



KYSOR WARREN



April 2019

Part No. 31E11013

Models:

QWST, QWSTE, QWSTG, QWSTGE

Applications:



Introduction—General Information	2
Plan and Cross Views	3
Case Data	6
Case Installation	11
Installation Trim, Caps and Shelves	14
Electrical Connections—General	21
Refrigeration Piping and Dehydration	26
Operation	29
Parts List	31
Warranty	33

Installation and Operation Manual

Introduction—General Information

This manual has been prepared for our customers and the personnel involved in installing and maintaining our cases.

Our refrigerated island case line has been designed with a focus on things most important to your bottom line. Enhanced merchandise visibility, high energy efficiency, and merchandising flexibility have all merged in an attractive, modular design. Custom styles fit seamlessly into your floor plan and an eco-friendly design protects the environment while saving energy costs. The multi-deck, dairy door case line is available in medium-temperature applications.

These cases should be installed and operated according to the instructions contained in this manual to ensure proper performance. They are designed for display of products in an air-conditioned store where temperature and humidity are maintained at a maximum of 75°F dry-bulb temperatures and 55% relative humidity.

CAUTION: Failure to maintain maximum design conditions may result in operational issues such as the following: increased BTUH load, high product temperature, coil icing, product frosting, and external sweating.

Case Description

Model	Description
QWST	High efficiency, wide, split temperature, twin, non-glass
QWSTE	High efficiency, wide, split temperature, twin, non-glass, end case
QWSTG	High efficiency, wide, split temperature, twin, glass
QWSTGE	High efficiency, wide, split temperature, twin, glass, end case

Receiving/Shipping Damage/Lost Items

All equipment should be examined for shipping damage before and during unloading. If there is any damage, the carrier should be notified immediately and an inspection requested. The delivery receipt must be noted that the equipment was received damaged. If damage is of a concealed nature, you must contact the carrier within three (3) days following delivery. The consignee for all damages must file a claim with the carrier.

NOTE: All claims for shortages must be within 10 days after receipt of shipment.

Refrigerant

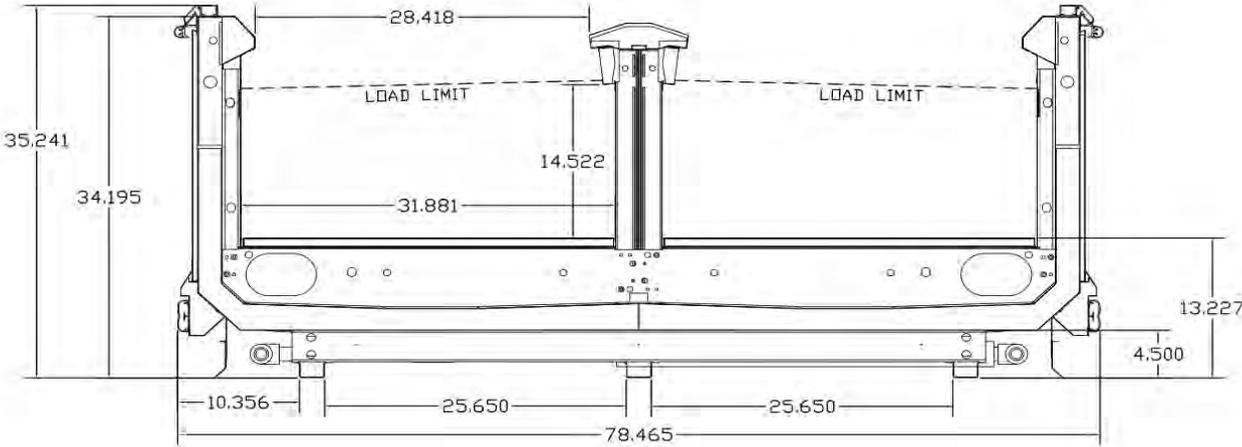
A variety of refrigerants can be used in the Kysor Warren cases provided the correct expansion valve is equipped with the case when ordered. The correct expansion valve must be specified on the order to meet end user requirements. If none is specified on the order, the default expansion valve will be shipped with the case.

In addition, cases can be modified in the field to allow changing the type of refrigerant used. This requires changing the expansion valve and distributor orifice that is currently equipped in the case. Contact your Kysor Warren Service Representative for additional information.

NOTE: Refer to Case Data Control Settings for refrigeration requirements.

