vessels from rusting, the tube side (water side) is purged and charged with nitrogen to a positive pressure of 5 psig to 7 psig.

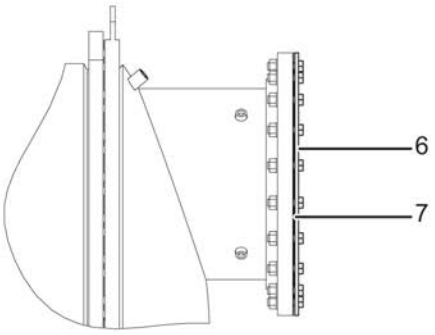
Do not break the seal or remove closures until the unit is ready for set up. Relieve pressure according to the procedure shown in Figure 3.

DANGER

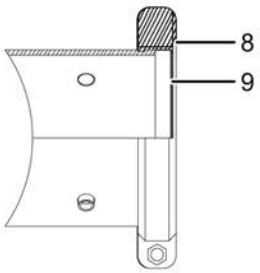
Failure to follow the following procedures will cause severe personal injury or death to operators themselves or people on-site. It is the obligation and responsibility of operators to identify and recognize the inherent hazards of material under pressure and to protect themselves.

Figure 3: Long term storage - tube side

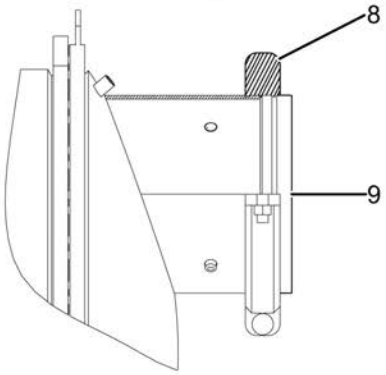




Nozzle with flange
150 lb and 300 lb closures



Nozzle without flanges
(Lines 4 in. through 12 in.)



Nozzle without flanges
(Lines 14 in. through 24 in.)

ITEM	DESCRIPTION
1	Tag Warning Dennison 8E
2	Gauge Press 2 Dia 0-30
3	Tag GlvSt Wire Speed
4	Bush Pipe 3/4 - 14 NPTE X
5	Valve, Transducer 1/4 NPTE X
6	Flange Cover
7	Gasket
8	Victaulic Coupling
9	Sealing Cap

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To relieve pressure from the unit, complete the following steps:

1. Check the working space to make sure that it is open and has good ventilation. If the space is not well ventilated, connect a hose or pipe to the valve (Item 5) and route it to outside.
2. Open the valve slowly until it is fully opened.
3. Monitor the pressure gauge (Item 2). The pressure should decline gradually.
4. When the pointer of pressure gauge does not move and no nitrogen comes out of valve (Item 5), it means that no positive pressure exists in the waterbox.
5. Now it is safe to remove the flange cover (Item 6) or sealing cap (Item 9).
6. Close the valve and remove the warning tag (Item 1).

Shipment form 2/3/7/9

All openings on the compressor, shells including evaporator and condenser, and oil reservoir are closed and charged with nitrogen to a pressure of 2 to 3 psig (115 to 122 kPa).

WARNING

To remove the closures, sealing caps, or sealing plug under pressure is extremely dangerous, and may cause severe injury or death to the operator or people in site.

Before trying to remove the closures, caps, or plugs on compressor and shells, relieve the pressure in compressor, shells, or system that are charged with nitrogen by opening the valves on them slowly until fully open.

DANGER

When relieving the pressure from compressor, shells, or system, conduct the nitrogen to outside to prevent the potential risk of asphyxiation.

Shipment form 1/10

The unit is shipped with refrigerant charge, it is not needed to relieve the pressure. Do not try to open any valves to relieve pressure or open closures, cap, or plugs on the compressor, shells, and elsewhere on the system.

Reclaim the refrigerant in the system before any service activities are done to the refrigeration system. Fully relieve the system pressure and then repair.

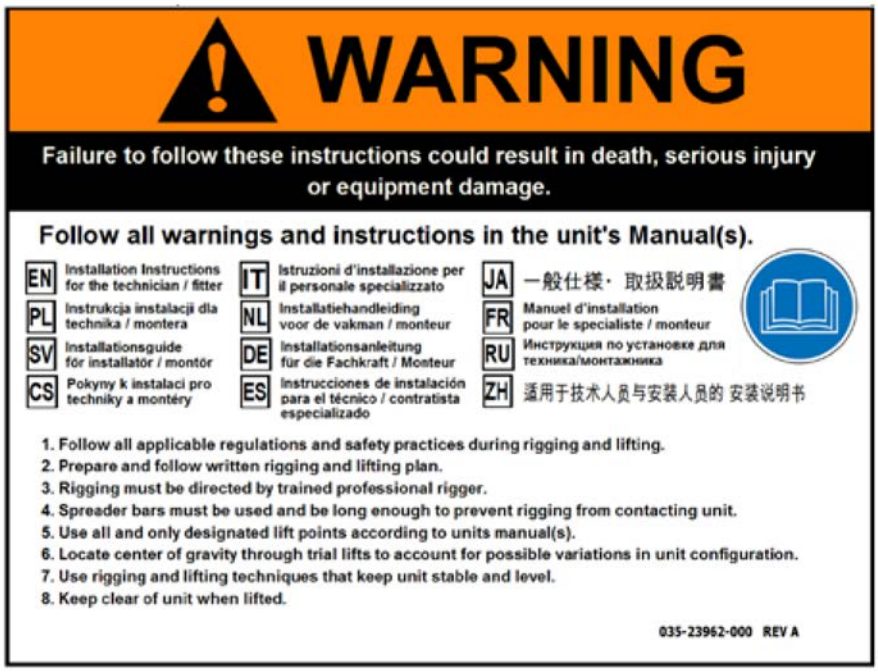
DANGER

The unit is charged with tons of refrigerant. When an uncontrollable leak is found, inform all of the relevant people to evacuate from the building to prevent from asphyxiation.

Never touch the refrigerant that is leaking, especially the liquid refrigerant, this will cause severe freezing to your hands or body.

Rigging

Figure 4: Rigging warning



LD19197

DANGER

Rigging and lifting should only be done by a professional rigger in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method depends on job specific factors, such as the rigging equipment available and site needs. A professional rigger must determine the rigging and lifting method to be used. It is beyond the scope of this manual to specify rigging and lifting details.

The complete standard chiller is shipped without skids. When optional skids are used it may be necessary to remove the skids so riggers skates can be used under the unit end sheets to reduce overall height.

Each unit has four lifting holes, two in each end, in the end sheets which should be used to lift the unit.

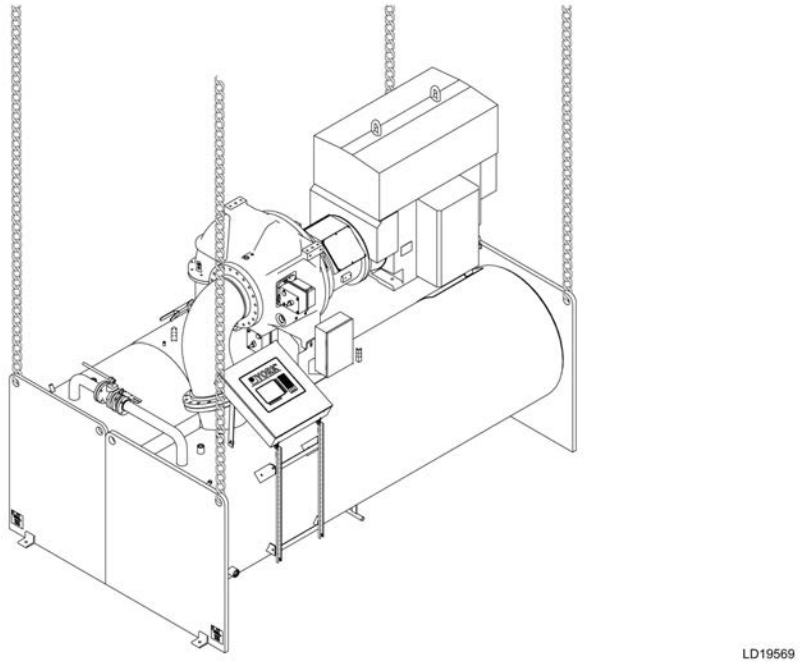
Care should be taken at all times during rigging and handling of the chiller to avoid damage to the unit and its external connections. Lift only using holes shown in Figure 5.

CAUTION

Do not lift the unit with slings around motor/compressor assembly or by means of eyebolts in the tapped holes of the compressor motor assembly. Do not turn a unit on its side for rigging. Do not rig vertically.

The rigging and operating weights and overall dimensions are given in the Installation section as a guide to determine the clearances required for rigging. Add 6 in. (15 cm) to overall height for optional skidded unit.

Figure 5: Rigging



Location

YORK Chillers are furnished with vibration isolator mounts for basement or ground level installations. Units can be located on upper floor levels providing the floor is capable of supporting the total unit operating weight and optional spring isolators are used.

⚠ CAUTION

Sufficient clearance to facilitate normal service and maintenance work must be provided all around and above the unit and particularly space provided at either end to permit cleaning or replacement of evaporator and condenser tubes, see Clearance. A doorway or other sufficiently large opening properly located may be used. The chiller should be located in an indoor location where temperatures range from 40°F to 110°F (4.4°C to 43.3°C).

Motors

The YK open motor is air cooled. Check state, local, and other codes for ventilation requirements.

Foundation

A level floor, mounting pad, or foundation not provided by Johnson Controls, capable of supporting the operating weight of the unit.

Clearance

Clearances should be adhered to as follows:

- Rear and above unit: 2 ft (61 cm).
- Front of unit: 3 ft (91 cm).
- Tube Removal:
    - 14 ft. (4.3 m) (either end)
    - 16 ft (4.9 m) on shell codes Q-Q, N-N, R-R, X-T and X-X.
    - 18 ft (5.5 m) on shell code S-S, S-V, Z-Z.
    - 22 ft (6.7 m) on shell code W-W.

Figure 6: Neoprene isolators, in. (mm)

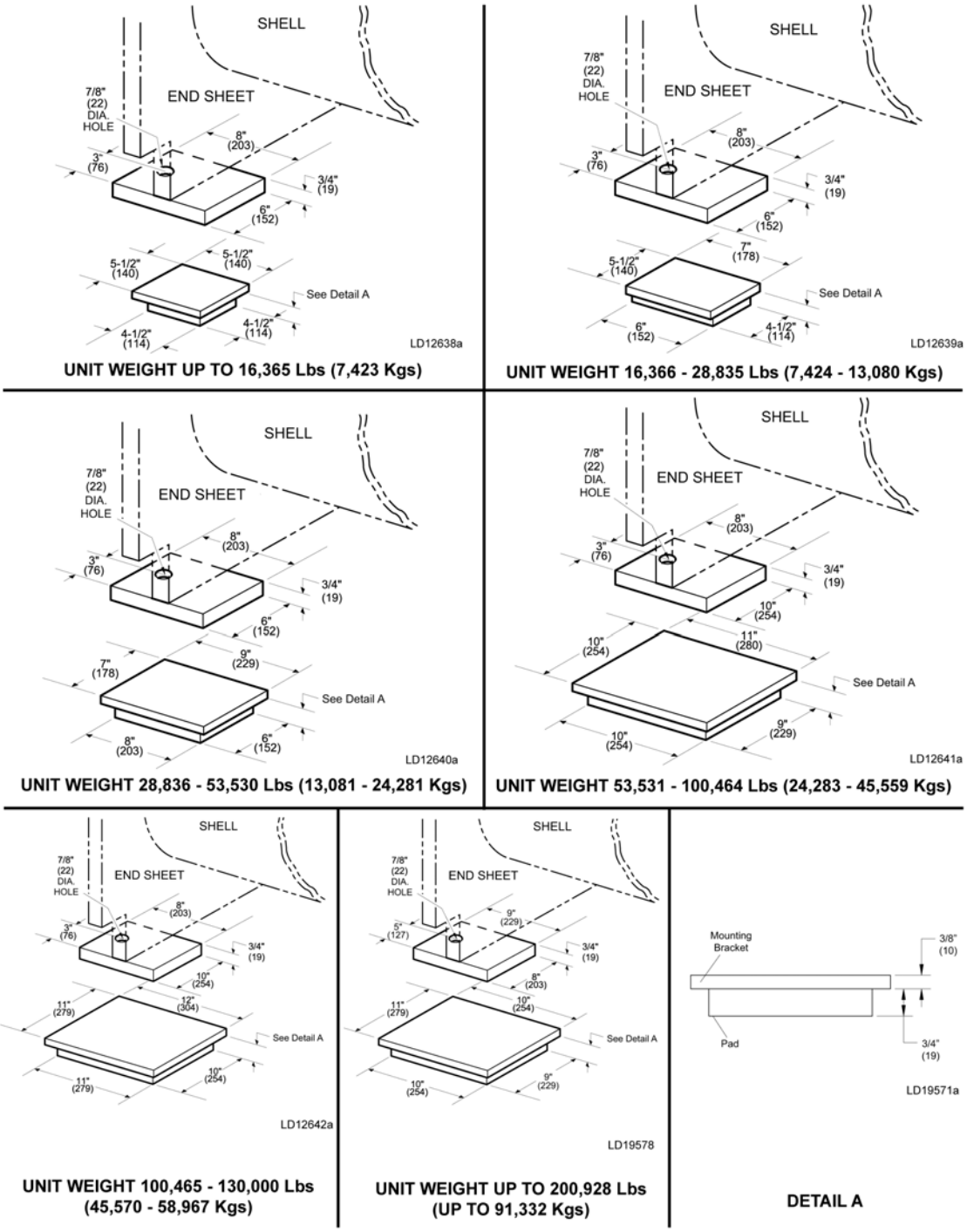


Figure 7: Spring isolators, in. (mm)

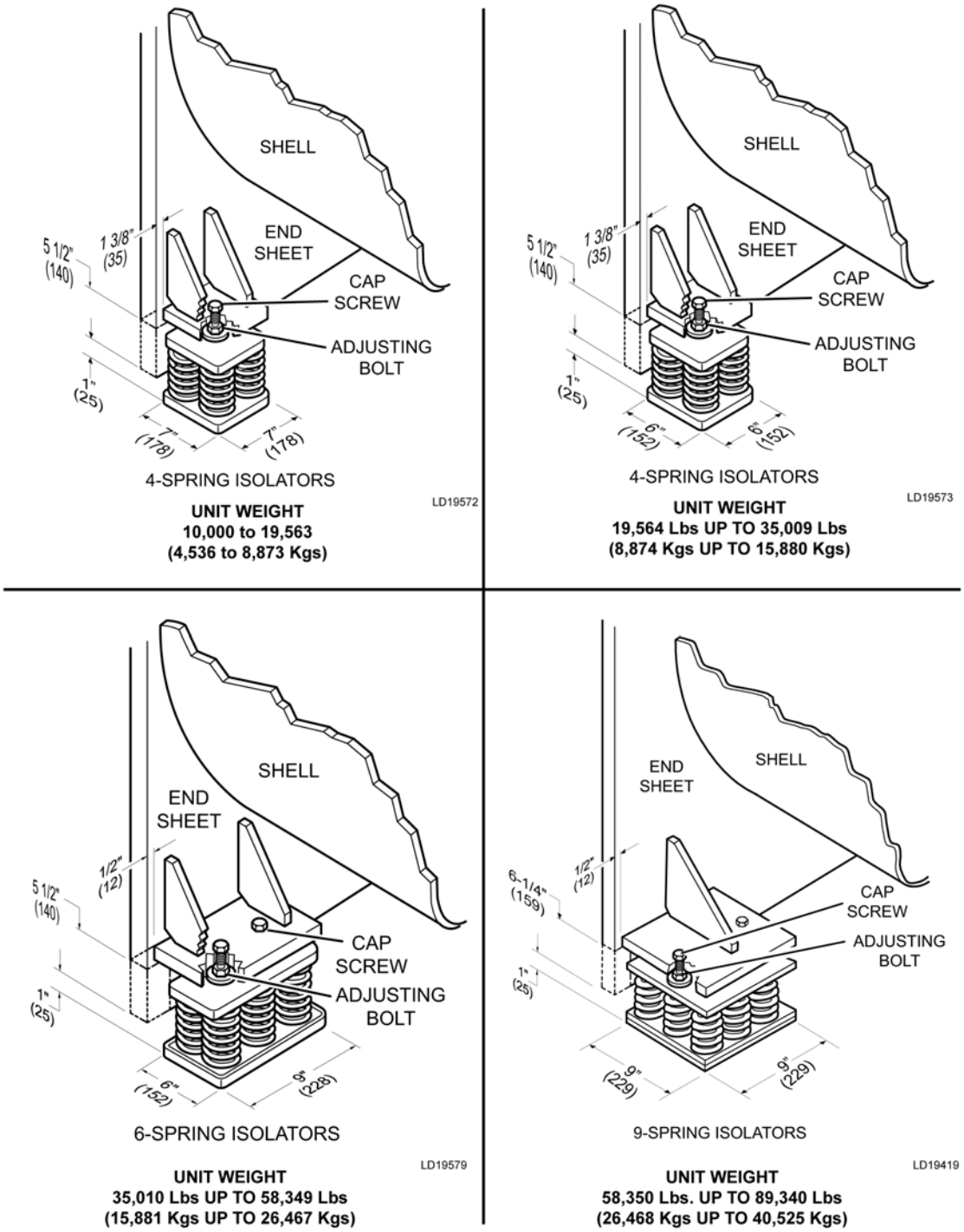
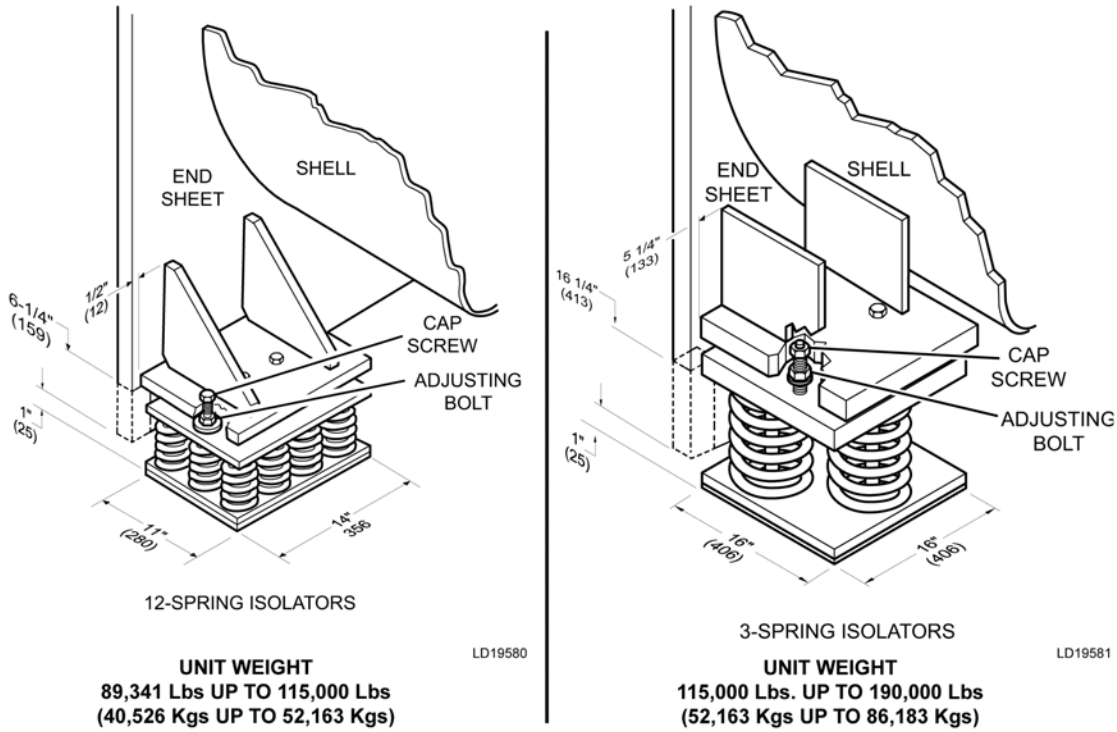


Figure 8: Spring isolators continued, in. (mm)



Installation

Rigging unit to final location

Rig the unit to its final location on the floor or mounting pad, lift the unit or shell assembly using an overhead lift and lower the unit to its mounting position. If optional shipping skids are used, remove them before lowering the chiller to its mounting position.

ⓘ **Note:** At this point units shipped dismantled should be assembled under the supervision of a Johnson Controls representative.

If the evaporator is to be field insulated, the insulation should be applied to the evaporator before the unit is placed in position while the unit is in the lift position. Be sure unit is properly supported. See Figure 5.

Locating and installing isolator pads

Locate the isolator pad mounts as shown in Figure 6, rubber side down.

After the isolator pads have been placed into position on the floor, lower the chiller onto the pads. When the unit is in place, remove the rigging equipment and check that the unit is level. The unit should be level within 1/4 in. (6 mm) from one end to the other end and from front to the rear. If the chiller is not level within the amount specified, lift it and place shims between the isolation pad and the chiller tube sheets. Shims are provided by the installer. Lower unit again and recheck to see that it is level.

Checking the isolation pad deflection

All isolation pads should be checked for the proper deflection while checking to see if the unit is level. Each pad should be deflected approximately 0.10 in. (2.5 mm) to 0.20 in. (5 mm). If an isolation pad is under-deflected, place shims between the unit tube sheet and the top of the pad to equally deflect all pads.

Leveling the unit

Check the longitudinal alignment of the unit by placing a level on the top center of the evaporator shell under the compressor and motor assembly. Check the transverse alignment by placing a level on top of the shell end sheets.

Installing optional spring isolators

When ordered, spring type isolator assemblies are supplied with the unit. The four assemblies are identical and can be placed at any of the four corners of the unit.

While the unit is still suspended by the rigging, bolt the isolators to the unit by inserting the cap screws through the holes in the mounting bracket into the tapped hole in the top of the isolator leveling bolts. Then the unit can be lowered onto the floor.

Rotate the leveling bolts one turn at a time, in sequence, until the unit end sheets are clear of the floor by the dimension shown in Figure 7 and Figure 8 and the unit is level. Check that the unit is level, both longitudinally and transversely. See Leveling the unit. If the leveling bolts are not long enough to level unit due to an uneven or sloping floor or foundation, steel shims, which are grouted if necessary, must be added beneath the isolator assemblies as necessary.

After the unit is leveled, wedge and shim under each corner to solidly support the unit in this position while piping connections are being made, pipe hangers adjusted and connections checked for alignment. Fill the unit with water and check for leaks. Adjust the leveling bolts until the wedges

and shims can be removed. The unit is now in the correct level position, clear of the floor or foundation and without any effect from the weight of the piping.

Piping connections

After the unit is leveled, and wedged in place for optional spring isolators, the piping connections can be made, chilled water, condenser water and refrigerant relief. The piping should be arranged with offsets for flexibility, and 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, not supplied by Johnson Controls, in the piping and hangers can be required by specifications, in order to effectively utilize the vibration isolation characteristics of the vibration isolation mounts of the unit.

Check for piping alignment – When the piping is complete, check for piping alignment. To check for piping alignment, open a connection in each line as close to the unit as possible by removing the flange bolts or coupling. If any of the bolts are bound in their holes, or if the connection springs are out of alignment, the misalignment must be corrected by correctly supporting the piping or by applying heat to anneal the pipe.

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

Evaporator and condensor water piping

The evaporator and condenser liquid heads of the chiller have nozzles which are grooved, suitable for welding 150 psig DWP flanges or the use of flexible couplings. Factory mounted flanges are optional.

The nozzles and water pass arrangements are furnished in accordance with the job requirements furnished with the job, see product drawings. Standard units are designed for 150 psig DWP on the water side. If job requirements are for greater than 150 psig DWP, check the unit data plate before applying pressure to evaporator or condenser to determine if the chiller has provisions for the required DWP.

Inlet and outlet connections are identified by labels placed adjacent to each nozzle.

The coolant temperature inside any JCI-supplied liquid-cooled motor starter must be maintained above the dewpoint temperature in the equipment room to prevent condensing water vapor inside the starter cabinet. An additional temperature-controlled throttle valve is needed in the flow path for the starter heat exchanger to regulate cooling above the equipment room dewpoint for applications using cooling sources other than evaporative air-exchange methods, such as wells, bodies of water, and chilled water. The temperature control valve should be the type to open on increasing drive coolant temperature, fail-closed, and set for a temperature above dewpoint. This can be requested as factory-supplied on a chiller order by special quotation.

Chilled water

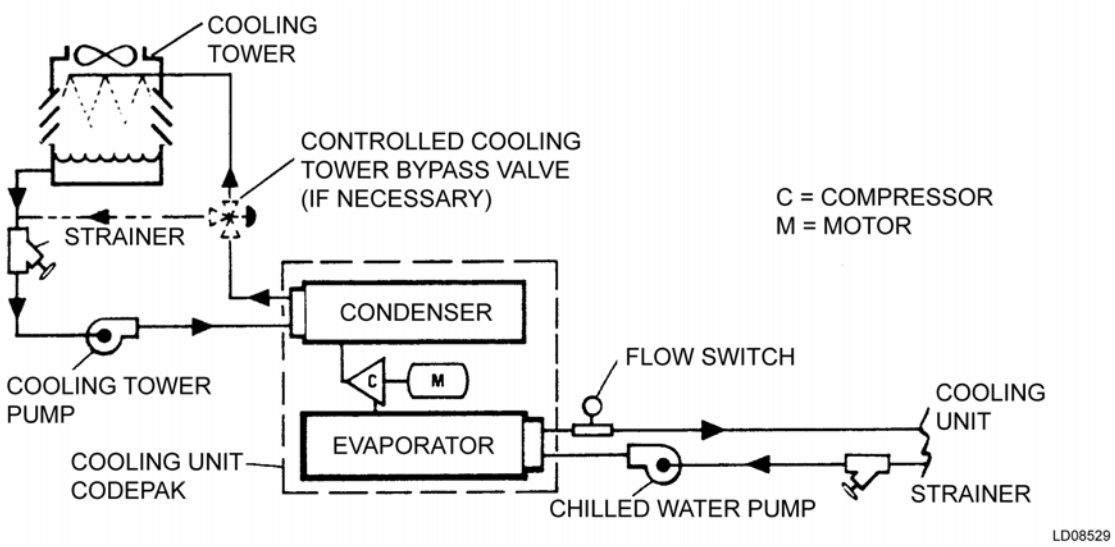
Foreign objects which could lodge in, or block flow through, the evaporator and condenser tubes must be kept out of the water circuit. All water piping must be cleaned or flushed before being connected to the chiller pumps, or other equipment.

Permanent strainers are not supplied by Johnson Controls and are required in both the evaporator and condenser water circuits to protect the chiller as well as the pumps, tower spray nozzles, chilled water coils and controls, and other elements. The strainer must be installed in the entering chilled water line, directly upstream of the chiller.

Water piping circuits should be arranged so that the pumps discharge through the chiller, and should be controlled as necessary to maintain essentially constant chilled and condenser water flows through the unit at all load conditions.

If pumps discharge through the chiller, the strainer can be located upstream from pumps to protect both pump and chiller. Piping between strainer, pump and chiller must be very carefully cleaned before start-up. If pumps are remotely installed from chiller, strainers should be located directly upstream of the chiller.

Figure 9: Schematic of a typical piping arrangement



Condenser water circuit

For the correct operation of the unit, condenser refrigerant pressure must be maintained above evaporator pressure. If operating conditions will fulfill this requirement, do not control condenser water temperature by means of automatic valves, cycling of the cooling tower fan or other means, since chillers are designed to function satisfactorily and efficiently when condenser water is allowed to seek its own temperature level at reduced loads and off-peak seasons of the year. If entering condenser water temperature can go below the required minimum, refer to *Unit Operation and Maintenance (Form 160.75-O1),* condenser water temperature must be maintained equal to or slightly higher than the required minimum. See Figure 9 for typical water piping schematic.

Stop valves

Stop valves are not provided by Johnson Controls. Stop valves can be provided by others in the evaporator and condenser water piping adjacent to the unit to facilitate maintenance. Thermometer wells and pressure taps can be provided by others in the piping as close to the unit as possible to facilitate operating check.

Flow switches

Thermal type water flow switches are factory mounted in the chilled and condensed water nozzles and are factory wired to the OptiView™ control panel. These solid-state flow sensors have a small internal heating element and use the cooling effect of the flowing fluid to sense when an adequate flow rate is established.

Waterbox drain and vent valves

Drain and vent valves are not provided by Johnson Controls. If using drain and vent valves install them in the connections provided in the evaporator and condenser liquid heads. These connections can be piped to drain.

Checking piping circuits and venting air

After the water piping is completed, but before any waterbox insulation is applied, tighten and torque to maintain between 30 lb·ft and 60 lb·ft (41 N·m and 81 N·m) the nuts on the liquid head flanges. Gasket shrinkage and handling during transit cause nuts to loosen. If water pressure is applied before tightening is done, the gaskets may be damaged and have to be replaced. Fill the chilled and condenser water circuits, operate the pumps manually and carefully check the evaporator and condenser water heads and piping for leaks. Repair leaks as necessary.

Before initial operation of the unit both water circuits should be thoroughly vented of all air at the high points.

Unit piping

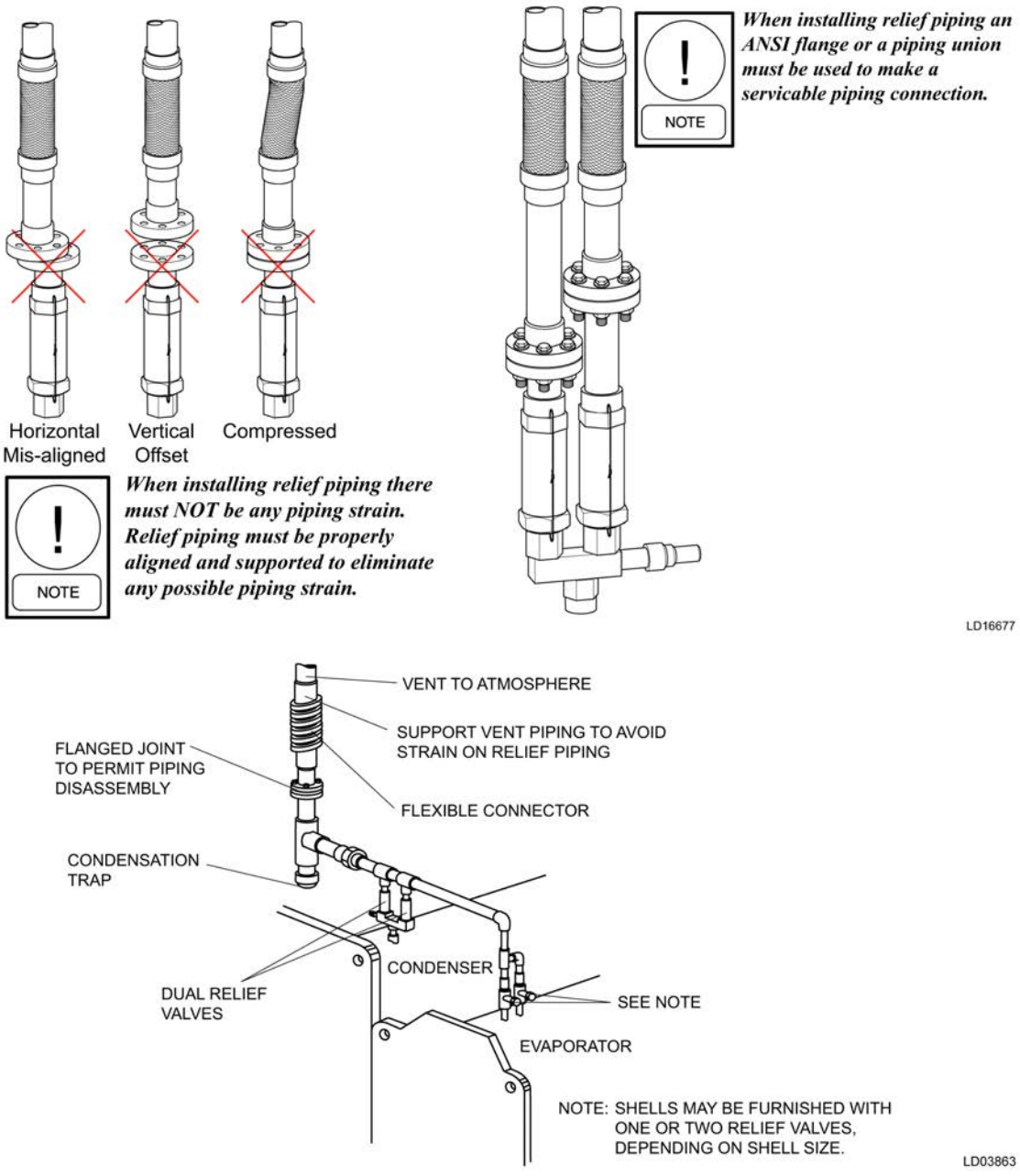
Compressor lubricant piping and system external piping are factory installed on all units shipped assembled. On units shipped dismantled, the following piping should be completed under the supervision of the Johnson Controls representative: (1) the lubricant piping to oil sump and oil evaporator and system oil return connections using material furnished. Refer to *Installation and Reassembly - Unit (Form 160.75-N3).*

Refrigerant relief piping

Each unit is equipped with pressure relief valves located on the condenser and on the evaporator to quickly relieve excess pressure of the refrigerant charge to the atmosphere as a safety precaution in case of an emergency, such as fire.

Refrigerant relief vent piping, from the relief valves to the outside of the building, is required by code in most areas and should be installed on all chillers. Refrigerant relief vent piping is not supplied by Johnson Controls. The vent line should be sized in accordance with the ANSI/ASHRAE-15, or local code. The vent line must include a dirt trap in the vertical leg to intercept and permit clean out and to trap any vent stack condensation. The piping must be arranged to avoid strain on the relief valves, using a flexible connection, if necessary.

Figure 10: Typical refrigerant vent piping

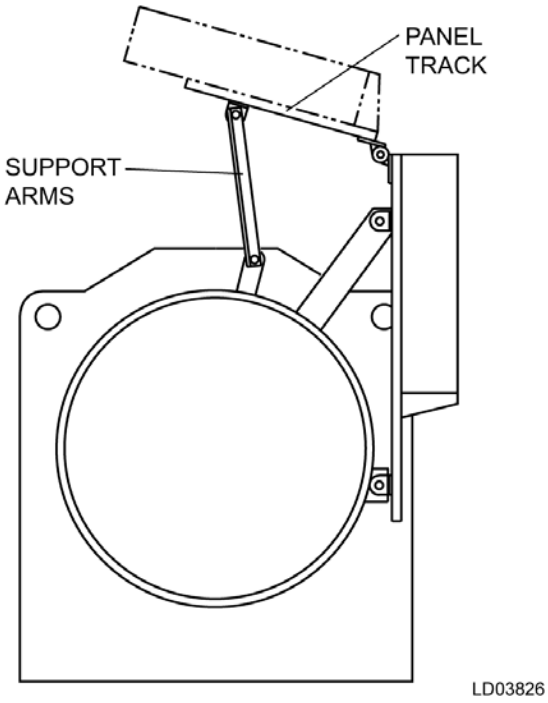


Control panel positioning

About this task:
On large YK chillers equipped with H9 and K1-K7 compressors, the control panel height can be adjusted. On chillers equipped with P and Q compressors, the control panel height is not adjustable. The OptiView™ Control Center is placed in a position above the evaporator for shipping. To move the control center into position for operation, complete the following steps:

1. While supporting the control center, remove the hardware between the support arms and the evaporator.
2. Swing the control center into a vertical position.
3. Slide the control center down the guide rails to the proper position. Tighten securely.
4. Discard unused hardware.

Figure 11: Correct control panel positioning (H9, K1-K7)



Control wiring

On units shipped disassembled, after installation of the control center, control wiring must be completed between unit components and control center, solid state starter, or variable speed drive, when used, using wiring harnesses furnished. Refer to *Installation and Reassembly - Unit (Form 160.75-N3).*

Field wiring connections for commonly encountered control modifications not by Johnson Controls, if required, are shown on *Wiring Diagrams – Field Control Modifications (Form 160.75-PW4).*

Note: When wiring the unit, do not deviate from what is shown in the provided drawings without prior approval from a Johnson Controls representative.

Power wiring

Chiller with electromechanical starter

A 115 volt, single phase, 60 or 50 Hertz power supply of 20 amperes must be furnished to the control center, from the control transformer (2 KVA required) included with the compressor motor starter. Do not make final power connections to control center until approved by a Johnson Controls representative.

Oil pump - three-phase starter

Separate wiring or a fused disconnect switch should be supplied by the installer.

ⓘ **Note:** Remote electromechanical starters for the chiller must be furnished in accordance with *YORK Starter Specifications Product Drawing Form 160.73-PA1* to provide the features necessary for the starter to function properly with the YORK control system.

Each chiller unit is furnished for a specific electrical power supply as stamped on the unit data plate, which also details the motor connection diagrams.

ⓘ **Note:** To insure proper motor rotation the starter power input and starter to motor connections must be checked with a phase sequence indicator in the presence of the Johnson Controls representative.

⚠ CAUTION

Do not cut wires to final length or make final connections to motor terminals or starter power input terminals until approved by the Johnson Controls representative.

YK motors with electromechanical starter

Motor leads are furnished with a crimp type connection having a clearance hole for a 3/8 in. (9.5 mm) bolt, motor terminal lugs are not furnished. Refer to wiring labels in motor terminal box for hook-up to suit motor voltage and amperage for power wiring connections.

Chiller with solid state starter or variable speed drive

A chiller equipped with a factory mounted solid state starter or variable speed drive does not require wiring to the compressor motor. The motor power wiring is factory connected to the solid state starter or variable speed drive. Refer to *Field Wiring Diagram*. All wiring to the control panel and the oil pump starter is completed by the factory. A control transformer is furnished with the solid state starter or variable speed drive.

ⓘ **Note:** Only copper conductors should be connected to compressor motors and starters. Do not use aluminum to connected to copper lugs. Aluminum oxide and the difference in thermal conductivity between copper and aluminum cannot guarantee the required tight connection over a long period of time.