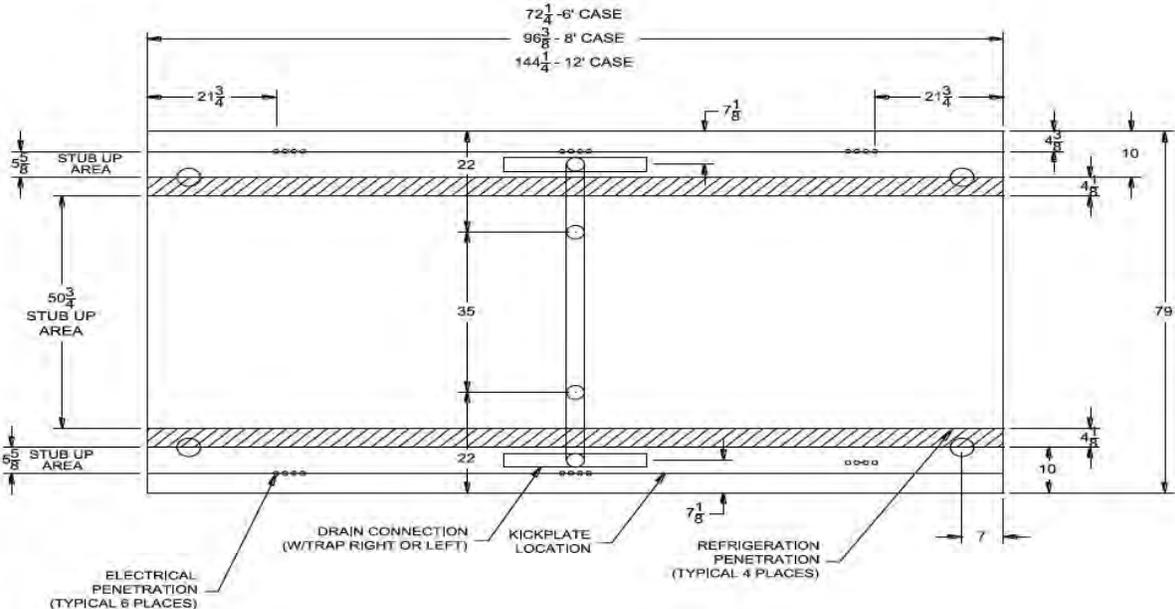
Plan and Cross Views

QWST CROSS VIEW

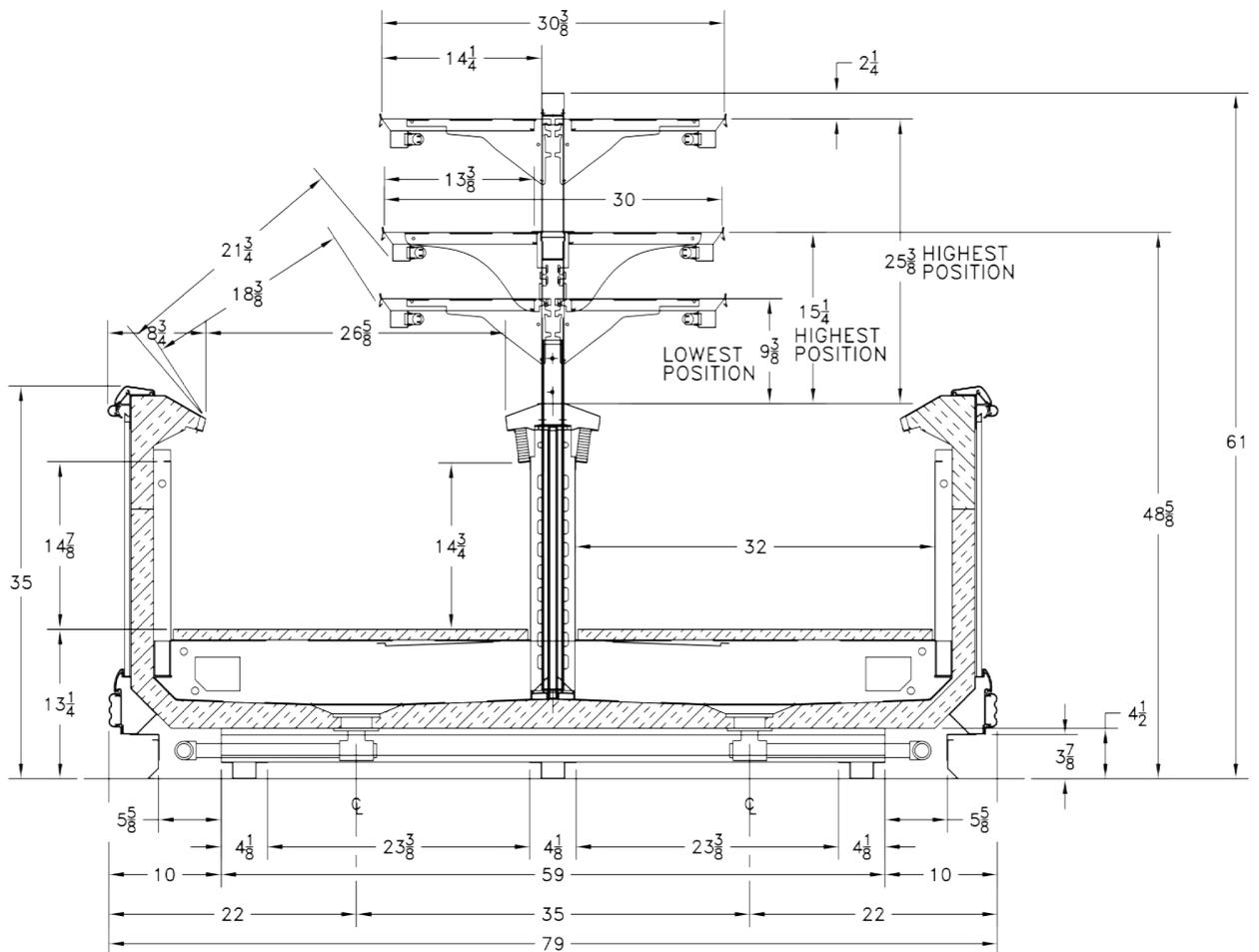
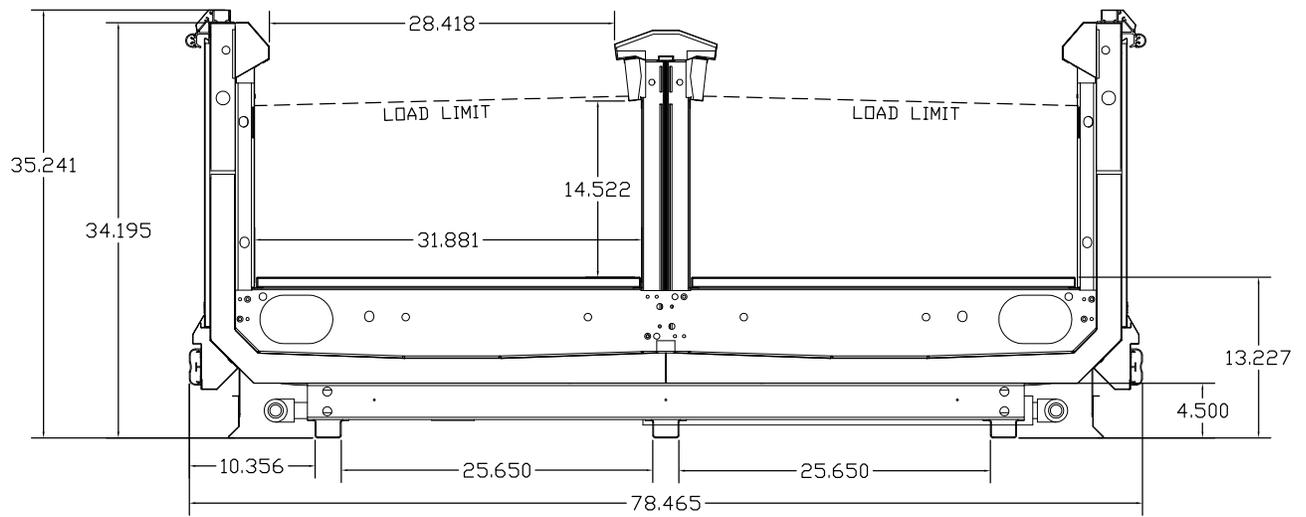


Add 3" thickness for a pair of ends.

QWST PLAN VIEW



Installation and Operation Manual



QWSTG w/Superstructure

Case Data

QWST - Legacy Island ISLAND SPECIFICATION SHEET



General Case Data	Case Length (ft)			APPLICATIONS	
	6'	8'	12'		
Total Display Area (ft ²)	14.26	19.02	28.52	   	
Cubic Capacity (ft ³)	19.36	25.82	38.72		
Max Shelf Depth (in) [Top/Bottom]	NA	NA	NA		
Weight (lb)	-	1500	1850		
Refrigeration Data (All data is per side)					
Evaporator Temperature (°F)					
Frozen Food	-15	-15	-15		
Ice Cream	-20	-20	-20		
Dairy	24	24	24		
Discharge Air Temperature (°F)					
Frozen Food	-11	-11	-11		
Ice Cream	-16	-16	-16		
Dairy	30	30	30		
Discharge Air Velocity (fpm)					
Fan Speed (rpm)	1800	1800	1800		
Parallel Thermal Load (Btuh unlighted)					
Frozen Food	1714	2285	3427		
Ice Cream	1926	2568	3853		
Dairy	1155	1540	2310		
Conventional Thermal Load (Btuh unlighted)					
Frozen Food	1788	2384	3576		
Ice Cream	2010	2680	4020		
Dairy	1260	1680	2520		
Superheat Setpoint (°F)					
Estimated Refrigerant Charge (lbs)	7.504	10.324	16.035		
Electrical Data (Amps/Watts)					
ECM Fan Data (Amps/Qty)					
	0.42 / 2	0.42 / 2	0.63 / 3		
Anti-Sweat Heater Amps (I.C./F.F./Med. Temp)					
	0.89	0.97	1.46		
Drain Heater Amps					
Electric	0.65	0.65	0.65		
Hot Gas	0.39	0.65	1.09		
Defrost Heater Amps (Low/Dual Temp)					
	5.90	8.48	12.72		

Defrost Data				
	Per Day	Fail Safe (min) ¹	Termination (°F)	Drip Time (min)
Electric	1	60	47	0
Hot Gas	1	25	47	0
Off Cycle	3	40	47	0

¹ At ASHRAE conditions. For conditions above 75°F, 55% RH, increase defrost time by 15 min. Type I refrigerator, intended for use in an area where the environmental conditions are controlled and maintained that conditions do not exceed 75°F and 55% relative humidity. Kysor Warren, whose policy is one of continuous improvement, reserves the right to change at any time specifications, designs, or prices without incurring obligation. DOE 2017 Compliant



The above case model has case lengths that are UL and NSF approved.