Insulation

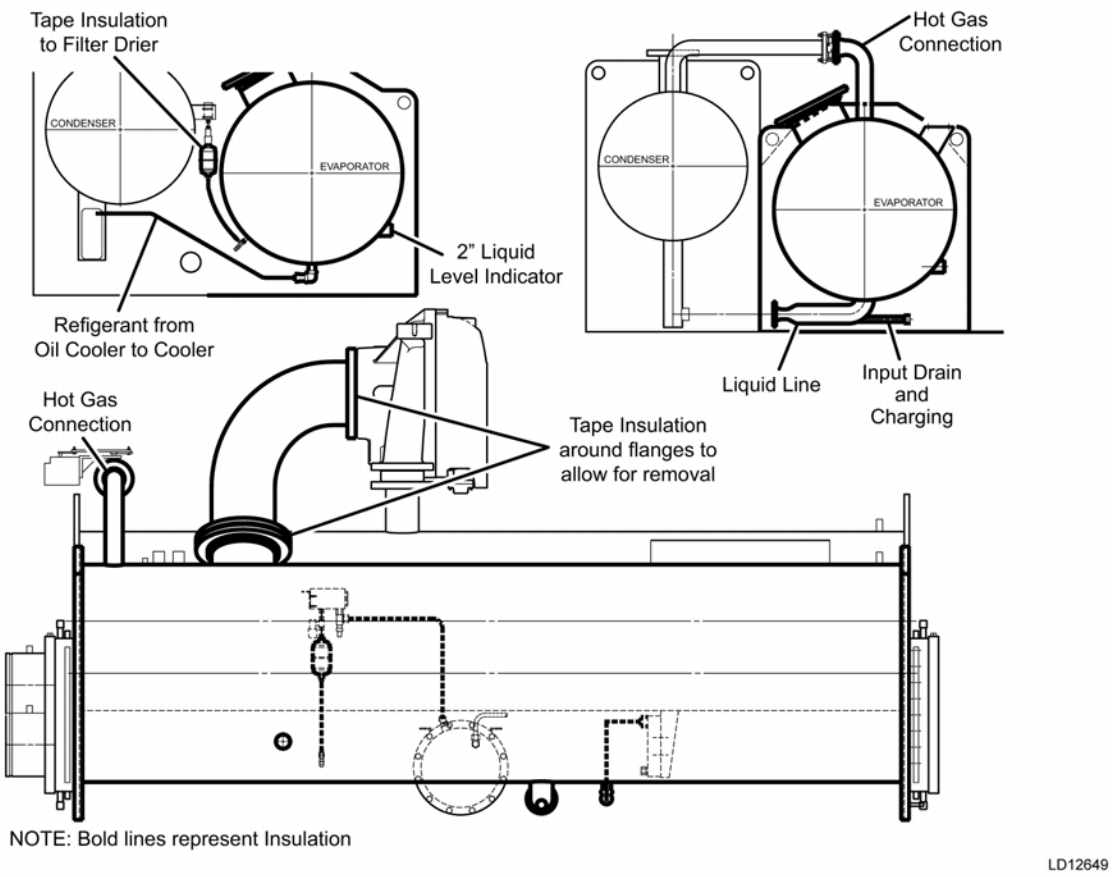
CAUTION

Do not field insulate until the unit has been leak tested under the supervision of the Johnson Controls representative.

Insulation, not supplied by Johnson Controls, of the type specified for the job, or minimum thickness to prevent sweating of 30°F (-1°C) surfaces can be furnished and applied to the evaporator shell, end sheets, liquid feed line to flow chamber, compressor suction connection, and evaporator liquid heads and connections. The liquid head flange insulation must be removable, to allow head removal for the tube maintenance. Details of areas to be insulated are given on the product drawing.

Units are furnished factory anti-sweat insulated on order at additional cost. This includes all low temperature surfaces except the two cooler liquid heads.

Figure 12: Unit insulation



Installation check - request for start-up service

The services of a Johnson Controls representative is provided to check the installation and supervise the initial start-up and operation on all chillers installed in the Continental United States.

After the unit is installed, piped and wired as described in these instructions, but before any attempt is made to start the unit, the Johnson Controls District Office should be advised so that the start-up service, included in the contract price, can be scheduled. Use the *Installation Checklist and Start-up Request (Form 160.75-CL1).*

Table 2: Available compressor, shell or motor combinations for YK Mod G

Compressor codes	Evaporator codes	Condenser codes	Motor codes	
			60 Hz	50 Hz
Q3	AP to AS	AP to AS	CF-CT	5CC-5CO
Q3, Q4	CP to CS	CP to CS	EF-ET	5EC-5EO
	DP to DS	DP to DS		
Q4	EP to ET	EP to ET		
Q5	CP to CS	CP to CS	CH-CT	5CE-5CO
	DP to DS	DP to DS	EH-ET	5EE-5EO
Q5, Q6, Q7	EP to ET	EP to ET		
	FQ to FT	FQ to FT		
P7	EP to ET	EP to ET	CU-CY	5CP-5CU
	FQ to FT	FQ to FT	EU-EY	5EP-5EU
P8	GQ to GS	EV to EX	CH-CZ	5CE-5CU
P8, P9	HQ to HS	FV to FX	EH-EZ	5EE-5EU
	JP to JS	JP to JS		
	LQ to LS	LQ to LS		
H9	KP to KS, K2 to K4	KP to KS, K2 to K4	CN-CA	5CK-5CW
	MQ to MS, M2 to M4	MP to MS, M2 to M4	EN-EA	5EK-5EW
K1	KT to KX, K5 to K7	KP to KS, K2 to K4	CS-DC	5CN-5DC
K1, K2	MQ to MS, M2 to M4	MP to MS, M2 to M4	ES-FC	5EN-5FB
	NQ to NS, N2 to N4	NP to NS, N2 to N4		
	PQ to PS, P2 to P4	PQ to PS, P2 to P4		
	QQ to QS, Q2 to Q4	QQ to QS, Q2 to Q4		
K3	NQ to NS, N2 to N4	NP to NS, N2 to N4	DA-DJ	5DA-5DH
	QQ to QV, Q2 to Q4	QQ to QS, Q2 to Q4	FA-FD	5FA-5FB
	RQ, RS, RN, R3, R5, R7	RQ, RR, RS, R2, R3, R4		
K4	RP, RR, RT, R2, R4, R6	RQ, RR, RS, R2, R3, R4, R5	DA-DJ	5DA-5DJ
	SQ, SS, SV, S3, S5, S7	SQ, SR, SS, S2, S3, S4	FA-FD	5FA-5FB
		VP, VQ, VR, VS, V2, V3, V4, V5		
	XQ, XR, XS, X2, X3, X4	TP, TQ, TR, TS, T2, T3, T4, T5		
		XQ, XR, XS, X2, X3, X4		
K7	WP, WR, WT, W1, W2, W4, W6	WQ, WR, WS, W1, W2, W3, W4	DD-DL	5DD-5DL
	ZQ, ZR, ZS, Z1, Z2, Z3, Z4	ZQ, ZR, ZS, Z1, Z2, Z3, Z4		

Table 3: Available compressor, shell or motor combinations for YK Mod G heat recovery

Compressor codes	Evaporator codes	Condenser codes	Motor codes	
			60 Hz	50 Hz
Q4	CP, CQ, CR, CS	BV, BW, BX	CF-CT	5CC-5CO
Q7	EP, EQ, ER, ES, ET	IV, IW, IX	EF-ET	5EC-5EO
H9	KP, KQ, KR, KS, K2, K3,K4	OW, OX, O7, O8, O9	CN-CA	5CK-5CW
			EN-EA	5EK-5EW
K2	MQ, MR, MS, M2, M3, M4	UW, UX, U7, U8, U9	CS-DC	5CN-5DC
			ES-FC	5EN-5FB
K7	ZQ, ZR, ZS, Z1, Z2, Z3, Z4	YW, YX, Y7, Y8, Y9	DD-DL	5DD-5DL

Table 4: Available compressor, shell or motor combinations for YK Mod G falling film

Compressor codes	Hybrid falling film evaporator codes	Condenser codes	Motor codes	
			60 Hz	50 Hz
Q3	AC, AD, A3, A4	AP to AS	CF-CT	5CC-5CO
	CC to CE, C3 to C5	CP to CS	EF-ET	5EC-5EO
Q4	CC to CE, C3 to C5	CP to CS		
	DC to DE, D3 to D5	DP to DS		
Q5	CC to CE, C3 to C5	CP to CS	CH-CT	5CE-5CO
	DC to DE, D3 to D5	DP to DS	EH-ET	5EE-5EO
Q5, Q6, Q7	EC to EE, E3 to E5	EP to ET		
	FC to FE, F3 to F5	FQ to FT		
P7	EC to EE, E3 to E5	EP to ET	CU-CY	5CP-5CU
	FC to FE, F3 to F5	FQ to FT	EU-EY	5EP-5EU
P8, P9	GC to GE, G3 to G5	EV to EX, E3 to E4	CH-CZ EH-EZ	5CE-5CU 5EE-5EU
	HC to HE, H3 to H5	FV to FX, F3 to F4		
H9	KC, KD, K8, K9, K0	KP, KQ, KR, KS, K2, K3, K4	CN-CA	5CK-5CW
	IB, IC, ID, IF, IH, I2, I4, I6, I8	KP, KQ, KR, KS, K2, K3, K4, K5	EN-EA	5EK-5EW
	MB, MD, MF, M5, M7, M8	MP, MQ, MR, MS, M2, M3, M4		
K1	IB, IC, ID, IF, IH, I2, I4, I6, I8	KP, KQ, KR, KS, K2, K3, K4, K5	CS-DC	5CN-5DC
K1, K2	MB, MD, MF, M5, M7, M8, M9	MP, MQ, MR, MS, M2, M3, M4	ES-FC	5EN-5FB
	NB, ND, NF, N5, N7, N8, N9	NP, NQ, NR, NS, N2, N3, N4		
	PB, PD, PF, P5, P7, P8	PQ, PR, PS, P2, P3, P4		
	QB, QD, QF, Q5, Q7, Q8	QQ, QR, QS, Q2, Q3, Q4		
K3	NB, ND, NF, N5, N7, N8, N9	NP, NQ, NR, NS, N2, N3, N4	DA-DJ	5DA-5DH
	QD, QF, QH, Q5, Q7, Q8, Q9	QQ, QR, QS, Q2, Q3, Q4	FA-FD	5FA-5FB

P and Q compressor units (standard)

Figure 13: P and Q compressor unit dimensions (ft in.)

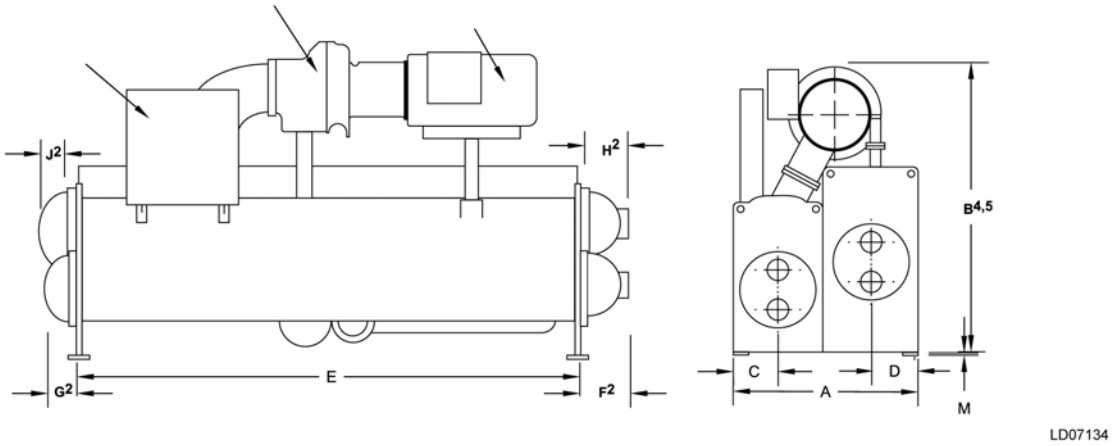


Table 5: Additional operating height clearance to floor

Type of chiller mounting	M (in.)
Neoprene pad isolators	1 3/4
Spring isolators 1 in. deflection	1
Direct mount	3/4

Table 6: Q3 compressor, evaporator - condensor shell codes

Series	A–A	C–C	D–D
A	5 ft 1 in.	5 ft 6 in.	5 ft 6 in.
B	7 ft 0 in.	7 ft 3 3/4 in.	7 ft 3 3/4 in.
C	1 ft 3 1/2 in.	1 ft 5 1/2 in.	1 ft 5 1/2 in.
D	1 ft 3 in.	1 ft 3 1/2 in.	1 ft 3 1/2 in.
E	12 ft 0 in.	12 ft 0 in.	16 ft 0 in.

Table 7: Q4 compressor, evaporator - condenser shell codes

Series	C–B	C–C	D–D	E–E
A	6 ft 4 3/4 in.	5 ft 6 in.	5 ft 6 in.	7 ft 0 in.
B	7 ft 11 3/8 in.	7 ft 2 1/2 in.	7 ft 2 1/2 in.	7 ft 8 1/2 in.
C	1 ft 5 1/2 in.	1 ft 5 1/2 in.	1 ft 5 1/2 in.	1 ft 7 1/2 in.
D	1 ft 8 7/8 in.	1 ft 3 1/2 in.	1 ft 3 1/2 in.	1 ft 5 1/2 in.
E	12 ft 0 in.	12 ft 0 in.	16 ft 0 in.	12 ft 0 in.

Table 8: Q5 compressor, evaporator - condenser shell codes

Series	C–C	D–D	E–E	F–F
A	5 ft 6 in.	5 ft 6 in.	7 ft 0 in.	7 ft 0 in.
B	7 ft 10 5/8 in.	7 ft 10 5/8 in.	8 ft 5 1/2 in.	8 ft 5 1/2 in.
C	1 ft 5 1/2 in.	1 ft 5 1/2 in.	1 ft 7 1/2 in.	1 ft 7 1/2 in.
D	1 ft 3 1/2 in.	1 ft 3 1/2 in.	1 ft 5 1/2 in.	1 ft 5 1/2 in.
E	12 ft 0 in.	16 ft 0 in.	12 ft 0 in.	16 ft 0 in.

Table 9: Q6 compressor, evaporator - condenser shell codes

Series	E–E	F–F
A	7 ft 0 in.	7 ft 0 in.
B	8 ft 3 in.	8 ft 3 in.
C	1 ft 7 1/2 in.	1 ft 7 1/2 in.
D	1 ft 5 1/2 in.	1 ft 5 1/2 in.
E	12 ft 0 in.	16 ft - 0 in.

Table 10: P7, Q7 compressor, evaporator - condenser shell codes

Series	E–E	E–I	F–F
A	6 ft 2 in.	7 ft 1 3/4 in.	6 ft 2 in.
B	8 ft 0 5/8 in.	8 ft 8 in.	7 ft 6 1/2 in.
C	1 ft 7 1/2 in.	1 ft 7 1/2 in.	1 ft 7 1/2 in.
D	1 ft 5 1/2 in.	1 ft 11 3/8 in.	1 ft 5 1/2 in.
E	12 ft 0 in.	12 ft 0 in.	16 ft 0 in.

Table 11: P8 compressor, evaporator - condenser shell codes

Series	G–E	H–F	J–J	L–L
A	6 ft 11 in.	6 ft 11 in.	7 ft 6 1/2 in.	7 ft 6 1/2 in.
B	10 ft 6 in.	10 ft 6 in.	10 ft 11 in.	10 ft 11 in.
C	2 ft 0 in.	2 ft 0 in.	2 ft 1 1/4 in.	2 ft 1 1/4 in.
D	1 ft 5 1/2 in.	1 ft 5 1/2 in.	1 ft 8 in.	1 ft 8 in.
E	12 ft 0 in.	16 ft 0 in.	12 ft 0 in.	16 ft 0 in.

Table 12: P9 compressor, evaporator - condenser shell codes

Series	H–F	J–J	L–L
A	6 ft 11 in.	7 ft 6 1/2 in.	7 ft 6 1/2 in.
B	10 ft 3 in.	10 ft 8 1/2 in.	10 ft 8 1/2 in.
C	2 ft 0 in.	2 ft 1 1/4 in.	2 ft 1 1/4 in.
D	1 ft 5 1/2 in.	1 ft 8 in.	1 ft 8 in.
E	16 ft 0 in.	12 ft 0 in.	16 ft 0 in.

Note:

1. All dimensions are approximate.
2. For compact waterboxes, see Figure 13, determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2 in. (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8 in. (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

P and Q compressor units (metric)

Figure 14: P and Q compressor unit dimensions (mm)

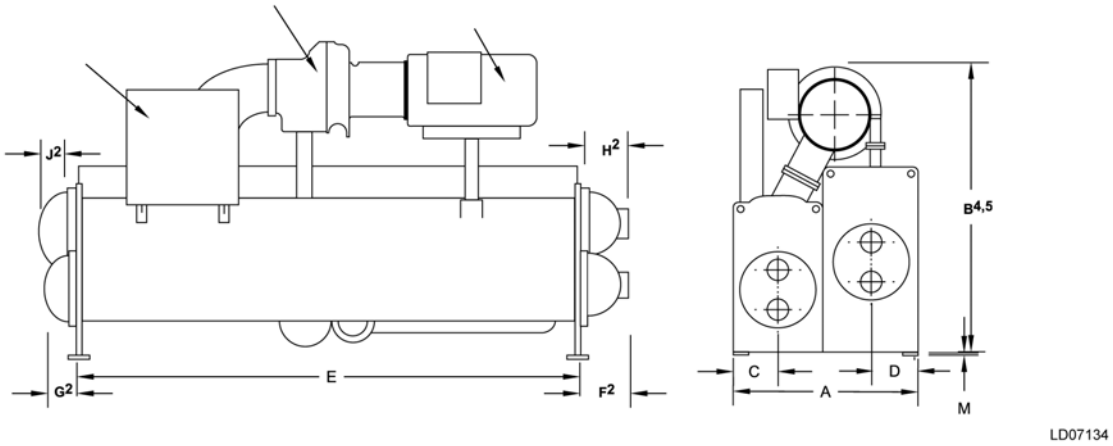


Table 13: Additional operating height clearance

Type of chiller mounting	M (mm)
Neoprene pad isolators	45
Spring isolators 25 mm deflection	25
Direct mount	19

Table 14: Q3 compressor, evaporator - condenser shell codes

Series	A–A (mm)	C–C (mm)	D–D (mm)
A	1,549	1,676	1,676
B	2,134	2,229	2,229
C	394	445	445
D	381	394	394
E	3,658	3,658	4,877

Table 15: Q4 compressor, evaporator - condenser shell codes

Series	C–C (mm)	C–B (mm)	D–D (mm)	E–E (mm)
A	1,676	1,949	1,676	2,134
B	2,197	2,423	2,197	2,350
C	445	445	445	495
D	394	530	394	445
E	3,658	3,658	4,877	3,658

Table 16: Q5 compressor, evaporator - condenser shell codes

Series	C–C (mm)	D–D (mm)	E–E (mm)	F–F (mm)
A	1,676	1,676	2,134	2,134
B	2,403	2,403	2,578	2,578
C	445	445	495	495
D	394	394	445	445
E	3,658	4,877	3,658	4,877

Table 17: Q6 compressor, evaporator - condenser shell codes

Series	E–E (mm)	F–F (mm)
A	2,134	2,134
B	2,515	2,515
C	495	495
D	445	445
E	3,658	4,877

Table 18: P7, Q7 compressor, evaporator - condenser shell codes

Series	E–E (mm)	E–I (mm)	F–F (mm)
A	1,880	2,178	1,880
B	2,299	2,642	2,299
C	495	495	495
D	445	594	445
E	3,658	3,658	4,877

Table 19: P8 compressor, evaporator - condenser shell codes

Series	E–E (mm)	F–F (mm)	G–G (mm)	H–H (mm)
A	2,108	2,108	2,299	2,299
B	3,200	3,200	3,327	3,327
C	610	610	641	641
D	445	445	508	508
E	3,658	4,877	3,658	4,877

Table 20: P9 compressor, evaporator - condenser shell codes

Series	H–F (mm)	J–J (mm)	L–L (mm)
A	2,108	2,299	2,299
B	3,124	3,264	3,264
C	610	641	641
D	445	508	508
E	4,877	3,658	4,877

Note:

1. All dimensions are approximate.
2. For compact waterboxes, see Figure 14, determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2 in. (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8 in. (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

H compressor units (standard)

Figure 15: H compressor unit dimensions (ft in.)

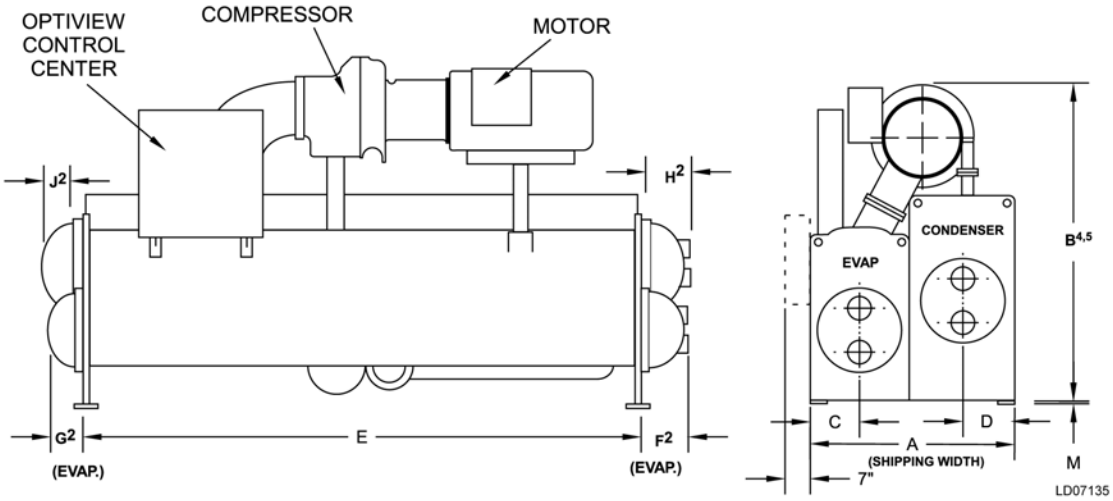


Table 21: Additional operating height clearance to floor

Type of chiller mounting	M (in.)
Neoprene pad isolators	1 3/4
Spring isolators 1 in. deflection	1
Direct mount	3/4

Table 22: H9 compressor evaporator - condenser shell codes

	I-K, K–K	K–O	M–M
A	7 ft 6 1/2 in.	8 ft 9 1/4 in.	8 ft 7 in.
B	10 ft 4 in.	10 ft 7 5/8 in.	10 ft 10 1/2 in.
C	2 ft 1 1/4 in.	2 ft 1 1/4 in.	2 ft 4 1/2 in.
D	1 ft 8 in.	2 ft 3 3/8 in.	1 ft 11 in.
E	14 ft 0 in.	14 ft 0 in.	14 ft 0 in.

ⓘ Note:

1. All dimensions are approximate.
2. For compact waterboxes, see Figure 15, determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2 in. (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8 in. (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

H compressor units (metric)

Figure 16: H compressor unit dimensions (mm)

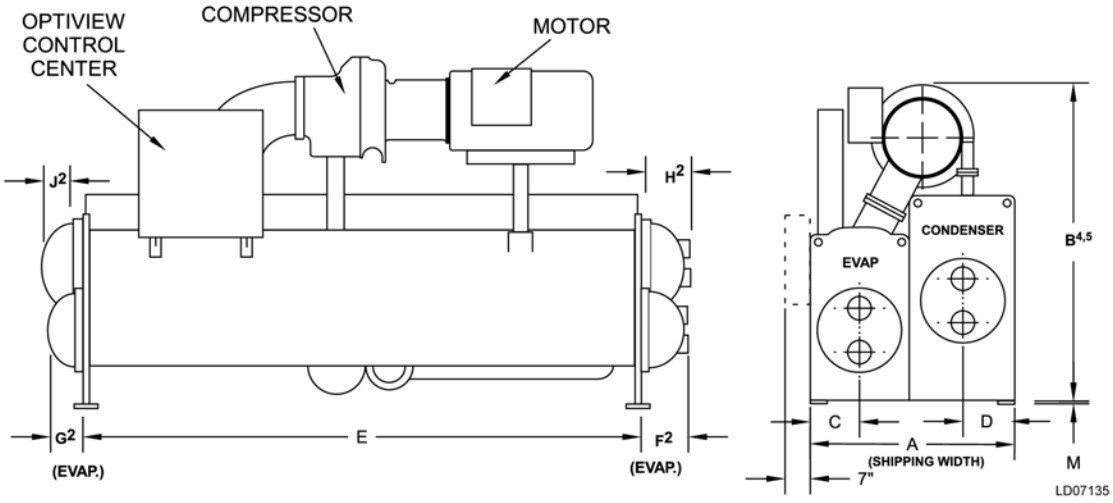


Table 23: Additional operating height clearance

Type of chiller mounting	M (mm)
Neoprene pad isolators	44
Spring isolators 25mm deflection	25
Direct mount	19

Table 24: H9 compressor evaporator - condenser shell codes

	I-K, K–K (mm)	K–O (mm)	M–M (mm)
A	2,299	2,673	2,616
B	3,150	3,242	3,315
C	641	641	724
D	508	695	584
E	4,267	4,267	4,267

Note:

1. All dimensions are approximate.
2. For compact waterboxes, see Figure 16, determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2 in. (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8 in. (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

K compressor units (standard)

Figure 17: K compressor unit dimensions (ft in.)

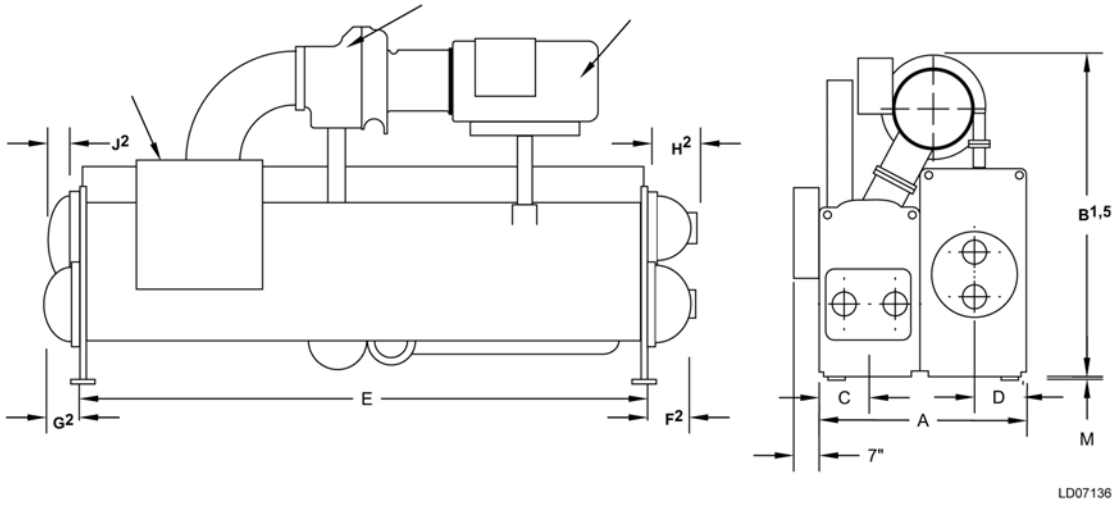


Table 25: Additional operating height clearance

Type of chiller mounting	M (in.)
Neoprene pad isolators	1 3/4
Spring isolators 1 in. deflection	1
Direct mount	3/4

Table 26: K1 compressor, evaporator - condenser shell

	I-K, K–K	M–M	N–N	P–P	Q–Q
A	7 ft 6 1/2 in.	8 ft 7 in.	8 ft 7 in.	9 ft 1 1/2 in.	9 ft 1 1/2 in.
B	9 ft 7 in.	11 ft 4 in.	11 ft 4 in.	11 ft 5 1/2 in.	11 ft 5 1/2 in.
C	2 ft 1 1/4 in.	2 ft 4 1/2 in.	2 ft 4 1/2 in.	2 ft 5 1/2 in.	2 ft 5 1/2 in.
D	1 ft 8 in.	1 ft 11 in.	1 ft 11 in.	2 ft 1 1/4 in.	2 ft 1 1/4 in.
E	14 ft 0 in.	14 ft 0 in.	16 ft 0 in.	14 ft 0 in.	16 ft 0 in.

Table 27: K2 compressor, evaporator - condenser shell codes

	M–M	M–U	N–N	P–P	Q–Q
A	8 ft 7 in.	9 ft 6 in.	8 ft 7 in.	9 ft 1 1/2 in.	9 ft 1 1/2 in.
B	11 ft 4 in.	11 ft 10 in.	11 ft 4 in.	11 ft 5 in.	11 ft 5 in.
C	2 ft 4 1/2 in.	2 ft 4 1/2 in.	2 ft 4 1/2 in.	2 ft 5 1/2 in.	2 ft 5 1/2 in.
D	1 ft 11 in.	2 ft 4 1/2 in.	1 ft 11 in.	2 ft 1 1/4 in.	2 ft 1 1/4 in.
E	14 ft 0 in.	14 ft 0 in.	16 ft 0 in.	14 ft 0 in.	16 ft 0 in.

Table 28: K3 compressor, evaporator - condenser shell codes

	N–N	Q–Q	R–R
A	8 ft 7 in.	9 ft 1 1/2 in.	9 ft 9 in.
B	10 ft 8 in.	11 ft 6 in.	11 ft 10 in.
C	2 ft 4 1/2 in.	2 ft 5 1/2 in.	2 ft 8 in.
D	1 ft 11 in.	2 ft 1 1/4 in.	2 ft 3 1/2 in.
E	16 ft 0 in.	16 ft 0 in.	16 ft 0 in.

Table 29: K4 compressor, evaporator - condenser shell codes

	R–R	S–S	S–V	X–T	X–X
A	9 ft 9 in.	9 ft 9 in.	10 ft 3 in.	10 ft 10 in.	11 ft 3 in.
B	11 ft 11 in.	11 ft 11 in.	12 ft 4 in.	12 ft 4 in.	12 ft 4 in.
C	2 ft 8 in.	2 ft 8 in.	2 ft 8 in.	2 ft 11 1/2 in.	2 ft 11 1/2 in.
D	2 ft 3 1/2 in.	2 ft 3 1/2 in.	2 ft 5 1/2 in.	2 ft 5 1/2 in.	2 ft 8 in.
E	16 ft 0 in.	18 ft 0 in.	18 ft 0 in.	16 ft 0 in.	16 ft 0 in.

Table 30: K7 compressor, evaporator - condenser shell codes

	W–W	Z–Y	Z–Z
A	10 ft 3 in.	12 ft 7 in.	11 ft 3 in.
B	12 ft 2 in.	14 ft 1 5/8 in.	12 ft 10 in.
C	2 ft 8 in.	2 ft 11 1/2 in.	2 ft 11 1/2 in.
D	2 ft 5 1/2 in.	3 ft 4 in.	2 ft 8 in.
E	22 ft 0 in.	18 ft 0 in.	18 ft 0 in.

Note:

1. All dimensions are approximate.
2. For compact waterboxes, see Figure 17, determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 1/2 in. (13 mm) to nozzle length for flanges connections.
4. To determine overall height, add 7/8 in. (22 mm) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

K compressor units (metric)

Figure 18: K compressor unit dimensions (mm)

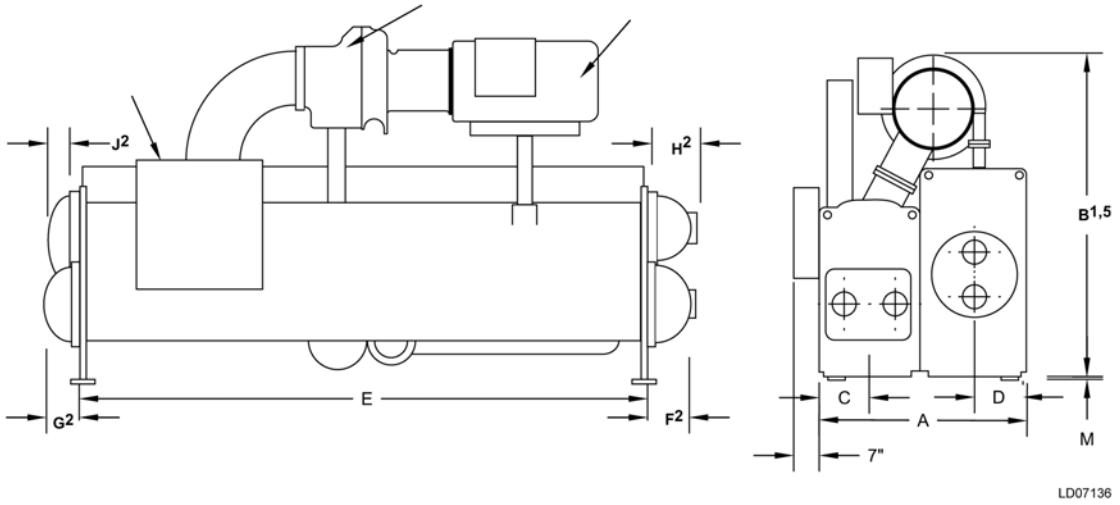


Table 31: Additional operating height clearance

Type of chiller mounting	M (mm)
Neoprene pad isolators	44
Spring isolators 25 mm deflection	25
Direct mount	19

Table 32: K1 compressor, evaporator - condenser shell codes

	I-K, K–K (mm)	M–M (mm)	N–N (mm)	P–P (mm)	Q–Q (mm)
A	2,299	2,616	2,616	2,781	2,781
B	2,921	3,454	3,454	3,493	3,493
C	641	724	724	749	749
D	508	584	584	641	641
E	4,267	4,267	4,877	4,267	4,877

Table 33: K2 compressor, evaporator - condenser shell codes

	M–M (mm)	M–U (mm)	N–N (mm)	P–P (mm)	Q–Q (mm)
A	2,616	2,896	2,616	2,781	2,781
B	3,454	2,921	3,454	3,480	3,480
C	724	724	724	749	749
D	584	724	584	641	641
E	4,267	4,267	4,877	4,267	4,877

Table 34: K3 compressor, evaporator - condenser shell codes

	N–N (mm)	Q–Q (mm)	R–R (mm)
A	2,616	2,781	2,972
B	3,251	3,505	3,607
C	724	749	813
D	584	641	699
E	4,877	4,877	4,877

Table 35: K4 compressor, evaporator - condenser shell codes

	R–R (mm)	S–S (mm)	S–V (mm)	X–T (mm)	X–X (mm)
A	2,972	2,972	3,124	3,302	3,429
B	3,632	3,632	3,759	3,759	3,759
C	813	813	813	902	902
D	699	699	749	749	813
E	4,877	5,486	5,486	4,877	4,877

Table 36: K7 compressor, evaporator - condenser shell codes

	W–W (mm)	Z–Y (mm)	Z–Z (mm)
A	3,124	3,835	3,429
B	3,708	4,308	3,912
C	813	902	902
D	749	1,016	813
E	6,706	5,486	5,486

Note:

1. All dimensions are approximate.
2. For compact waterboxes, see Figure 18, determine overall unit length by adding waterbox depth to tube sheet length.
3. Water nozzles can be located on either end of unit. Add 13 mm (1/2 in.) to nozzle length for flanges connections.
4. To determine overall height, add 22 mm (7/8 in.) for isolators.
5. Use of motors with motor hoods may increase overall unit dimensions.

Evaporator compact waterboxes - ft in. (mm)

Figure 19: One pass evaporator dimensions

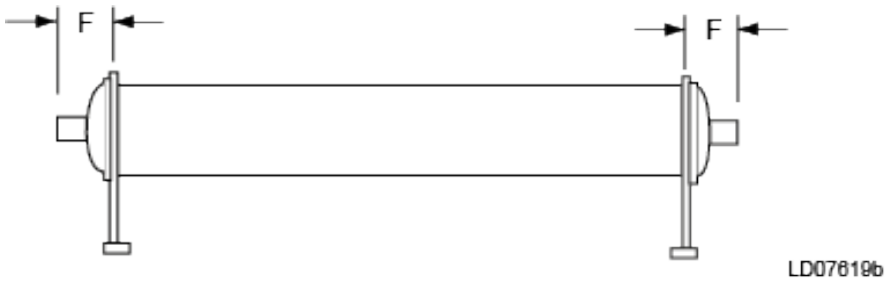


Table 37: Two pass evaporators, shell codes ft in. (mm)

Dimensions	A	C,D	E,F	G,H	I,J,K,L	M,N	P,Q	R,S,W	X,Z
F	1 ft 2 1/4 in. (362)	1 ft 3 in. (381)	1 ft 3 1/2 in. (394)	1 ft 3 3/4 in. (400)	1 ft 5 1/2 in. (445)	1 ft 11 5/8 in. (600)	1 ft 11 5/8 in. (600)	2 ft 0 5/8 in. (625)	2 ft 1 3/4 in. (654)

Figure 20: Two pass evaporator dimensions

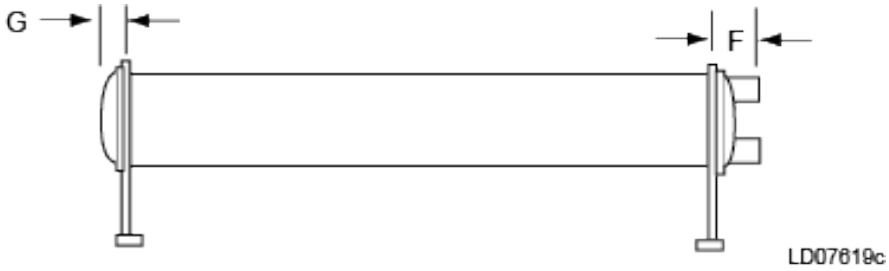


Table 38: One pass evaporators, shell codes in. (mm)

Dimensions	A	C,D	E,F	G,H	I,J,K,L	M,N	P,Q	P,S,W	X,Z
F	1 ft 2 1/4 in. (362)	1 ft 3 in. (381)	1 ft 3 1/2 in. (394)	1 ft 3 3/4 in. (400)	1 ft 5 1/2 in. (445)	1 ft 11 5/8 in. (600)	1 ft 11 5/8 in. (600)	2 ft 0 5/8 in. (625)	2 ft 1 3/4 in. (654)
G	0 ft 6 1/2 in. (165)	0 ft 7 in. (178)	0 ft 7 1/2 in. (191)	0 ft 7 3/4 in. (197)	0 ft 9 1/2 in. (241)	1 ft 3 5/8 in. (397)	1 ft 3 5/8 in. (397)	1 ft 3 5/8 in. (425)	1 ft 5 3/4 in. (451)

Figure 21: Three pass evaporator dimensions

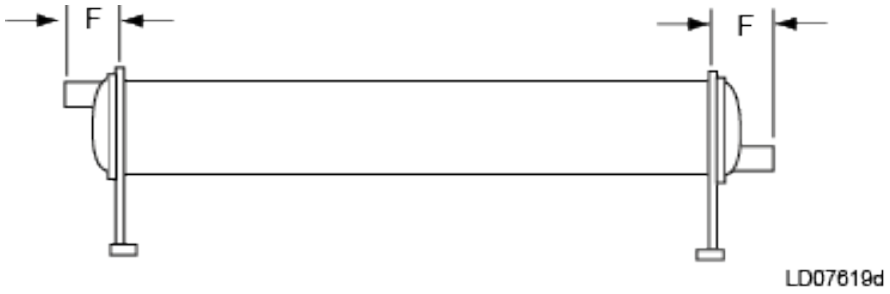


Table 39: Three pass evaporators, shell codes in. (mm)

Dimensions	A	C,D	E,F	G,H	I,J,K,L	M,N	P,Q	P,S,W	X,Z
F	1 ft 2 1/4 in. (362)	1 ft 3 in. (381)	1 ft 3 1/2 in. (394)	1 ft 3 3/4 in. (400)	1 ft 5 1/2 in. (445)	1 ft 11 5/8 in. (600)	1 ft 11 5/8 in. (600)	2 ft 0 5/8 in. (625)	2 ft 1 3/4 in. (654)

See note in P and Q compressor units (standard).