Installation and Operation Manual

Case Data

QWSTE- Legacy

ISLAND SPECIFICATION SHEET



KYSOR WARREN

General Case Data	Case Length (ft)			
	3.5' End	4' End	4' Side	8' Side
Total Display Area (ft ²)	15.87	16.09	9.51	19.02
Cubic Capacity (ft ³)	19.54	19.28	12.91	25.82
Max Shelf Depth (in) [Top/Bottom]	NA	NA	NA	NA
Weight (lb)	800	800	-	-
Refrigeration Data (All data is per side)				
Evaporator Temperature (°F)				
Frozen Food	-15	-15	-15	-15
Ice Cream	-20	-20	-20	-20
Dairy	24	24	24	24
Discharge Air Temperature (°F)				
Frozen Food	-11	-11	-11	-11
Ice Cream	-16	-16	-16	-16
Dairy	30	30	30	30
Discharge Air Velocity (fpm)				
Fan Speed (rpm)	1800	1800	1800	1800
Parallel Thermal Load (Btuh unlighted)				
Frozen Food	3002	3002	1142	2285
Ice Cream	3335	3335	1284	2568
Dairy	1722	1722	770	1540
Conventional Thermal Load (Btuh unlighted)				
Frozen Food	3132	3132	1192	2384
Ice Cream	3480	3480	1340	2680
Dairy	1878	1878	840	1680
Superheat Setpoint (°F)				
Estimated Refrigerant Charge (lbs)	3.752	3.752	14.076	24.400
Electrical Data (Amps/Watts)				
ECM Fan Data (Amps/Qty)				
	0.42 / 2	0.42 / 2	0.21 / 1	0.42 / 2
Anti-Sweat Heater Amps (I.C./F.F./Med. Temp)				
	0.90	0.90	0.45	0.97
Drain Heater Amps				
Electric	0.52	0.52	0.52	0.65
Hot Gas	0.39	0.39	0.39	0.65
Defrost Heater Amps (Low/Dual Temp)				
	5.90	5.90	5.90	8.48

Defrost Data				
	Per Day	Fail Safe (min) ¹	Termination (°F)	Drip Time (min)
Electric	1	60	47	0
Hot Gas	1	25	47	0
Off Cycle	3	40	47	0

¹ At ASHRAE conditions. For conditions above 75°F, 55% RH, increase defrost time by 15 min. Type I refrigerator, intended for use in an area where the environmental conditions are controlled and maintained that conditions do not exceed 75°F and 55% relative humidity. Kysor Warren, whose policy is one of continuous improvement, reserves the right to change at any time specifications, designs, or prices without incurring obligation. DOE 2017 Compliant

APPLICATIONS



The above case model has case lengths that are UL and NSF approved.

Case Data

QWSTG - Legacy Island ISLAND SPECIFICATION SHEET



General Case Data	Case Length (ft)			APPLICATIONS	
	6'	8'	12'		
Total Display Area (ft ²)	17.40	23.22	34.81		
Cubic Capacity (ft ³)	19.78	26.38	39.56		
Max Shelf Depth (in) [Top/Bottom]	NA	NA	NA		
Weight (lb)	-	-	-		
Refrigeration Data (All data is per side)					
Evaporator Temperature (°F)					
Frozen Food	-15	-15	-15		
Ice Cream	-20	-20	-20		
Dairy	24	24	24		
Discharge Air Temperature (°F)					
Frozen Food	-11	-11	-11		
Ice Cream	-16	-16	-16		
Dairy	30	30	30		
Discharge Air Velocity (fpm)					
	175	175	175		
Parallel Thermal Load (Btuh per side)					
Frozen Food	1783	2377	3565		
Ice Cream	2001	2668	4002		
Dairy	1208	1611	2416		
Conventional Thermal Load (Btuh per side)					
Frozen Food	1860	2480	3720		
Ice Cream	2088	2784	4176		
Dairy	1338	1784	2676		
Superheat Setpoint (°F)					
	6-8	6-8	6-8		
Estimated Refrigerant Charge (lbs)					
	7.504	10.324	16.035		
Electrical Data (Amps/Watts)					
ECM Fan Data (Amps/Qty)					
	0.42 / 2	0.42 / 2	0.63 / 3		
Anti-Sweat Heater Amps (I.C./F.F./Med. Temp)					
	1.73	2.17	3.27		
Drain Heater Amps					
Electric	0.65	0.65	0.65		
Hot Gas	0.39	0.65	1.09		
Defrost Heater Amps (Low/Dual Temp)					
	5.90	8.48	12.72		

Defrost Data				
	Per Day	Fail Safe (min) ¹	Termination (°F)	Drip Time (min)
Electric	1	60	47	0
Hot Gas	1	20	47	0
Off Cycle	4	35	47	0

¹ At ASHRAE conditions. For conditions above 75°F, 55% RH, increase defrost time by 15 min. Type I refrigerator, intended for use in an area where the environmental conditions are controlled and maintained that conditions do not exceed 75°F and 55% relative humidity. Kysor Warren, whose policy is one of continuous improvement, reserves the right to change at any time specifications, designs, or prices without incurring obligation. DOE 2017 Compliant



The above case model has case lengths that are UL and NSF approved

Installation and Operation Manual

Case Data

QWSTGE - Legacy Island ISLAND SPECIFICATION SHEET



General Case Data	Case Length (ft)			APPLICATIONS	
	4' End	4' Side	8' Side		
Total Display Area (ft ²)	21.88	11.61	23.22	 	
Cubic Capacity (ft ³)	20.91	13.19	26.38		
Max Shelf Depth (in) [Top/Bottom]	NA	NA	NA		
Weight (lb)	-	-	-		
Refrigeration Data (All data is per side)					
Evaporator Temperature (°F)					
Frozen Food	-15	-15	-15		
Ice Cream	-20	-20	-20		
Dairy	24	24	24		
Discharge Air Temperature (°F)					
Frozen Food	-11	-11	-11		
Ice Cream	-16	-16	-16		
Dairy	30	30	30		
Discharge Air Velocity (fpm)					
Parallel Thermal Load (Btuh per side)	175	175	175		
Frozen Food					
Ice Cream	3214	1188	2377		
Dairy	3554	1332	2664		
Conventional Thermal Load (Btuh per side)					
Frozen Food	1901	803	1607		
Ice Cream	3354	1240	2480		
Dairy	3708	1390	2780		
Superheat Setpoint (°F)					
Frozen Food	2106	890	1780		
Ice Cream	6-8	6-8	6-8		
Dairy	6-8	6-8	6-8		
Estimated Refrigerant Charge (lbs)					
Frozen Food	3.752	14.076	24.400		
Ice Cream					
Dairy					
Electrical Data (Amps/Watts)					
ECM Fan Data (Amps/Qty)					
4' End	0.42 / 2	0.21 / 1	0.42 / 2		
Anti-Sweat Heater Amps (I.C./F.F./Med.Temp)					
4' End	1.83	1.25	2.10		
Drain Heater Amps					
Electric					
4' End	0.52	0.52	0.65		
Hot Gas					
4' End	0.39	0.39	0.65		
Defrost Heater Amps (Low/Dual Temp)					
4' End	5.90	5.90	8.48		

Defrost Data				
	Per Day	Fail Safe (min) ¹	Termination (°F)	Drip Time (min)
Electric	1	60	47	0
Hot Gas	1	20	47	0
Off Cycle	4	35	47	0

¹ At ASHRAE conditions. For conditions above 75°F, 55% RH, increase defrost time by 15 min. Type I refrigerator, intended for use in an area where the environmental conditions are controlled and maintained that conditions do not exceed 75°F and 55% relative humidity. Kysor Warren, whose policy is one of continuous improvement, reserves the right to change at any time specifications, designs, or prices without incurring obligation. DOE 2017 Compliant



The above case model has case lengths that are UL and NSF approved.