Condenser compact waterboxes - ft in. (mm)

Figure 22: One pass condensers dimensions

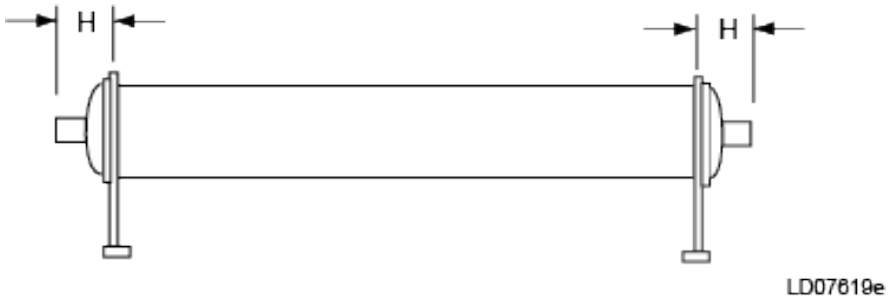


Table 40: One pass condensers, shell codes ft in. (mm)

Dimensions	A	C,D	E,F	J,K,L	M,N	P,Q	R,S	T,V,W	X,Z
H	1 ft 1 7/8 in. (352)	1 ft 1 7/8 in. (352)	1 ft 3 in. (381)	1 ft 4 in. (406)	1 ft 2 7/8 in. (378)	1 ft 4 7/8 in. (429)	1 ft 7 1 3/8 in. (492)	1 ft 7 1/2 in. (495)	1 ft 9 3/4 in. (552)

Table 41: Double bundle heat recovery condensers, shell codes

	B		I		O		U		Y	
Dimensions	Tower	Heating	Tower	Heating	Tower	Heating	Tower	Heating	Tower	Heating
H	1 ft 6 1/2 in. (470)	1 ft 5 in. (432)	1 ft 7 1/2 in. (495)	1 ft 4 3/4 in. (425)	1 ft 9 1/2 in. (546)	1 ft 6 in. (457)	1 ft 10 1/4 in. (565)	1 ft 8 in. (508)	2 ft 4 3/4 in. (730)	1 ft 10 1/2 in. (572)

Figure 23: Two pass condensers dimensions

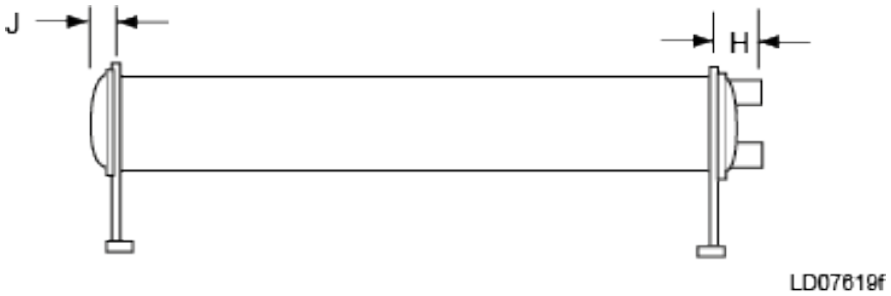


Table 42: Two pass condensers, shell codes ft in. (mm)

Dimensions	A	C,D	E,F	J,K,L	M,N	P,Q	R,S	T,V,W	X,Z
H	1 ft 1 7/8 in. (352)	1 ft 1 7/8 in. (352)	1 ft 3 in. (381)	1 ft 4 in. (406)	1 ft 2 7/8 in. (378)	1 ft 4 7/8 in. (429)	1 ft 7 3/8 in. (492)	1 ft 7 1/2 in. (495)	1 ft 9 3/4 in. (552)
J	0 ft 5 7/8 in. (149)	0 ft 6 1/2 in. (165)	0 ft 7 in. (178)	0 ft 7 1/2 in. (191)	0 ft 7 3/4 in. (197)	0 ft 9 1/2 in. (241)	0 ft 11 3/4 in. (298)	0 ft 11 in. (279)	1 ft 1 7/8 in. (352)

Table 43: Double bundle heat recovery condensers, shell codes

	B		I		O		U		Y	
Dimensions	Tower	Heating	Tower	Heating	Tower	Heating	Tower	Heating	Tower	Heating
H	1 ft 6 1/2 in. (470)	1 ft 5 in. (432)	1 ft 7 1/2 in. (495)	1 ft 4 3/4 in. (425)	1 ft 9 1/2 in. (546)	1 ft 6 in. (457)	1 ft 10 1/4 in. (565)	1 ft 8 in. (508)	2 ft 4 3/4 in. (730)	1 ft 10 1/2 in. (572)
J	0 ft 10 1/2 in. (267)	0 ft 9 in. (229)	0 ft 11 1/2 in. (292)	0 ft 8 3/4 in. (222)	1 ft 1 1/2 in. (343)	0 ft 10 in. (254)	1 ft 2 1/4 in. (362)	1 ft 0 in. (305)	1 ft 8 3/4 in. (527)	1 ft 2 1/2 in. (368)

Figure 24: Three pass condensers dimensions

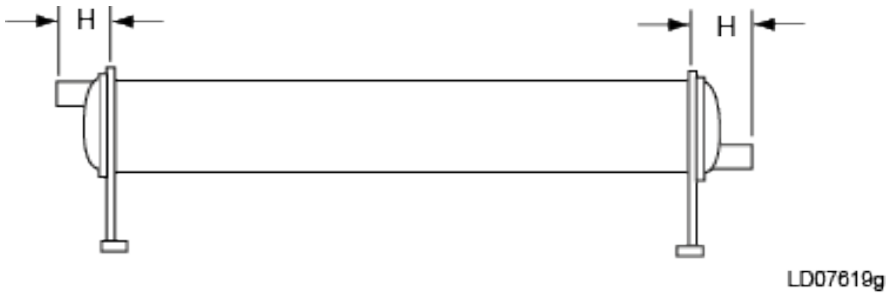


Table 44: Three pass condensers, shell codes ft in. (mm)

Dimensions	A	C,D	E,F	J,K,L	M,N	P,Q	R,S	T,V,W	X,Z
H	1 ft 1 7/8 in. (352)	1 ft 1 7/8 in. (352)	1 ft 3 in. (381)	1 ft 3 1/2 in. (394)	1 ft 3 3/8 in. (391)	1 ft 5 1/2 in. (445)	1 ft 7 3/8 in. (492)	1 ft 7 1/2 in. (495)	1 ft 7 3/8 in. (492)

Table 45: Double bundle heat recovery condensers, shell codes

	B		I		O		U		Y	
Dimensions	Tower	Heating	Tower	Heating	Tower	Heating	Tower	Heating	Tower	Heating
H	1 ft 6 1/2 in. (470)	1 ft 5 in. (432)	1 ft 7 1/2 in. (495)	1 ft 4 3/4 in. (425)	1 ft 9 1/2 in. (546)	1 ft 6 in. (457)	1 ft 10 1/4 in. (565)	1 ft 8 in. (508)	2 ft 4 3/4 in. (730)	1 ft 10 1/2 in. (572)

See note in P and Q compressor units (standard).

Evaporator - compact waterboxes - A through L evaporators - ft in. (mm)

Figure 25: Dimensions of evaporator compact waterboxes A through L evaporators ft in. (mm)

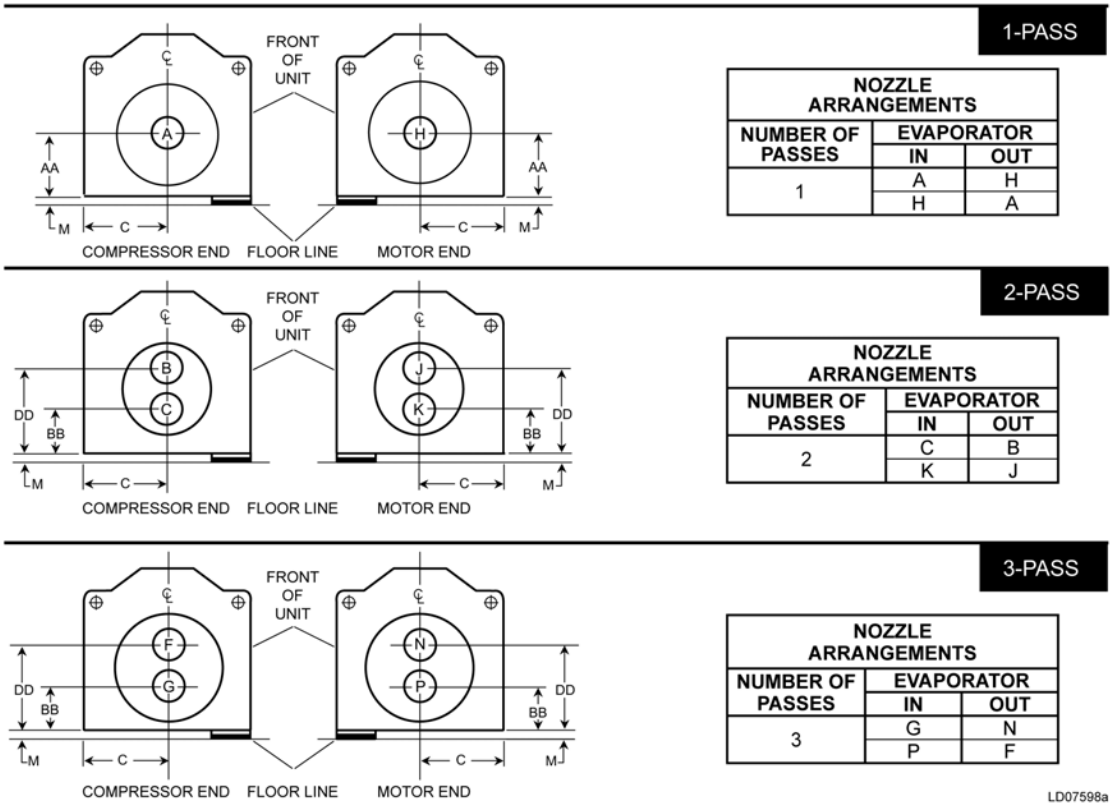


Table 46: Dimensions of compact waterboxes - 150 psi round

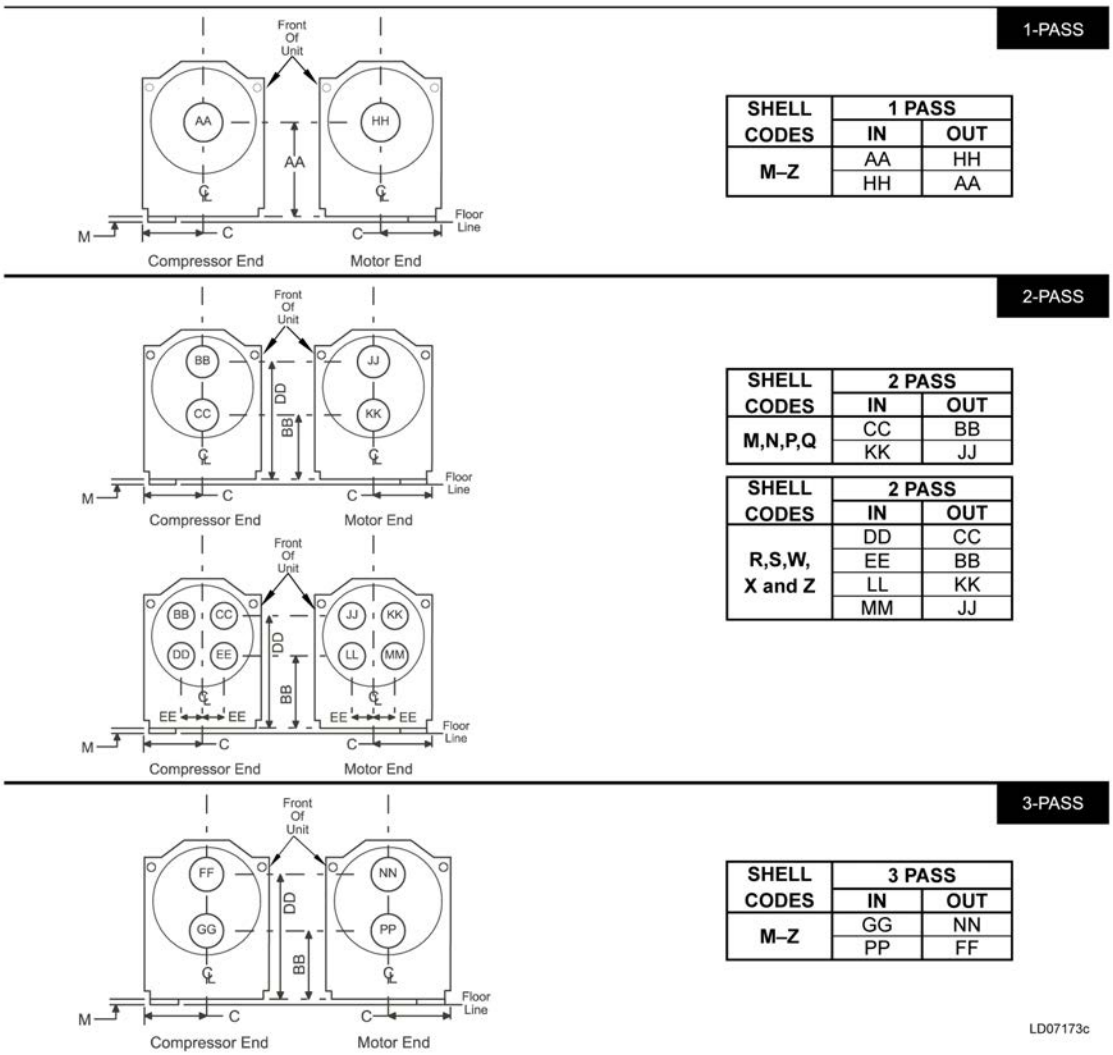
Condenser shell code	Nozzle pipe size in. (mm)			Evaporator nozzle dimensions ft in. (mm)					
	Number of passes			1-pass		2-pass		3-pass	
	1	2	3	C	AA[5]	BB[5]	DD[5]	BB[5]	DD[5]
A	8 in. (203)	6 in. (152)	4 in. (101)	1 ft 3 1/2 in. (394)	1 ft 10 in. (559)	1 ft 2 in. (356)	2 ft 6 in. (762)	1 ft 2 in. (356)	2 ft 6 in. (762)
C,D	10 in. (254)	8 in. (203)	6 in. (152)	1 ft 5 1/2 in. (445)	2 ft 0 in. (610)	1 ft 3 in. (381)	2 ft 9 in. (838)	1 ft 3 in. (381)	2 ft 9 in. (838)
E,F	14 in. (355)	10 in. (254)	8 in. (203)	1 ft 7 in. (483)	2 ft 2 in. (660)	1 ft 4 in. (406)	3 ft 0 in. (914)	1 ft 4 in. (406)	3 ft 0 in. (914)
G,H	14 in. (355)	10 in. (254)	8 in. (203)	2 ft 0 in. (610)	2 ft 3 1/2 in. (699)	1 ft 3 1/2 in. (394)	3 ft 3 1/2 in. (1,003)	1 ft 3 1/2 in. (394)	3 ft 3 1/2 in. (1,003)
I,J,K,L	16 in. (406)	12 in. (305)	10 in. (254)	2 ft 1 1/4 in. (641)	2 ft 6 in. (762)	1 ft 5 in. (432)	3 ft 7 in. (1,092)	1 ft 5 in. (432)	3 ft 7 in. (432)

Note:

1. Standard water nozzles are furnished as welding stub-outs with grooves, allowing the option of welding, flanges, or use of grooved couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1/16 in. (1.6 mm) raised face), water flanged nozzles are optional (add 1/2 in. (13 mm) to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
2. One-, two- and three-pass nozzle arrangements are available only in pairs shown and for all shell codes. Any pair of evaporator nozzles can be used in combination with any pair of condenser nozzles.
3. Evaporator and condenser water must enter the waterbox through the bottom connection to achieve rated performance.
4. Connected piping should allow for removal of compact waterboxes for tube access and cleaning.
5. Add dimension M as shown on the unit dimensions page for the appropriate isolator type.
6. Standard 150 psi design pressure boxes shown.

Evaporator - compact waterboxes - M through Z evaporators - ft in. (mm)

Figure 26: Dimensions of evaporator compact waterboxes M through Z evaporators ft in. (mm)



SHELL CODES	1 PASS	
	IN	OUT
M–Z	AA	HH
	HH	AA

SHELL CODES	2 PASS	
	IN	OUT
M,N,P,Q	CC	BB
	KK	JJ

SHELL CODES	2 PASS	
	IN	OUT
R,S,W, X and Z	DD	CC
	EE	BB
	LL	KK
	MM	JJ

SHELL CODES	3 PASS	
	IN	OUT
M–Z	GG	NN
	PP	FF

Table 47: Dimensions of compact waterboxes - 150 psi rectangular

Evaporator shell code	Nozzle pipe size in. (mm)			Evaporator nozzle dimensions ft in. (mm)						
	Number of passes			1-pass		2-pass			3-pass	
	1	2	3	C	AA[5]	BB[5]	DD[5]	EE	BB[5]	DD[5]
M,N	18 in. (457)	14 in. (356)	12 in. (304)	2 ft 4 1/2 in. (724)	3 ft 0 in. (914)	1 ft 8 1/2 in. (521)	4 ft 3 1/2 in. (1,308)	-	1 ft 8 1/2 in. (521)	4 ft 3 1/2 in. (1,308)
P,Q	18 in. (457)	14 in. (356)	12 in. (304)	2 ft 5 1/2 in. (749)	3 ft 1 1/2 in. (953)	1 ft 10 in. (559)	4 ft 5 in. (1346)	-	1 ft 10 in. (559)	4 ft 5 in. (1,346)
QV, QT	20 in. (508)	16 in. (406)	12 in. (305)	2 ft 5 1/2 in. (749)	3 ft 1 1/2 in. (953)	1 ft 11 1/2 in. (597)	4 ft 3 1/2 in. (1,308)	-	1 ft 11 1/2 in. (597)	4 ft 3 1/2 in. (1,308)
R,S,W	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 8 in. (813)	3 ft 5 1/4 in. (1,048)	2 ft 4 1/2 in. (724)	4 ft 6 1/2 in. (1,384)	0 ft 10 1/2 in. (267)	2 ft 1 in. (635)	4 ft 10 in. (1,473)
X,Z	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 11 1/2 in. (902)	3 ft 9 3/4 in. (1,162)	2 ft 8 3/4 in. (832)	4 ft 10 3/4 in. (1,492)	0 ft 11 in. (279)	2 ft 2 7/8 in. (683)	5 ft 4 5/8 in. (1,641)

See note in Evaporator - compact waterboxes - A through L evaporators - ft in. (mm).

Condenser - compact waterboxes - A through Q - standard - ft in. (mm)

Figure 27: Dimensions of condenser compact waterboxes - A through Q - standard (mm)

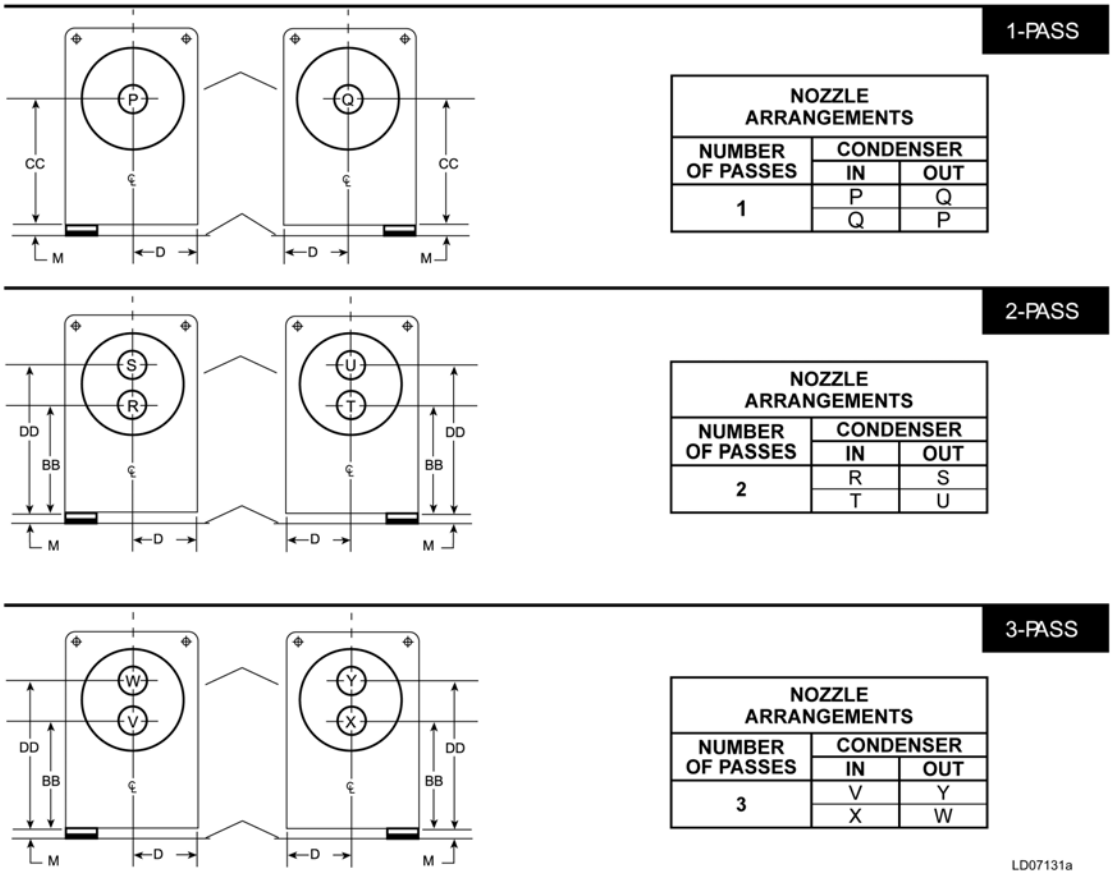


Table 48: Dimensions of compact waterboxes - 150 psi round

Condenser shell code	Nozzle pipe size in. (mm)			Condenser nozzle dimensions ft in. (mm)					
	Number of passes			1-pass		2-pass		3-pass	
	1	2	3	D	CC[5]	BB[5]	DD[5]	BB[5]	DD[5]
A	10 in. (254)	6 in. (152)	6 in. (152)	1 ft 3 in. (381)	2 ft 4 in. (711)	1 ft 9 1/2 in. (546)	2 ft 10 1/2 in. (876)	1 ft 9 1/2 in. (546)	2 ft 10 1/2 in. (876)
C,D	12 in. (305)	8 in. (203)	6 in. (152)	1 ft 3 1/2 in. (394)	2 ft 6 in. (762)	1 ft 10 3/8 in. (568)	3 ft 1 5/8 in. (956)	1 ft 10 3/8 in. (568)	3 ft 1 5/8 in. (956)
E,F	14 in. (356)	10 in. (254)	8 in. (203)	1 ft 5 1/2 in. (445)	2 ft 8 in. (813)	1 ft 11 3/4 in. (603)	3 ft 4 1/4 in. (1,022)	1 ft 11 3/4 in. (603)	3 ft 4 1/4 in. (1,022)

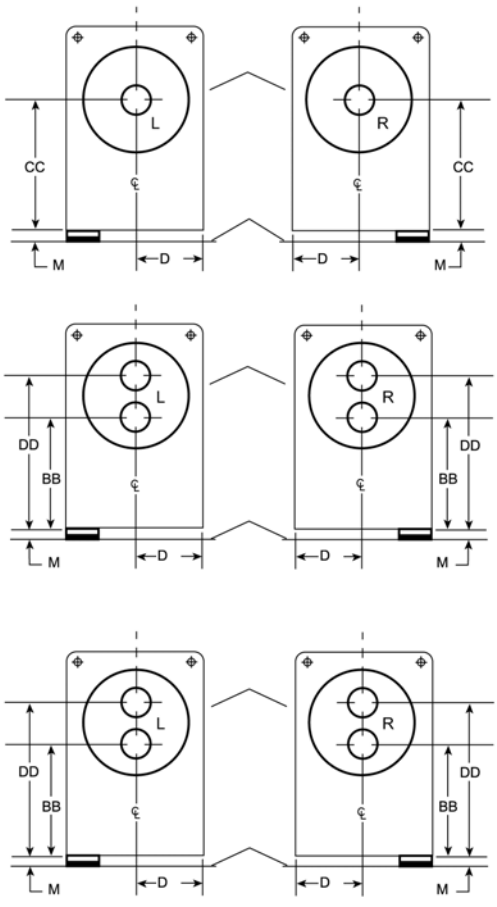
Table 48: Dimensions of compact waterboxes - 150 psi round

Condenser shell code	Nozzle pipe size in. (mm)			Condenser nozzle dimensions ft in. (mm)					
	Number of passes			1-pass		2-pass		3-pass	
	1	2	3	D	CC[5]	BB[5]	DD[5]	BB[5]	DD[5]
J,K,L	16 in. (406)	10 in. (254)	10 in. (254)	1 ft 8 in. (508)	3 ft 0 in. (914)	2 ft 3 in. (686)	3 ft 9 in. (1,143)	2 ft 3 in. (686)	3 ft 9 in. (1,143)
M,N	20 in. (508)	14 in. (356)	10 in. (254)	1 ft 11 in. (584)	3 ft 6 in. (1,067)	2 ft 6 3/8 in. (772)	4 ft 5 5/8 in. (1,362)	2 ft 6 3/8 in. (772)	4 ft 5 5/8 in. (1,362)
P,Q	20 in. (508)	16 in. (406)	14 in. (356)	2 ft 1 1/4 in. (641)	3 ft 8 in. (1,118)	2 ft 7 in. (787)	4 ft 9 in. (1,448)	2 ft 7 in. (787)	4 ft 9 in. (1,448)

See note in Evaporator - compact waterboxes - A through L evaporators - ft in. (mm).

Condenser - compact waterboxes - R through Z - standard - ft in. (mm)

Figure 28: Dimensions of condenser compact waterboxes - R through Z - standard (mm)



NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
1	PP	QG
	QQ	PP

NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
2	RR	SS
	TT	UU

NOZZLE ARRANGEMENTS		
NUMBER OF PASSES	CONDENSER	
	IN	OUT
3	VV	YY
	XX	WW

LD07131d

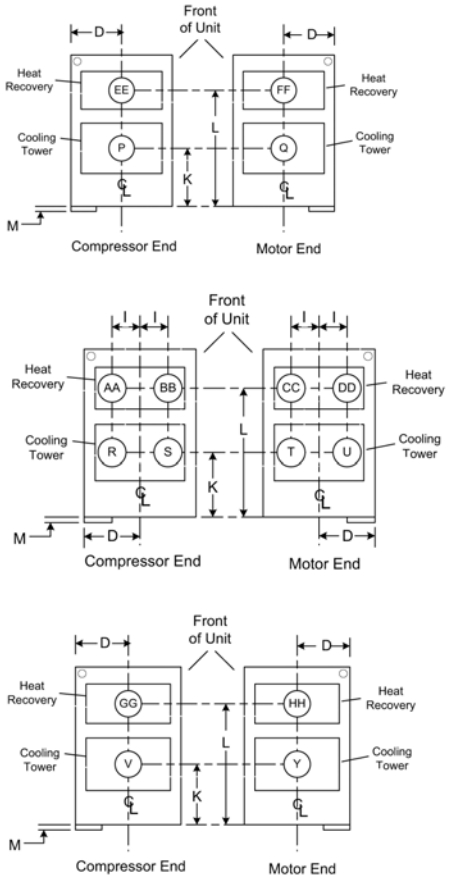
Table 49: Dimensions of compact waterboxes - 150 psi round

Condenser shell code	Nozzle pipe size in. (mm)			Condenser nozzle dimensions ft in. (mm)					
	Number of passes			1-pass		2-pass		3-pass	
	1	2	3	D	CC[5]	BB[5]	DD[5]	BB[5]	DD[5]
R,S	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 3 1/2 in. (699)	3 ft 10 1/2 in. (1,181)	2 ft 9 1/2 in. (851)	4 ft 11 1/2 in. (1,511)	2 ft 9 1/2 in. (851)	4 ft 11 1/2 in. (1,511)
T,V,W	24 in. (610)	18 in. (457)	16 in. (406)	2 ft 5 1/2 in. (749)	3 ft 11 1/2 in. (1,207)	2 ft 9 in. (838)	5 ft 2 in. (1,575)	2 ft 9 in. (838)	5 ft 2 in. (1,575)
X,Z	24 in. (610)	20 in. (508)	16 in. (406)	2 ft 8 in. (813)	4 ft 1 1/4 in. (1,251)	2 ft 9 1/4 in. (845)	5 ft 5 1/4 in. (1,657)	2 ft 9 1/4 in. (845)	5 ft 5 1/4 in. (1,657)

See note in Evaporator - compact waterboxes - A through L evaporators - ft in. (mm).

Condenser - heat recovery compact waterboxes - standard - ft in. (mm)

Figure 29: Dimensions of condenser heat recovery compact waterboxes - standard (mm)



	1 PASS NOZZLE ARRANGEMENTS	
	IN	OUT
HEAT RECOVERY	EE FF	FF EE
COOLING TOWER	P Q	Q P

	2 PASS NOZZLE ARRANGEMENTS	
	IN	OUT
HEAT RECOVERY	AA BB CC DD	BB AA DD CC
COOLING TOWER	R S T U	S R U T

	2 PASS NOZZLE ARRANGEMENTS	
	IN	OUT
HEAT RECOVERY	GG HH	HH GG
COOLING TOWER	V Y	Y V

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Table 50: Dimensions of heat recovery compact waterboxes - 150 psi rectangular

Condenser shell code	Nozzle pipe size in. (mm)			Condenser nozzle dimensions ft in. (mm)			
	Number of passes			1, 2 or 3 pass			2 pass
	1	2	3	D	K	L	I
B	10 in. (254)	8 in. (203)	6 in. (152)	1 ft 8 7/8 in. (530)	1 ft 9 1/4 in. (540)	3 ft 6 1/2 in. (1,018)	0 ft 9 1/16 in. (230)
I	14 in. (355)	10 in. (254)	8 in. (203)	1 ft 11 3/8 in. (594)	1 ft 10 1/4 in. (565)	3 ft 8 1/8 in. (1,121)	0 ft 10 1/8 in. (257)
O	16 in. (406)	12 in. (304)	10 in. (254)	2 ft 3 3/8 in. (695)	2 ft 0 3/8 in. (619)	4 ft 1 1/8 in. (1,248)	0 ft 11 13/16 in. (300)
U	18 in. (457)	14 in. (355)	10 in. (254)	2 ft 4 1/2 in. (724)	2 ft 11 3/16 in. (894)	5 ft 2 13/16 in. (1,595)	1 ft 0 3/8 in. (314)
Y	24 in. (609)	20 in. (508)	16 in. (406)	3 ft 4 in. (1,016)	3 ft 3 15/16 in. (1,014)	6 ft 3 7/8 in. (1,927)	1 ft 5 7/8 in. (454)

See note in Evaporator - compact waterboxes - A through L evaporators - ft in. (mm).

Evaporator - nozzle arrangements - standard - ft in. (mm)

Figure 30: Dimensions of evaporator - nozzle arrangements - standard (mm)

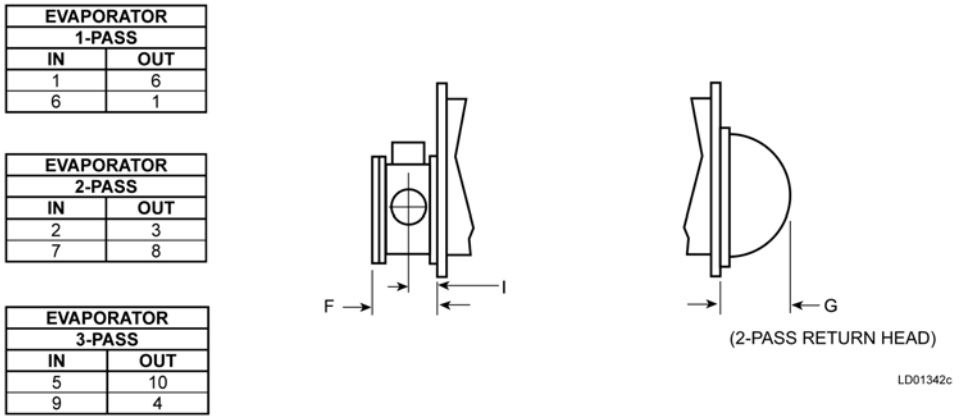

Table 51: Evaporator nozzle dimensions

Evaporator shell code	Evaporator nozzle dimensions ft in. (mm)						
	1-pass		2-pass			3-pass	
	F	I	F	G	I	F	I
A	1 ft 7 in. (483)	0 ft 8 3/4 in. (222)	1 ft 5 in. (432)	0 ft 6 1/2 in. (165)	0 ft 7 3/4 in. (197)	1 ft 5 in. (432)	0 ft 7 3/4 in. (197)
C,D	1 ft 10 3/4 in. (578)	0 ft 10 5/8 in. (270)	1 ft 8 5/8 in. (524)	0 ft 7 in. (178)	0 ft 9 1/2 in. (241)	1 ft 8 5/8 in. (524)	0 ft 9 1/2 in. (241)
E,F	2 ft 1 3/4 in. (654)	1 ft 0 1/8 in. (308)	1 ft 10 in. (559)	0 ft 7 1/2 in. (191)	0 ft 10 1/4 in. (260)	1 ft 10 in. (559)	0 ft 10 1/4 in. (260)
G,H	2 ft 5 5/8 in. (752)	1 ft 1 7/8 in. (352)	2 ft 5 5/8 in. (752)	1 ft 9 7/8 in. (556)	1 ft 1 7/8 in. (352)	2 ft 5 5/8 in. (752)	1 ft 1 7/8 in. (352)

Table 51: Evaporator nozzle dimensions

Evaporator shell code	Evaporator nozzle dimensions ft in. (mm)						
	1-pass		2-pass			3-pass	
	F	I	F	G	I	F	I
I,J,K,L	2 ft 9 5/16 in. (846)	1 ft 3 1/2 in. (394)	2 ft 9 5/16 in. (846)	2 ft 0 5/8 in. (625)	1 ft 3 1/2 in. (394)	2 ft 9 5/16 in. (846)	1 ft 3 1/2 in. (394)
M,N	2 ft 11 in. (889)	1 ft 4 in. (406)	2 ft 6 in. (762)	1 ft 0 1/4 in. (311)	1 ft 1 1/2 in. (343)	2 ft 4 in. (711)	1 ft 0 1/4 in. (311)
P,Q	3 ft 5 in. (1,041)	1 ft 7 in. (483)	3 ft 0 in. (914)	0 ft 11 in. (279)	1 ft 4 1/2 in. (419)	2 ft 10 in. (864)	1 ft 3 1/4 in. (387)
QT, QV	2 ft 8 in. (813)	1 ft 2 1/2 in. (368)	2 ft 4 in. (711)	1 ft 1 1/2 in. (343)	1 ft 0 1/2 in. (318)	2 ft 4 in. (711)	1 ft 0 1/2 in. (318)
R,S,W	2 ft 8 in. (813)	1 ft 2 5/8 in. (371)	2 ft 6 in. (762)	1 ft 2 1/2 in. (368)	1 ft 1 5/8 in. (346)	2 ft 6 in. (762)	1 ft 1 5/8 in. (346)
X,Z	3 ft 1 in. (940)	1 ft 4 1/4 in. (413)	2 ft 8 1/2 in. (826)	1 ft 2 in. (356)	1 ft 1 5/8 in. (346)	2 ft 6 1/2 in. (775)	1 ft 1 in. (330)

Note:

1. All dimensions are approximate.
2. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with grooves, allowing the option of welding, flanges, or use of grooved couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1/16 in. raised face), water flanged nozzles are optional (add 1/2 in. to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
3. One-, two-, and three-pass nozzle arrangements are available only in pairs shown and for all shell codes. Any pair of evaporator nozzles may be used in combination with any pair of condenser nozzles. Compact waterboxes on one heat exchanger may be used with Marine Waterboxes on the other heat exchanger.
4. Condenser water must enter the waterbox through the bottom connection for proper operation of the sub-cooler to achieve rated performance.
5. Add dimension M as shown in Table 5 or Table 13 according to the isolator type.