NOTE: All items related to shelving and canopies apply to models QWST and QWSTG only when the super structure (Canopy) option is chosen.

NOTE: The air current is very important to the performance of this case. The load limit line (see load case section) is the indicator of the inside edge of the air current and at no time should shelving, product, signs, debris, etc., interfere with air current.

NOTE: Temperature is measured in discharge air. Defrost frequency is at design conditions. Higher temperature or humidity may require more defrost and longer fail-safes. These cases are not designed to operate in environments where the ambient temperature is greater than 75°F and the relative humidity is greater than 55%.

NOTE: Off-cycle defrost is the recommended defrost for medium temp cases. Hot gas or Electrical defrost is the recommended defrost for low temp cases. There are some exceptions, please refer to Case Data Plate. Refer to www.kysorwarren.com for other electrical data and information.

CAUTION: Failure to maintain maximum design conditions may result in operational issues such as the following: increased BTUH load, high product temperature, coil icing, product frosting, and external sweating.

CAUTION: Failure to properly install electrical wiring and control wiring as per wiring diagram(s), defrost settings, and temperature set-points may result in operational issues such as the following: increased BTUH load, high product temperature, coil icing, product frosting, and external sweating.

Case Installation

These display cases may be installed individually or in a continuous line up consisting of several 4', 8' and 12' sections using a joint kit. A Plexiglas divider kit must be used between cases operating on different refrigeration systems. The divider will be factory installed if specified on order.

Preparation—Prepare the installation area as follows:

1. Clean area where case is to be installed.
2. Verify installation area is at least 15 feet from any outside entrances or heating and cooling outlets.
3. Verify at least 2 feet of distance between hot and cold cases.
4. Ensure floor loading will support the case and the case contents.
5. Ensure proper AC power is available. Refer to case AC input requirements located in the electrical connections section of this manual.
6. Ensure location will allow connection to drain lines and the drain line, when installed, will meet the recommendations as set forth in the refrigeration piping and dehydration section of this manual.
7. Ensure expansion valve in case is the proper valve for the type of refrigerant used at the installation site.

CAUTION: To prevent condensation on the end panels of cases, a minimum of 3.0 inches between walls or other cases is required for airflow. If 3.0 inches is not possible, then the space between the cases must be completely filled and sealed or an updraft fan kit must be installed to provide air circulation through the space.

Installation

The following instructions are provided for unpacking, moving, loading, and lifting the case prior to installation.

NOTE: READ ALL INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION.

Unpacking

WARNING: Use caution when removing the strapping in the following procedure, as the shelves are very heavy and could fall causing personal injury or equipment damage.

1. Remove all shipping tape from lamps and ensure that all lamp ends are snapped in place.
2. Ensure the evaporator cover is installed correctly with the deck pans installed.
3. Move the case into position, install, adjust superheat, and perform the operational checkout procedures following the instructions within this manual.

CAUTION: Be careful not to damage the factory-installed end while moving the case. Use the case lift points on the case to move it to the proper location.

Installation and Operation Manual

Installing First Case

1. Ensure all preparation for installation, as outlined in the above paragraphs, have been fully complied with and are complete.
2. If multiple cases are to be installed, find the highest area of the floor to place the first case.
3. All cases must be located on a firmly based floor and be leveled within plus or minus 1/16 inch.
4. Use metal shims where required to support entire length of the case(s) at each base leg (front and back). All base legs must be shimmed under the skid rail where the base leg meets the lower rails (typically every 4' on 4' and 8' cases, and every 6' on 6' and 12' cases). If the case is equipped with adjustable levelling legs, all legs should be adjusted so that all are making equal contact with the floor for equal weight distribution. **WARNING:** If any part of the case rail or leveling leg is not supported at each base leg, the case can appear out of level or become damaged when product weight is added.
5. If multiple cases are to be installed, refer to the floor plan and install the first case in the lineup by snapping a chalk line where the front and rear of the cases are to be located.
6. Continue the chalk line if multiple cases are to be installed. The first case is typically the case that is at the highest area on the floor.
7. Connect water drain line. Reference waste outlet (drip pipe) description and location procedure later in this chapter.
8. Connect input AC power. Reference electrical installation procedure later in this manual.
9. Connect refrigerant lines. Reference procedure later in this manual.
10. Install all ends, caps, and trim per the applicable instructions contained in this manual.
11. Remove shipping tape on fluorescent lamps and remove all other shipping material.
12. Refer to the operational start up procedures later in this manual. If multiple cases are to be installed, refer to the following paragraph for installing subsequent cases.

CASES MUST BE LEVELED FROM FRONT TO BACK AND END-TO-END AND SUPPORTED CONTINUOUSLY AS NEEDED WITH SHIMS

Installing Subsequent Cases

NOTE: All cases are factory numbered with line up and position numbers. Make sure that cases are installed in order (line up sticker found on the fan plenum or door and on the back panel of the case).

If additional cases are to be installed, follow the same procedures as described in the installing first case procedure (above), in addition to the following:

1. Move cases as near their permanent location as possible before removing shipping braces, skids, or rollers.
2. Remove skids, shipping braces and optional casters, if provided.
3. Ensure all case expansion valves are correct and match the refrigerant being used.
4. Do not install electrical, drain lines, or refrigerant lines until all the cases have been set/placed into position and properly leveled.
5. Do not install case trim, ends, or caps until all cases have been set/placed into position and properly leveled.
6. Before lining up cases using the front and rear edges as a baseline, inspect refrigeration lines, electrical connections and controls to insure cases are in proper line up and are in proper sequence.
7. Remove shipping tape on fluorescent lamps and remove all other shipping material. Follow all joining to connect cases in a line-up.

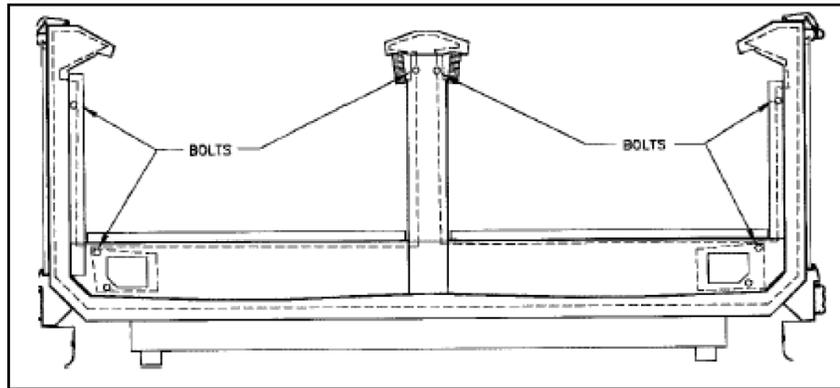
Joining Instructions

Two or more cases of like models can be joined together to form a continuous line up. Before lining up cases, inspect refrigeration lines, electrical connections and controls to ensure cases are in the proper line-up and are in the proper sequence. Reference and become familiar with the below figures, and then join the cases using the instructions that follow.

NOTE: Cases must be leveled from front to back end-to-end and supported continuously as needed with shims.

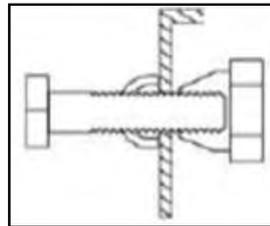
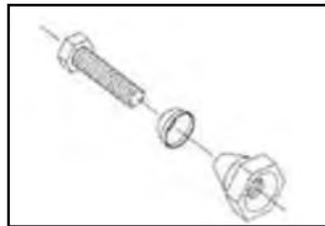
Line Up Bolt Holes on Side of Cases—See Caulking Diagram Below

LINE-UP BOLT AND CAULKING DIAGRAM



Apply caulking as indicated by dashed line

LINE-UP BOLT

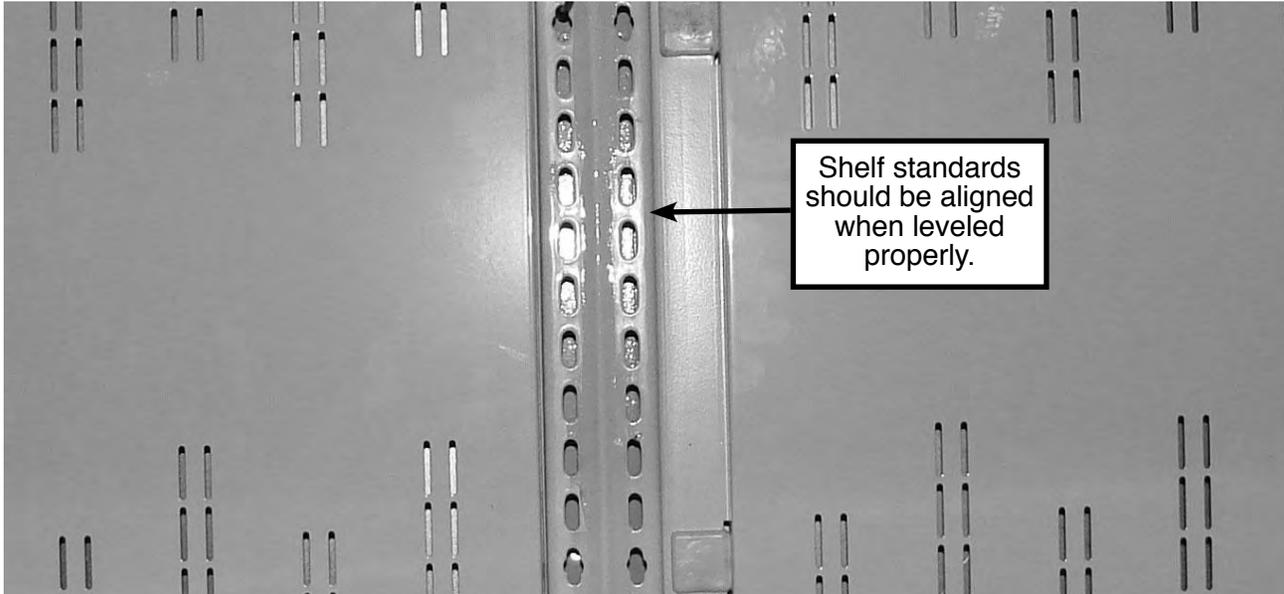


1. Move cases as close together as possible and use shims to level (same as original case). Use shelf standard struts for alignment to be sure cases are level.
2. Apply foam insulation tape and caulking around the side of the case as shown in the diagram above.
3. Remove access covers over line up holes and insert the small line up bolts (see previous diagram) in the end frame in the bolt hole pattern. Place the special T-nut washer on the 3/8" machine bolt with the hollow section away from the bolt head. Tighten the 3/8" bolts with nut washer into the T-nuts alternately until cases are pulled up tight and the joint is completely sealed. Be careful and do not distort the end frames. (Reasonable care should be exercised in this procedure to prevent end frame distortion.) Assist pulling case up tight by bumping from opposite end of case or by using pry bar.
4. Pull the cases close together bumping from the opposite ends or by carefully using a pry bar. Inspect joint for proper air and watertight seal inside and outside the case.
5. Replace line up access cover plugs and plates.
6. Move cases as close together as possible and level by using the shims provided (same as original case). Use shelf standard struts for alignment to be sure cases are level.

NOTE: A Plexiglas divider and EPR valve must be used when joining a Q-series case with a non Q-series case.

Installation and Operation Manual

CASES MUST BE LEVELED FROM FRONT TO BACK AND END-TO-END AND SUPPORTED CONTINUOUSLY AS NEEDED WITH SHIMS.



Installation of Trim, Caps, & Shelves

We offer several different trim packages and different models. Below are basic instructions for our 3000 trim and may or may not apply to the specific model you have. For other trim packages or questions not answered below, please contact the Technical Service Department at Kysor Warren (800-866-5596). Case front part selection and case trim selection are provided in the information that follows:

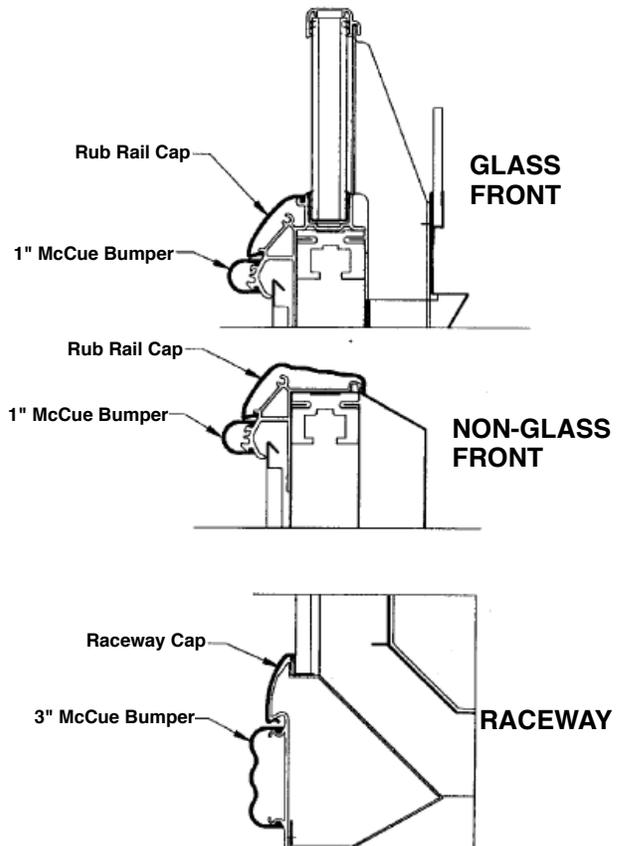
Case Front Part Selection

For Cases in a Lineup:

- Rub Rail Cap Starter 1/lineup Std. or w/ptm
- Raceway Cap Starter 1/lineup
- 1" McCue Bumper Starter 1/lineup
- 3" McCue Bumper Starter 1/lineup
- Rub Rail Cap 1/case Std. or w/ptm
- Raceway Cap 1/case
- 1" McCue Bumper 1/case
- 3" McCue Bumper 1/case

For Single Case

- Rub Rail Cap 1/case Std. or w/ptm
- Raceway Cap 1/case
- 1" McCue Bumper 1/case
- 3" McCue Bumper 1/case
- Canopy End Trim 2/lineup
- Glass Cap End Trim 2/lineup
- Glass Cap Joint Trim 1/joint
- Front Panel End Trim 2/lineup



Case Trim Selection

Trim is provided on the right and left end cases only. All exterior panels slide from right to center and left to center.

For Single Case with Two Ends:

The trim is factory installed.