Condenser - nozzle arrangements - standard - ft in. (mm)

Figure 31: Dimensions of condenser - nozzle arrangements - standard (mm)

CONDENSER 1-PASS	
IN	OUT
11	16
16	11

CONDENSER 2-PASS	
IN	OUT
12	13
17	18

CONDENSER 3-PASS	
IN	OUT
15	20
19	14

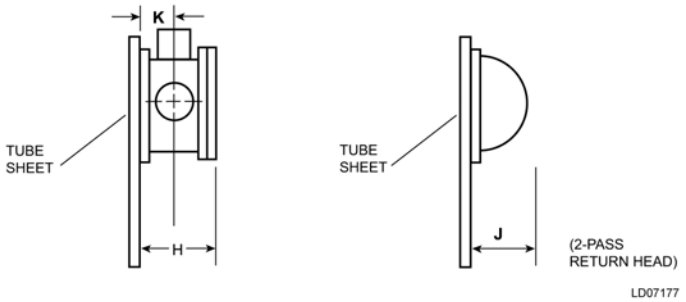

Table 52: Condenser nozzle dimensions

Condenser shell code	Condenser nozzle dimensions ft in. (mm)						
	1-pass		2-pass			3-pass	
	H	K	H	J	K	H	K
A	1 ft 9 in. (533)	0 ft 9 7/8 in. (251)	1 ft 4 3/4 in. (425)	0 ft 6 in. (152)	0 ft 7 3/4 in. (197)	1 ft 4 3/4 in. (425)	0 ft 7 3/4 in. (197)
B[6]	1 ft 10 1/2 in. (572)	0 ft 10 1/2 in. (267)	1 ft 8 in. (508)	0 ft 10 1/2 in. (267)	0 ft 9 1/4 in. (235)	1 ft 8 in. (508)	0 ft 9 1/4 in. (235)
C,D	2 ft 0 in. (610)	0 ft 11 1/8 in. (283)	1 ft 7 1/2 in. (495)	0 ft 6 3/8 in. (162)	0 ft 9 in. (229)	1 ft 7 1/2 in. (495)	0 ft 9 in. (229)
E,F	2 ft 0 1/2 in. (622)	0 ft 11 1/2 in. (292)	1 ft 10 1/4 in. (565)	0 ft 7 in. (178)	0 ft 9 7/8 in. (251)	1 ft 10 1/4 in. (565)	0 ft 9 7/8 in. (251)
I[6]	2 ft 3 in. (686)	1 ft 0 3/4 in. (324)	1 ft 10 1/2 in. (572)	0 ft 11 1/2 in. (292)	0 ft 10 1/2 in. (267)	1 ft 10 1/2 in. (572)	0 ft 10 1/2 in. (267)
J,K,L	2 ft 8 3/8 in. (822)	1 ft 3 3/8 in. (391)	2 ft 8 3/8 in. (822)	0 ft 7 1/2 in. (191)	1 ft 3 3/8 in. (391)	2 ft 8 3/8 in. (822)	1 ft 3 3/8 in. (391)
M,N	2 ft 11 in. (889)	1 ft 4 in. (406)	2 ft 11 in. (889)	1 ft 0 in. (305)	1 ft 4 in. (406)	2 ft 11 in. (889)	1 ft 4 in. (406)
O[6]	2 ft 6 1/4 in. (768)	1 ft 2 1/4 in. (362)	2 ft 1 3/4 in. (654)	1 ft 1 1/2 in. (343)	1 ft 0 in. (305)	2 ft 1 3/4 in. (654)	1 ft 0 in. (305)
P,Q	2 ft 8 in. (813)	1 ft 2 1/2 in. (368)	2 ft 4 in. (711)	0 ft 9 1/2 in. (241)	1 ft 0 1/2 in. (318)	2 ft 4 in. (711)	1 ft 0 1/2 in. (318)
R,S	2 ft 8 in. (813)	1 ft 2 1/2 in. (368)	2 ft 6 in. (762)	1 ft 0 in. (305)	1 ft 1 1/2 in. (343)	2 ft 6 in. (762)	1 ft 1 1/2 in. (343)
T,V,W	3 ft 0 in. (914)	1 ft 4 1/2 in. (419)	2 ft 6 in. (762)	0 ft 11 in. (279)	1 ft 1 1/2 in. (343)	2 ft 6 in. (762)	1 ft 1 1/2 in. (343)

Table 52: Condenser nozzle dimensions

Condenser shell code	Condenser nozzle dimensions ft in. (mm)						
	1-pass		2-pass			3-pass	
	H	K	H	J	K	H	K
U[6]	2 ft 8 in. (813)	1 ft 3 in. (381)	2 ft 4 in. (711)	1 ft 2 1/4 in. (362)	1 ft 1 in. (330)	2 ft 4 in. (711)	1 ft 1 in. (330)
X,Z	3 ft 5 1/2 in. (1,054)	1 ft 6 1/2 in. (470)	3 ft 0 1/2 in. (927)	1 ft 2 in. (356)	1 ft 4 1/4 in. (413)	2 ft 9 1/2 in. (851)	1 ft 2 in. (356)
Y[6]	3 ft 4 3/4 in. (1,035)	1 ft 7 1/4 in. (489	3 ft 0 1/4 in. (921)	1 ft 8 3/4 in. (527)	1 ft 5 in. (432)	3 ft 0 1/4 in. (921)	1 ft 5 in. (432)

Note:

1. All dimensions are approximate.
2. Standard water nozzles are Schedule 40 pipe size, furnished as welding stub-outs with grooves, allowing the option of welding, flanges, or use of grooved couplings. Factory-installed, class 150 (ANSI B16.5, round slip-on, forged carbon steel with 1/16 in. raised face), water flanged nozzles are optional (add 1/2 in. to nozzle length). Companion flanges, nuts, bolts, and gaskets are not furnished.
3. One-, two-, and three-pass nozzle arrangements are available only in pairs shown and for all shell codes. Any pair of evaporator nozzles may be used in combination with any pair of condenser nozzles. Compact waterboxes on one heat exchanger may be used with Marine Waterboxes on the other heat exchanger.
4. Condenser water must enter the waterbox through the bottom connection for proper operation of the sub-cooler to achieve rated performance.
5. Add dimension M as shown in Table 5 or Table 13 according to the isolator type.
6. Heat recovery units offer marine waterbox option for tower (lower) bundle only.

Evaporator marine waterbox nozzle arrangements - ft in. (mm)

Figure 32: Dimensions of evaporator marine waterboxes ft in. (mm)

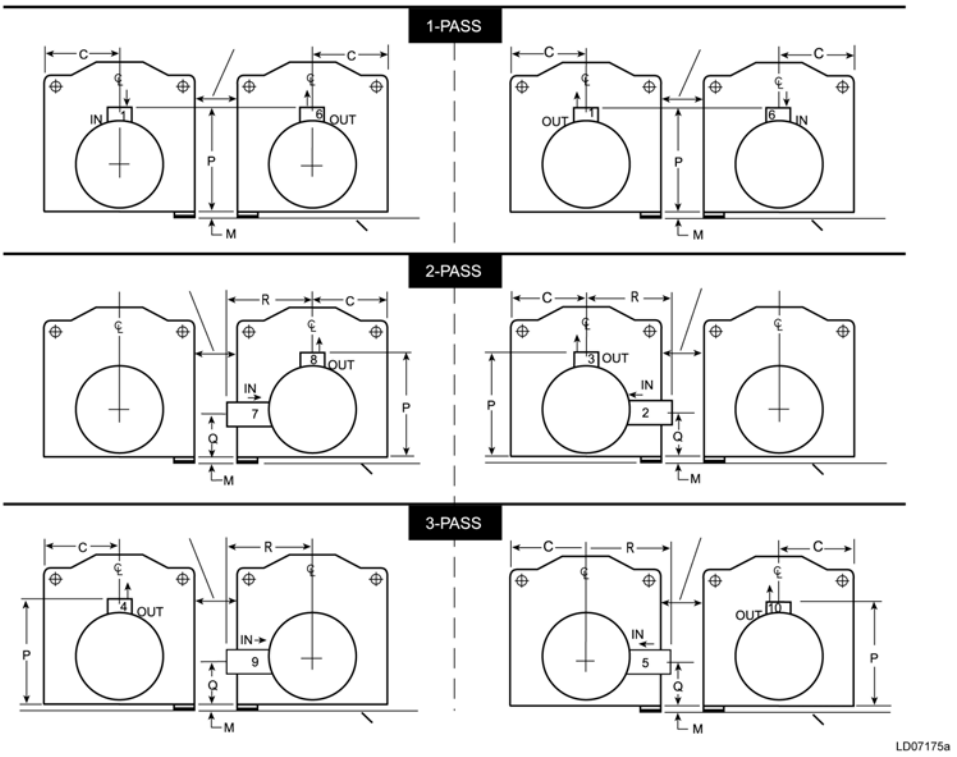

Table 53: Dimensions of marine waterboxes - 150 psi round

Evaporator shell code	Nozzle pipe size in. (mm) Number of passes			1-pass		2-pass			3-pass		
	1	2	3	C	P[5]	P[5]	Q[5]	R	P[5]	Q[5]	R
A	8 in. (203)	6 in. (152)	4 in. (101)	1 ft 3 1/2 in. (394)	3 ft 7 in. (1,092)	3 ft 7 in. (1,092)	0-11 in. (279)	1 ft 3 1/4 in. (387)	3 ft 7 in. (1,092)	0 ft 11 in. (279)	1 ft 3 1/4 in. (387)
C,D	10 in. (254)	8 in. (203)	6 in. (152)	1 ft 5 1/2 in. (445)	3 ft 11 in. (1,194)	3 ft 11 in. (1,194)	0 ft 10 in. (254)	1 ft 6 1/2 in. (470)	3 ft 11 in. (1,194)	0 ft 10 in. (254)	1 ft 6 1/2 in. (470)
E,F	14 in. (356)	10 in. (254)	8 in. (203)	1 ft 7 1/2 in. (495)	4 ft 3 in. (1,295)	4 ft 3 in. (1,295)	0 ft 11 in. (279)	1 ft 9 1/2 in. (546)	4 ft 3 in. (1,295)	0 ft 11 in. (279)	1 ft 9 1/2 in. (546)
G,H	14 in. (356)	10 in. (254)	8 in. (203)	2 ft 0 in. (610)	4 ft 5 1/2 in. (1,359)	4 ft 5 1/2 in. (1,359)	1 ft 0 1/2 in. (318)	1 ft 11 1/2 in. (597)	4 ft 5 1/2 in. (1,359)	0 ft 11 in. (279)	1 ft 9 7/8 in. (556)
I,J,K,L	16 in. (406)	12 in. (305)	10 in. (254)	2 ft 1 1/4 in. (641)	5 ft 0 3/8 in. (1,534)	5 ft 0 3/8 in. (1,534)	0 ft 10 1/2 in. (267)	2 ft 2 1/2 in. (673)	5 ft 0 3/8 in. (1,534)	0 ft 10 1/2 in. (267)	2 ft 2 1/2 in. (673)
M,N	18 in. (457)	14 in. (356)	12 in. (305)	2 ft 4 1/2 in. (724)	5 ft 8 1/2 in. (1,740)	5 ft 8 1/2 in. (1,740)	1 ft 2 in. (356)	2 ft 2 1/2 in. (673)	5 ft 8 1/2 in. (1,740)	1 ft 2 in. (356)	2 ft 4 3/4 in. (730)

Table 53: Dimensions of marine waterboxes - 150 psi round

Evaporator shell code	Nozzle pipe size in. (mm) Number of passes			1-pass		2-pass			3-pass		
	1	2	3	C	P[5]	P[5]	Q[5]	R	P[5]	Q[5]	R
P,Q	18 in. (457)	14 in. (356)	12 in. (305)	2 ft 5 1/2 in. (749)	6 ft 0 1/8 in. (1,832)	6 ft 0 1/8 in. (1,832)	1 ft 3 in. (381)	2 ft 6 1/2 in. (775)	6 ft 0 1/8 in. (1,832)	1 ft 3 in. (381)	2 ft 6 1/2 in. (775)
QT, QV	20 in. (508)	16 in. (406)	12 in. (305)	2 ft 5 1/2 in. (749)	6 ft 0 1/8 in. (1,832)	6 ft 0 1/8 in. (1,832)	1 ft 4 1/2 in. (419)	2 ft 6 1/2 in. (775)	6 ft 0 1/8 in. (1,832)	1 ft 4 1/2 in. (419)	2 ft 6 1/2 in. (775)
R,S	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 8 in. (813)	6 ft 5 7/8 in. (1,978)	6 ft 5 7/8 in. (1,978)	1 ft 3 3/4 in. (400)	3 ft 0 1/8 in. (918)	6 ft 5 7/8 in. (1,978)	1 ft 3 3/4 in. (400)	3 ft 0 1/8 in. (918)
W	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 8 in. (813)	6 ft 5 7/8 in. (1,978)	6 ft 5 7/8 in. (1,978)	1 ft 3 3/4 in. (400)	3 ft 0 1/8 in. (918)	6 ft 5 7/8 in. (1,978)	1 ft 3 3/4 in. (400)	3 ft 0 1/8 in. (918)
X,Z	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 11 1/2 in. (902)	6 ft 11 1/2 in. (2,121)	6 ft 11 1/2 in. (2,121)	2 ft 1 3/4 in. (654)	3 ft 2 1/8 in. (968)	6 ft 11 1/2 in. (2,121)	1 ft 8 1/4 in. (514)	3 ft 2 1/8 in. (968)

Condenser marine waterbox nozzle arrangements - ft in. (mm)

Figure 33: Dimensions of condenser marine waterboxes ft in. (mm)

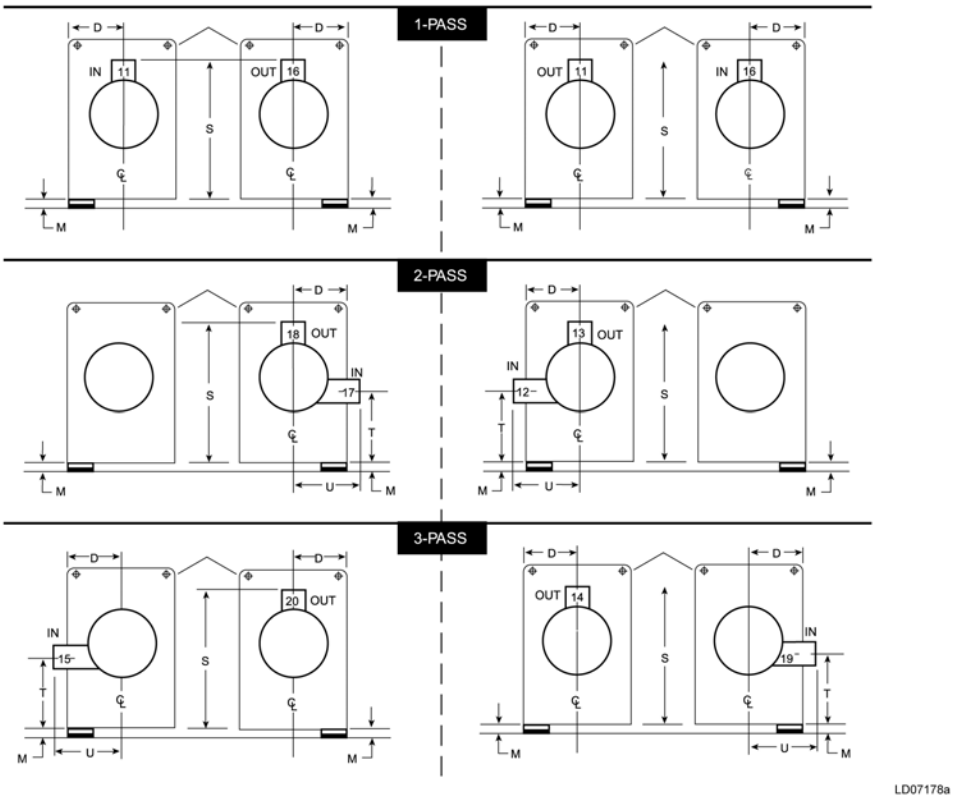

Table 54: Dimensions of marine waterboxes - 150 psi round

Condenser shell code	Nozzle pipe size in. (mm) Number of passes			1-pass		2-pass			3-pass		
	1	2	3	D	S[5]	S[5]	T[5]	U	S[5]	T[5]	U
A	10 in. (254)	6 in. (152)	6 in. (152)	1 ft 3 in. (381)	3 ft 11 in. (1,194)	3 ft 11 in. (1,194)	1 ft 8 in. (508)	1 ft 3 3/8 in. (391)	3 ft 11 in. (1,194)	1 ft 8 in. (508)	1 ft 3 3/8 in. (391)
C,D	12 in. (305)	8 in. (203)	6 in. (152)	1 ft 3 1/2 in. (394)	4 ft 3 in. (1,295)	4 ft 3 in. (1,295)	1 ft 8 in. (508)	1 ft 6 1/2 in. (470)	4 ft 3 in. (1,295)	1 ft 8 in. (508)	1 ft 6 1/2 in. (470)
E,F	14 in. (356)	10 in. (254)	8 in. (203)	1 ft 5 1/2 in. (445)	4 ft 7 in. (1,397)	4 ft 7 in. (1,397)	1 ft 10 in. (559)	1 ft 9 in. (533)	4 ft 7 in. (1,397)	1 ft 10 in. (559)	1 ft 9 in. (533)
J,K,L	16 in. (406)	10 in. (254)	10 in. (254)	1 ft 8 in. (508)	5 ft 1 in. (1,549)	5 ft 1 in. (1,549)	1 ft 9 in. (533)	1 ft 9 1/2 in. (546)	5 ft 1 in. (1,549)	1 ft 9 in. (533)	1 ft 9 1/2 in. (546)
M,N	20 in. (508)	14 in. (356)	10 in. (254)	1 ft 11 in. (584)	5 ft 9 7/8 in. (1,775)	5 ft 9 7/8 in. (1,775)	2 ft 4 in. (711)	2 ft 1 1/2 in. (648)	5 ft 9 7/8 in. (1,775)	2 ft 4 in. (711)	2 ft 1 1/2 in. (648)