For Mutual End in a Lineup:

Proper additional piece of end trim should be used.

Optional Canopy

NOTE: All items related to shelving and canopies apply to models QWST and QWSTG only when the super structure (Canopy) option is chosen.

After the display cases are properly joined and sealed, align the canopies by sliding the alignment pins across the joint from one canopy into the adjoining canopy. It may be necessary to loosen and/or remove the screws at the top of the canopy to aid in the alignment of the two canopies and to eliminate any gap between the canopies. The screws should be tightened after canopies are aligned.

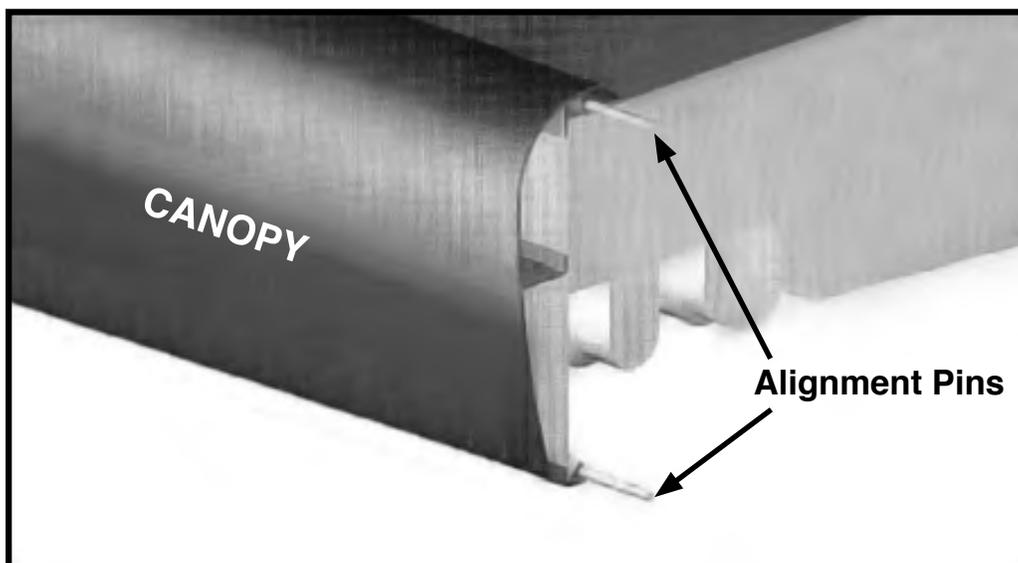
Align the case front rails with a single alignment pin sliding the pin across the joint into the adjoining front rail. It may be necessary to loosen the screws holding the front rail to aid in the alignment process. The screws should be tightened after the front rails are aligned.

For Single Case with Two Ends:

The trim is factory installed.

For Mutual End in a Lineup:

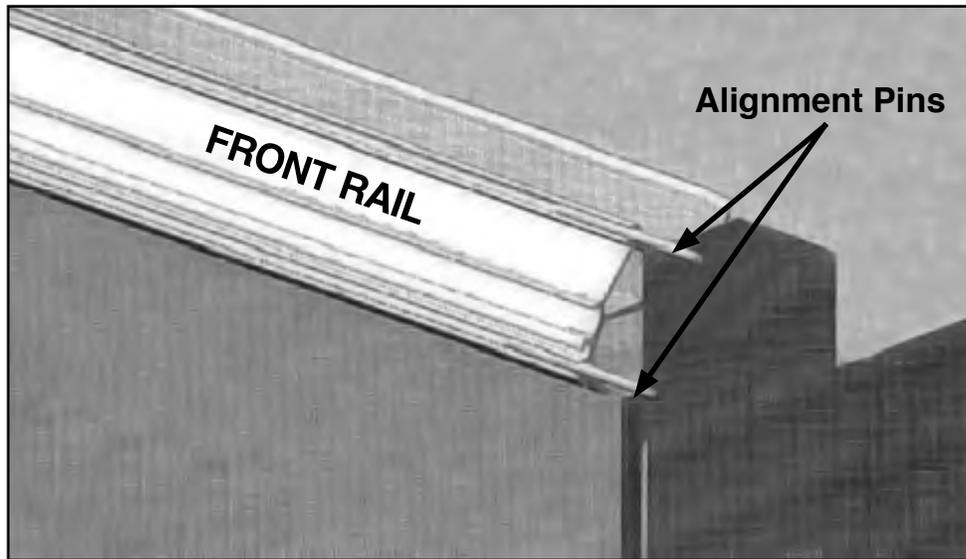
Proper additional piece of end trim should be used.



Installation and Operation Manual

Front Rail Alignment

After the display cases are properly joined and sealed, Align the case front rails with a single alignment pin sliding the pin across the joint into the adjoining front rail. It may be necessary to loosen the screws holding the front rail to aid in the alignment process. The screws should be tightened after the front rails are aligned.



3" Bumper

Install the 3" bumper parts to the raceway using the same procedure as described for the 1" bumper parts.

Raceway Cap

Install the raceway cap parts to the raceway using the same procedure as described for the rub rail cap.



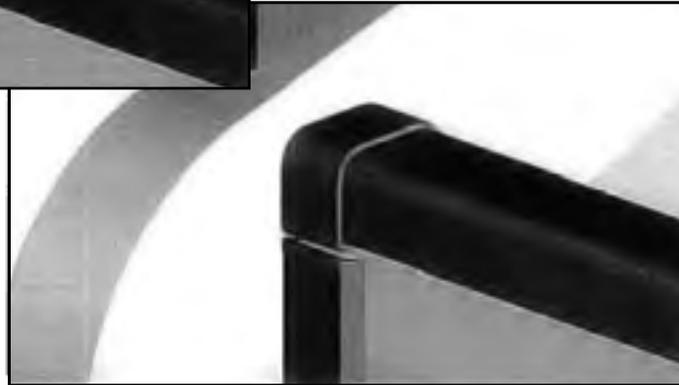
NOTE: The raceway cover parts do not overlap as the rub rail cap parts do.

Glass Cap Rail End Trim Installation- Glass Models

Install the raceway cap parts to the raceway using the same procedure as described for the rub rail cap.

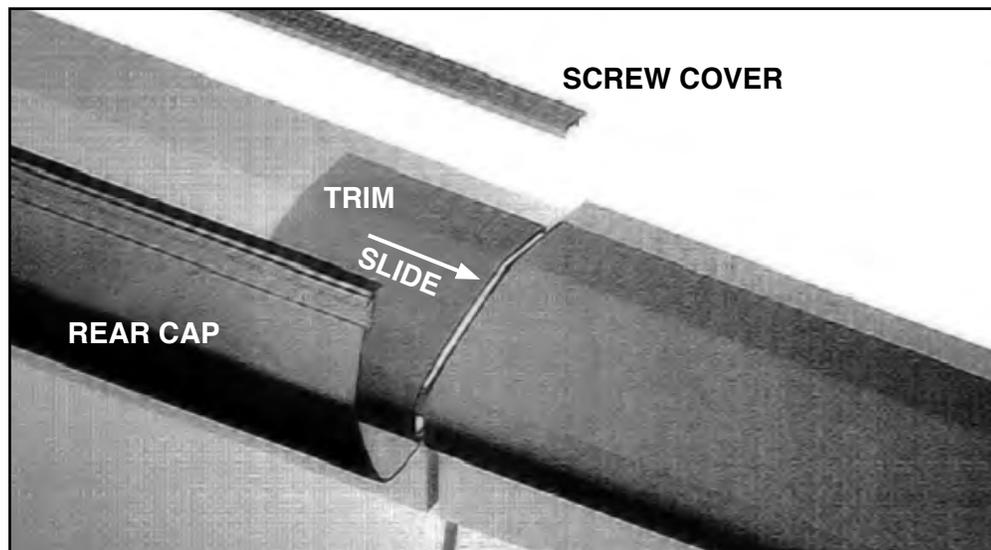


Hook the back inside edge of the end trim to the back side of the glass cap rail then rotate the part forward and snap into place.



Rear Cap Joint Trim Installation

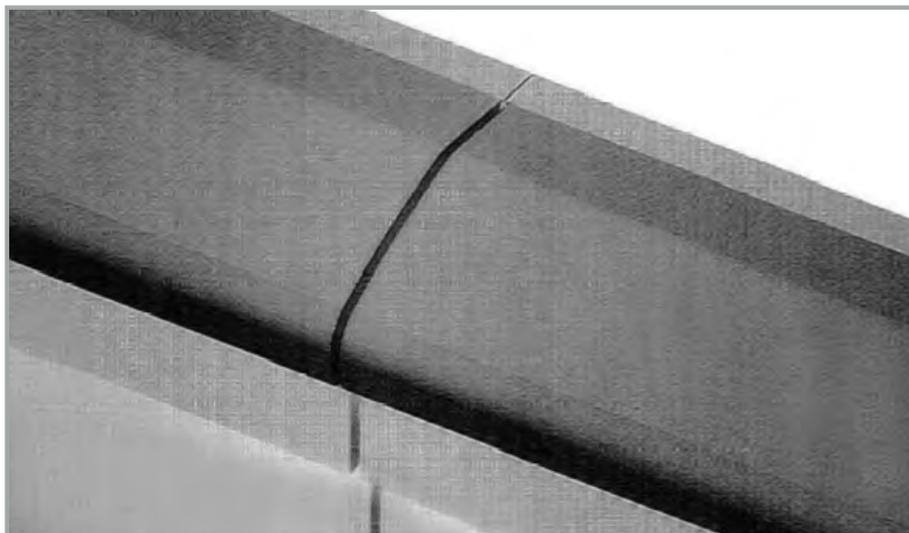
After the display cases are properly joined and sealed, remove the screw cover from the rear cap of every other case in the lineup and remove the screws from the rear cap. Rotate the rear cap forward (the alignment pins will hold it in place) and position the trim as shown in the illustration. Slide the trim across the case joint under the rear cap of the adjoining case about half the width of the trim.



Installation and Operation Manual

Rear Cap Joint Trim Installation (cont.)

Rotate the rear cap back into place over the trim and secure the rear cap and screw cover. Repeat this procedure for each case joint.



Bumper, Rub Rail Cap, and Raceway Cover Installation

1" Bumper

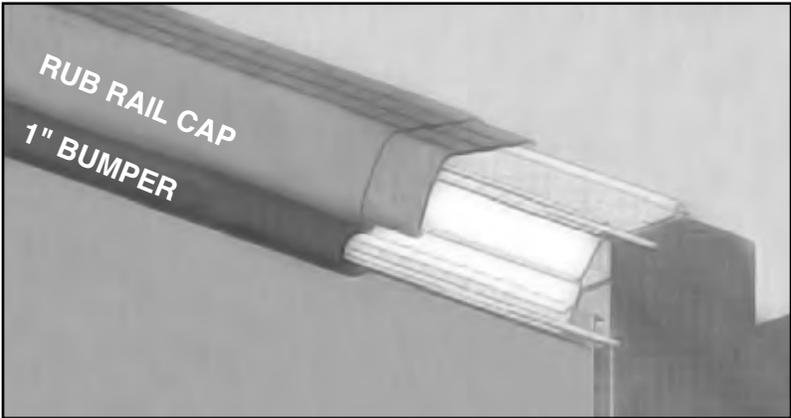
Install the two-foot length of 1" bumper to the left hand end of the first case in the lineup. To install the bumper, hook the lower edge of the bumper to the aluminum retainer. Rotate the bumper up and snap the top edge onto the retainer. Install this part as close to the case flat end panel as possible.

Install the additional case length 1" bumper parts, crossing over the joint of the cases in the lineup and trimming the last piece to fit the last case in the lineup.

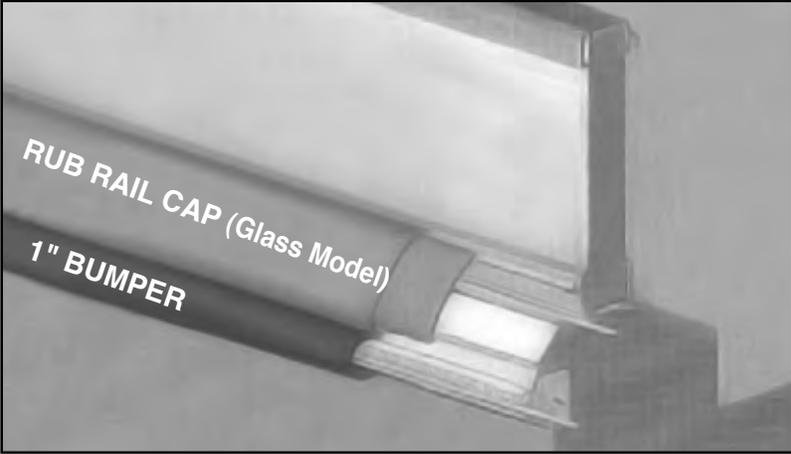
Rub Rail Cap

Install the four foot rub rail cap to the left hand of the first case in the lineup. To install the rub rail cap hook the lower edge of the cap to the aluminum front rail just above the 1" bumper. On non-glass models, rotate the cap toward the case and snap the cap onto the back hook of the aluminum front rail. For glass models, rotate the cap toward the case and snap the cap onto the top hook of the aluminum rail. Install this part as close to the case flat end panel as possible.

Install the additional case length rub rail cap parts as close to one another as possible, crossing over the joint of the cases in the lineup and overlapping each part where provided. Trim the last part to fit the last case in the lineup.



Non-Glass Model



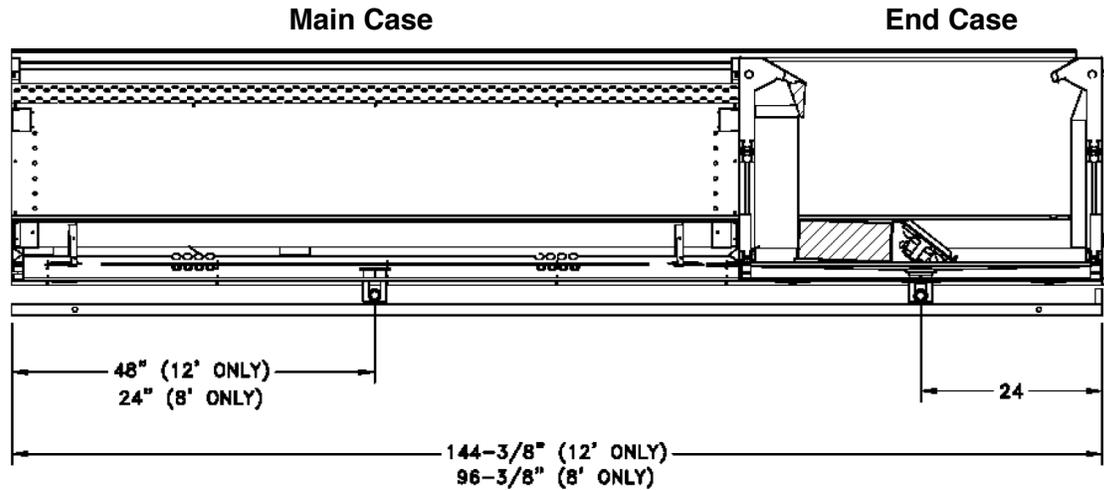
Glass Model

NOTE: If a mutual end is used in a lineup, the proper additional pieces of trim should be used.