Table 54: Dimensions of marine waterboxes - 150 psi round

Condenser shell code	Nozzle pipe size in. (mm) Number of passes			1-pass		2-pass			3-pass		
	1	2	3	D	S[5]	S[5]	T[5]	U	S[5]	T[5]	U
P,Q	20 in. (508)	16 in. (406)	14 in. (356)	2 ft 1 1/4 in. (641)	6 ft 2 3/8 in. (1,889)	6 ft 2 3/8 in. (1,889)	2 ft 4 1/2 in. (724)	2 ft 5 1/2 in. (749)	6 ft 2 3/8 in. (1,889)	2 ft 4 1/2 in. (724)	2 ft 5 1/2 in. (749)
R,S	20 in. (508)	18 in. (457)	14 in. (356)	2 ft 3 1/2 in. (699)	6 ft 7 in. (2,007)	6 ft 7 in. (2,007)	2 ft 6 1/2 in. (775)	2 ft 8 1/2 in. (825)	6 ft 7 in. (2,007)	2 ft 6 1/2 in. (775)	2 ft 8 1/2 in. (826)
T,V,W	24 in. (610)	18 in. (457)	16 in. (406)	2 ft 5 1/2 in. (749)	6 ft 10 1/4 in. (2,089)	6 ft 10 1/4 in. (2,089)	2 ft 6 in. (762)	2 ft 10 in. (864)	6 ft 10 1/4 in. (2,089)	2 ft 6 in. (762)	2 ft 10 in. (864)
X,Z	24 in. (610)	20 in. (508)	16 in. (406)	2 ft 8 in. (813)	7 ft 2 in. (2,184)	7 ft 2 in. (2,184)	2 ft 7 3/4 in. (806)	2 ft 11 1/2 in. (902)	7 ft 2 in. (2,184)	2 ft 7 3/4 in. (806)	2 ft 11 1/2 in. (902)

Condenser marine waterboxes heat recovery units - main (tower) circuit only

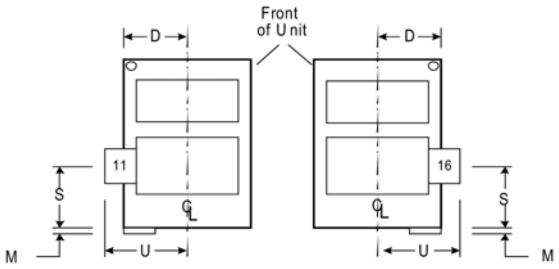

Table 55: 1 pass condenser nozzle options

Cooling water	
IN	OUT
11	16
16	11

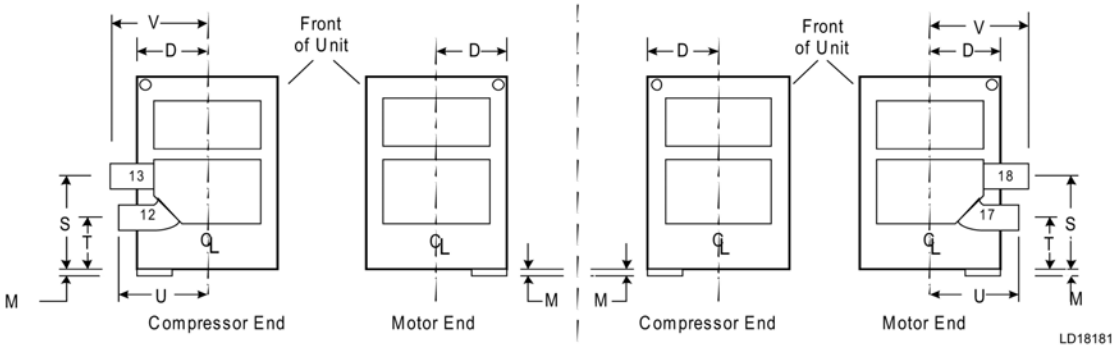

Table 56: 2 pass condenser nozzle options

Cooling water	
IN	**OUT**
12	13
17	18

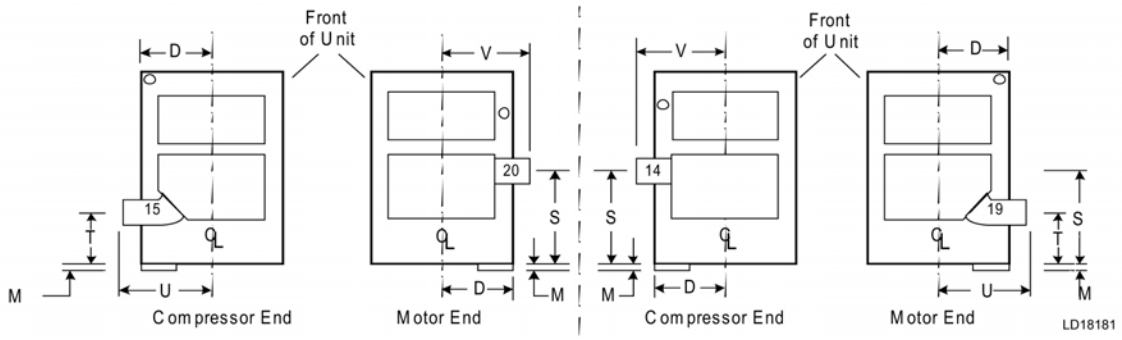

Table 57: 3 pass condenser nozzle options

Cooling water	
IN	**OUT**
15	20
19	14

Table 58: Dimensions of 1 pass marine waterboxes - 150 psi (rectangular) - ft in. (mm)

Condenser shell code	Nozzle pipe size in. (mm)					
	1	**2**	**3**	**D**	**S**	**U**
B	10 in. (254)	8 in. (203)	6 in. (152)	1 ft 8 7/8 in. (530)	1 ft 9 1/4 in. (539)	2 ft 6 3/4 in. (780)
I	14 in. (355)	10 in. (254)	8 in. (203)	1 ft 11 3/8 in. (593)	1 ft 10 1/4 in. (559)	2 ft 9 3/8 in. (838)
O	16 in. (406)	12 in. (305)	10 in. (254)	2 ft 3 3/8 in. (695)	2 ft 0 3/8 in. (610)	3 ft 2 3/8 in. (975)
U	18 in. (457)	14 in. (355)	10 in. (254)	2 ft 4 1/2 in. (723)	2 ft 11 3/16 in. (893)	3 ft 5 9/16 in. (1,056)
Y	24 in. (610)	20 in. (508)	16 in. (406)	3 ft 4 in. (1,016)	3 ft 3 15/16 in. (1,014)	4 ft 7 9/16 in. (1,411)

Table 59: Dimensions of 2 pass marine waterboxes - 150 psi (rectangular) - ft in. (mm)

Condenser shell code	Nozzle pipe size in. (mm)							
	1	2	3	D	S	T	U	V
B	10 in. (254)	8 in. (203)	6 in. (152)	1 ft 8 7/8 in. (530)	2 ft 3 7/16 in. (697)	1 ft 1 15/16 in. (338)	2 ft 4 3/4 in. (730)	2 ft 7 1/8 in. (790)
I	14 in. (355)	10 in. (254)	8 in. (203)	1 ft 11 3/8 in. (593)	2 ft 4 1/2 in. (723)	1 ft 1 in. (330)	2 ft 5 1/8 in. (740)	2 ft 10 5/8 in. (879)
O	16 in. (406)	12 in. (305)	10 in. (254)	2 ft 3 3/8 in. (695)	2 ft 7 1/8 in. (790)	1 ft 1 3/8 in. (339)	2 ft 10 1/4 in. (870)	3 ft 4 1/2 in. (1,029)
U	18 in. (457)	14 in. (355)	10 in. (254)	2 ft 4 1/2 in. (723)	3 ft 6 9/16 in. (1,081)	1 ft 11 3/16 in. (589)	3 ft 1 7/8 in. (962)	3 ft 7 1/2 in. (1,105)
Y	24 in. (610)	20 in. (508)	16 in. (406)	3 ft 4 in. (1,016)	4 ft 2 5/16 in. (1,278)	1 ft 10 5/16 in. (582)	4 ft 4 3/4 in. (1,340)	4 ft 11 11/16 in. (1,516)

Table 60: Dimensions of 3 pass marine waterboxes - 150 psi (rectangular) - ft in. (mm)

Condenser shell code	Nozzle pipe size in. (mm)							
	1	2	3	D	S	T	U	V
B	10 in. (254)	8 in. (203)	6 in. (152)	1 ft 8 7/8 in. (530)	2 ft 4 1/2 in. (723)	1 ft 5 1/2 in. (444)	2 ft 6 3/4 in. (780)	2 ft 6 3/4 in. (780)
I	14 in. (355)	10 in. (254)	8 in. (203)	1 ft 11 3/8 in. (593)	2 ft 5 1/2 in. (749)	1 ft 6 3/8 in. (466)	2 ft 9 1/8 in. (841)	2 ft 9 1/8 in. (841)
O	16 in. (406)	12 in. (305)	10 in. (254)	2 ft 3 3/8 in. (695)	2 ft 8 3/8 in. (822)	1 ft 7 5/8 in. (498)	3 ft 1 7/8 in. (962)	3 ft 1 7/8 in. (962)
U	18 in. (457)	14 in. (355)	10 in. (254)	2 ft 4 1/2 in. (723)	3 ft 8 3/16 in. (1,122)	2 ft 5 15/16 in. (760)	3 ft 0 11/16 in. (932)	3 ft 3 in. (991)
Y	24 in. (610)	20 in. (508)	16 in. (406)	3 ft 4 in. (1,016)	4 ft 4 5/16 in. (1,328)	2 ft 7 7/16 in. (798)	4 ft 2 1/16 in. (1,271)	4 ft 6 13/16 in. (1,392)

Note: Add dimension M as shown in Table 5 or Table 13 according to the isolator type.

Weights

Table 61: Approximate unit weight including motor for flooded evaporator units - lb (kg)

Shells	Compressor	Shipping weight lb (kg)	Operating weight lb (kg)	Estimate refrigerant charge lb (kg)
A-A	Q3	13,100 (5,942)	15,000 (6,804)	810 (367)
C-B	Q4	18,023 (8,175)	22,323 (10,126)	1,525 (692)
C-C	Q3, Q4	14,920 (6,768)	17,940 (8,138)	1,240 (562)
C-C	Q5	15,330 (6,954)	18,350 (8,324)	1,240 (562)
D-D	Q3, Q4	17,215 (7,809)	21,100 (9,571)	1,680 (762)
D-D	Q5	17,625 (7,995)	21,510 (9,757)	1,680 (762)
E-E	Q3, Q4	17,950 (8,142)	22,160 (10,052)	1,710 (776)
E-E	Q5,Q6,Q7,P7	18,360 (8,328)	22,570 (10,238)	1,710 (776)
E-I	Q7	23,567 (10,690)	29,384 (13,329)	1,805 (819)
F-F	Q5,Q6,Q7,P7	18,720 (8,491)	23,880 (10,832)	2,175 (987)
G-E	P8	20,300 (9,208)	24,200 (10,977)	1,990 (903)
H-F	P8,P9	23,100 (10,478)	28,000 (12,701)	2,610 (1,184)
J-J	P8,P9	24,000 (10,886)	29,100 (13,200)	2,550 (1,157)
L-L	P8,P9	27,400 (12,429)	33,900 (15,377)	3,165 (1,436)

Table 61: Approximate unit weight including motor for flooded evaporator units - lb (kg)

Shells	Compressor	Shipping weight lb (kg)	Operating weight lb (kg)	Estimate refrigerant charge lb (kg)
K-K	H9	28,530 (12,941)	36,000 (16,330)	2,925 (1,327)
K-K	K1	31,100 (14,107)	36,200 (16,420)	3,248 (1,473)
K-O	H9	34,483 (15,641)	44,776 (20,310)	3,260 (1,479)
M-M	H9	34,200 (15,513)	43,600 (19,777)	3,665 (1,662)
M-M	K1,K2	38,300 (17,373)	47,100 (21,365)	3,665 (1,662)
M-U	K2	45,178 (20,493)	58,017 (26,317)	3,540 (1,606)
N-N	K1,K2	28,530 (12,941)	50,800 (23,043)	4,225 (1,916)
N-N	K3	48,000 (21,773)	54,100 (24,540)	4,225 (1,916)
P-P	K1,K2	41,500 (18,824)	51,900 (23,542)	3,855 (1,749)
Q-Q	K1,K2	45,300 (20,548)	56,800 (25,764)	4,255 (1,930)
Q-Q	K3	46,000 (20,866)	60,200 (27,307)	4,255 (1,930)
R-R	K3	52,800 (23,950)	70,300 (31,888)	4,660 (2,114)
R-R	K4	53,000 (24,041)	70,600 (32,024)	4,785 (2,170)
S-S	K4	59,000 (26,762)	76,300 (34,610)	4,940 (2,241)
S-V	K4	60,100 (27,261)	81,300 (36,878)	5,500 (2,495)
X-T	K4	59,200 (26,853)	80,000 (36,288)	5,125 (2,325)
X-X	K4	66,000 (29,938)	87,000 (39,463)	5,625 (2,552)
W-W	K7	79,500 (36,061)	104,000 (47,174)	6,900 (3,130)
Z-Y	K7	95,300 (43,228)	123,015 (55,800)	6,555 (2,973)
Z-Z	K7	80,500 (36,515)	105,000 (47,628)	6,275 (2,846)

ⓘ **Note:** Refrigerant charge quantity and weights vary based on tube count, configuration, and chiller performance. Use for reference only. Refer to *YORKworks Performance Page* or chiller nameplate for actual charge requirement.

Table 62: Approximate unit weight including motor for hybrid falling film evaporator units - lb (kg)

Shells	Compressor	Shipping weight lb (kg)	Operating weight lb (kg)	Estimated refrigerant charge lb (kg)
A-A	Q3	12,850 (5,584)	14,419 (6,540)	695 (315)
C-C	Q3, Q4	14,570 (6,609)	16,848 (7,642)	875 (397)
C-C	Q5	15,000 (6,804)	17,278 (7,837)	875 (397)
D-D	Q4	17,000 (7,711)	20,051 (9,095)	1,180 (535)
D-D	Q5	17,410 (7,897)	20,461 (9,281)	1,180 (535)
E-E	Q5, Q6, Q7, P7	18,700 (8,482)	21,700 (9,843)	1,120 (508)
F-F	Q5, Q6, Q7, P7	19,220 (8,718)	23,142 (10,497)	1,415 (642)
G-E	P8, P9	20,640 (9,362)	24,036 (10,903)	1,320 (599)
H-F	P8, P9	23,540 (10,678)	28,083 (12,738)	1,775 (805)
I-K	H9	28,849 (13,086)	34,078 (15,458)	1,820 (826)
K-K	H9	28,850 (13,086)	34,079 (15,458)	1,820 (826)
I-K	K1	31,350 (14,220)	35,145 (15,942)	1,820 (826)
M-M	K1, K2	34,520 (15,000)	46,055 (20,013)	2,300 (1,043)
N-N	K1, K2	41,273 (18,721)	49,605 (22,501)	2,650 (1,202)
N-N	K3	48,380 (21,945)	52,905 (23,998)	2,650 (1,202)
P-P	K1, K2	41,950 (19029)	51,595 (23,403)	3,100 (1,406)
Q-Q	K1, K2	45,800 (20,775)	56,545 (25,649)	3,500 (1,588)
Q-Q	K3	46,500 (21,092)	59,945 (27,191)	3,500 (1,588)

ⓘ **Note:** Refrigerant charge quantity and weights will vary based on tube count, configuration, and chiller performance. Use for reference only. Refer to *YORKworks Performance Page* or chiller nameplate for actual charge requirement.

Add the following evaporator marine waterbox weights to the standard unit weights shown in Table 61 and Table 62

Table 63: Evaporator marine waterbox weights - lb (kgs).

Evaporator code	Shipping weight			Operating weight		
	Increase - lb (kg)			Increase - lb (kg)		
	1-pass	2-pass	3-pass	1-pass	2-pass	3-pass
A	924 (419)	744 (337)	978 (444)	1,468 (666)	1,288 (584)	1,522 (690)
C,D	1,352 (613)	1,114 (505)	1,480 (671)	2,224 (1,009)	1,986 (901)	2,352 (1,067)
E,F	1,878 (852)	1,260 (572)	2,080 (943)	3,378 (1,532)	2,760 (1,252)	3,580 (1,624)
G,H	1,213 550	1,296 (588)	1,293 (587)	2,655 (1,204)	2,738 (1,242)	2,735 (1,241)
I,J,K,L	1,751 (794)	1,843 (836)	1,856 (842)	3,864 (1,753)	3,956 (1,794)	3,969 (1,800)
M,N	4,290 (1,946)	2,036 (924)	4,140 (1,878)	7,535 (3,418)	3,264 (1,481)	6,300 (2,858)
P,Q	5,982 (2,713)	3,281 (1,488)	5,724 (2,596)	10,854 (4,923)	5,277 (2,394)	9,442 (4,283)
R,S,W	4,804 (2,179)	2,700 (1,225)	4,912 (2,228)	8,522 (3,866)	4,516 (2,048)	8,187 (3,714)
X,Z	7,088 (3,215)	3,660 (1,660)	7,244 (3,286)	11,552 (5,240)	5,507 (2,498)	11,243 (5,100)

The following condenser marine waterbox weights are to be added to the standard unit weights shown in Table 61 and Table 62

Table 64: Condenser marine waterbox weights - lb (kg).

Condenser code	Shipping weight			Operating weight		
	Increase - lb (kg)			Increase - lb (kg)		
	1-pass	2-pass	3-pass	1-pass	2-pass	3-pass
A	762 (346)	566 (257)	810 (367)	1,274 (578)	1,078 (489)	1,322 (600)
B	1,569 (712)	874 (396)	1,677 (761)	2,113 (958)	1,094 (496)	2,071 (939)
C,D	946 (429)	778 (353)	1,046 (474)	1,692 (767)	1,524 (691)	1,792 (813)
E,F	726 (329)	811 (368)	791 (359)	1,337 (606)	1,722 (781)	1,702 (772)
I	2,066 (937)	1,070 (485)	2,032 (922)	3,017 (1,396)	1,416 (642)	2,738 (1,242)
J,K,L	1,029 (467)	1,167 (529)	1,151 (522)	2,309 (1,047)	2,448 (1,110)	2,431 (1,103)
M,N	2,466 (1,119)	1,330 (603)	2,324 (1,054)	4,863 (2,206)	2,448 (1,110)	4,582 (2,078)
O	2,985 (1,354)	1,443 (655)	2,987 (1,355)	4,435 (2,012)	2,172 (985)	3,979 (1,805)
P,Q	3,700 (1,678)	1,858 (843)	3,752 (1,702)	6,561 (2,976)	3,132 (1,421)	5,991 (2,717)
R,S	3,806 (1,726)	1,946 (883)	3,960 (1,796)	6,657 (3,020)	3,195 (1,449)	6,352 (2,881)

Table 64: Condenser marine waterbox weights - lb (kg).

Condenser code	Shipping weight			Operating weight		
	Increase - lb (kg)			Increase - lb (kg)		
	1-pass	2-pass	3-pass	1-pass	2-pass	3-pass
V,T,W	5,196 (2,357)	2,565 (1,163)	5,204 (2,361)	9,161 (4,155)	4,012 (1,820)	8,219 (3,728)
U	3,641 (1,652)	1,893 (859)	3,609 (1,637)	5,350 (2,427)	2,556 (1,159)	4,770 (2,164)
X,Z	5,840 (2,649)	2,953 (1,339)	5,380 (2,440)	9,900 (4,491)	4,649 (2,109)	8,100 (3,674)
Y	9,094 (4,125)	4,762 (2,160)	9,058 (4,109)	13,326 (6,045)	6,524 (2,959)	12,409 (5,629)

Unit conversion

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

Table 65: 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)	0.4536	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 = 7.22°C

To convert a temperature range (that is, 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