Installation and Operation Manual

Waste Outlet (Drip Pipe) Description and Location

These cases are equipped with 1 1/2" M-NPT waste outlet connection that terminates in the center of the refrigerator below the insulated bottom. The water seal trap is shipped unattached for field installation.



NOTE: Improperly installed drip pipes can seriously affect the operation of this case and result in increased maintenance cost. Listed below are some general rules for drip pipe installation.

- Never use a double water seal.
- Never use a pipe smaller than the size pipe or water seal supplied with the case.
- Always provide as much fall as possible in drip pipe (1" fall for each 4' of drip pipe.)
- Avoid long runs in drip pipe, which make it impossible to provide maximum fall in pipe.
- Provide a drip space between drip pipe and floor drain or sewer connection.

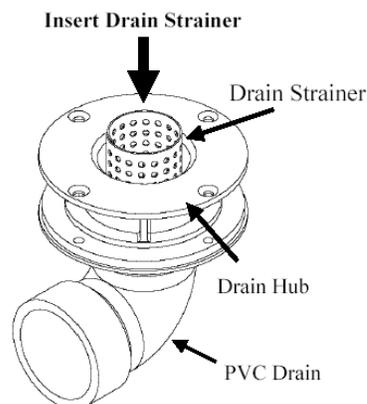
Drain Strainer

NOTE: Not all Kysor Warren cases have drain strainers. This information applies only to the cases equipped with strainers.

The drain strainer is used to keep debris or any foreign objects from entering the PVC drain, which could cause blockage. To install, insert into drain until drain strainer stops. It will not be flush. Strainer will exceed hub by 1".

DO NOT flatten drain strainer.

NOTE: 1 1/2" Drain Pipe.



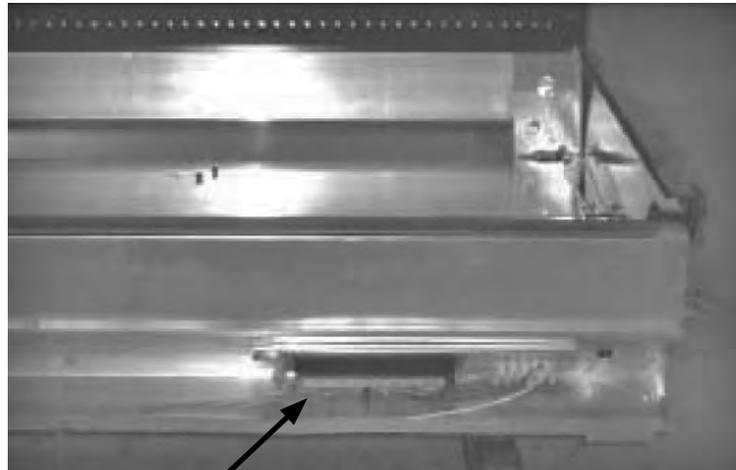
Electrical Connections—General

Cases are standard with one row of high output lamps. Ballasts are located in the raceway. If lighted shelves are supplied, ballasts for each shelf will be located under each shelf in the electrical raceway. See wiring diagram for layout.

CAUTION: Failure to properly install electrical wiring and control wiring as per wiring diagram(s), defrost settings, and temperature set-points may result in operational issues such as the following: increased BTUH load, high product temperature, coil icing, product frosting, and external sweating.

CAUTION: Failure to follow these instructions may result in premature bulb and ballast failure.

NOTE: Failure to follow installation instructions may void standard warranty.



Raceway Ballast Location

Electrical Termination

The wires are clearly identified for termination purposes as follows:

All electrical connections are made in the electrical raceway.

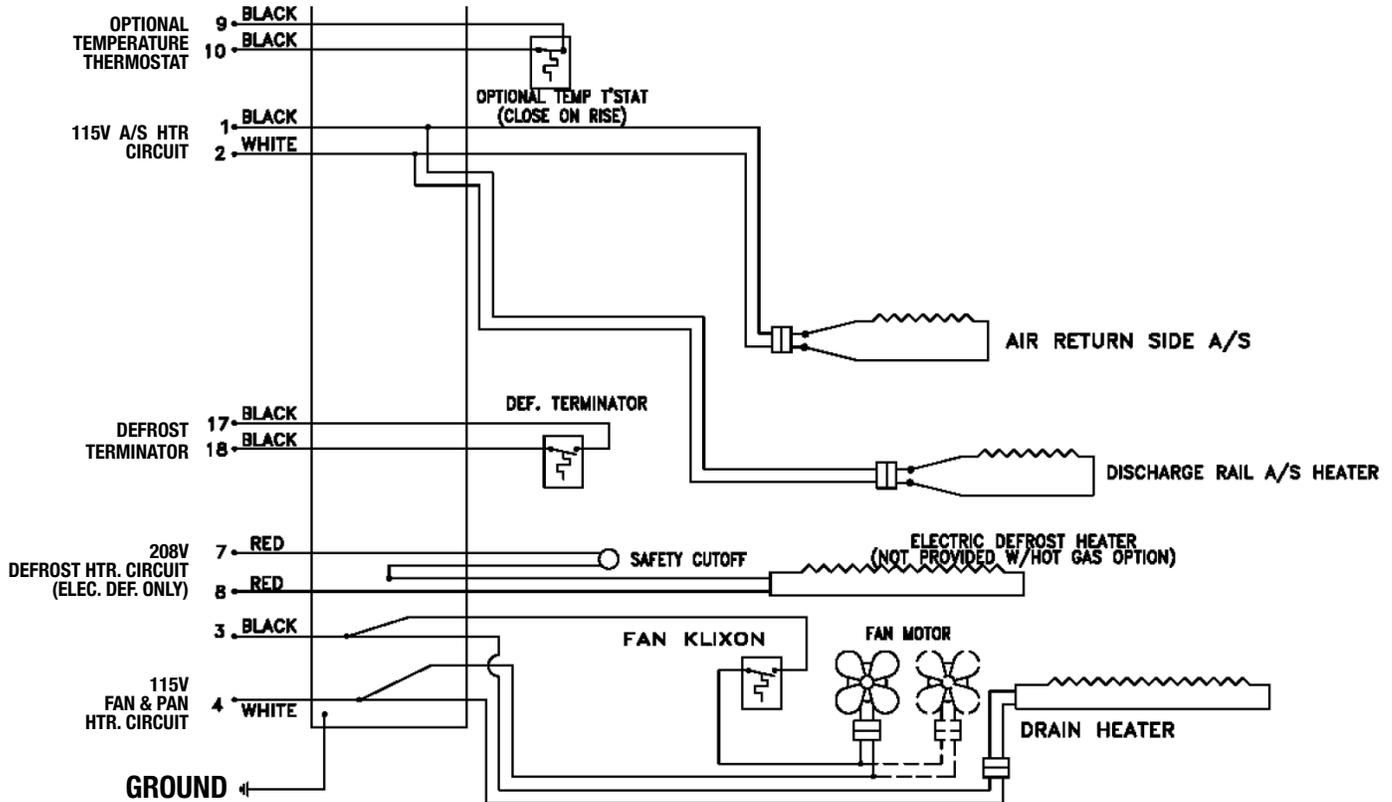


The wires are clearly identified for termination purposes as follows:

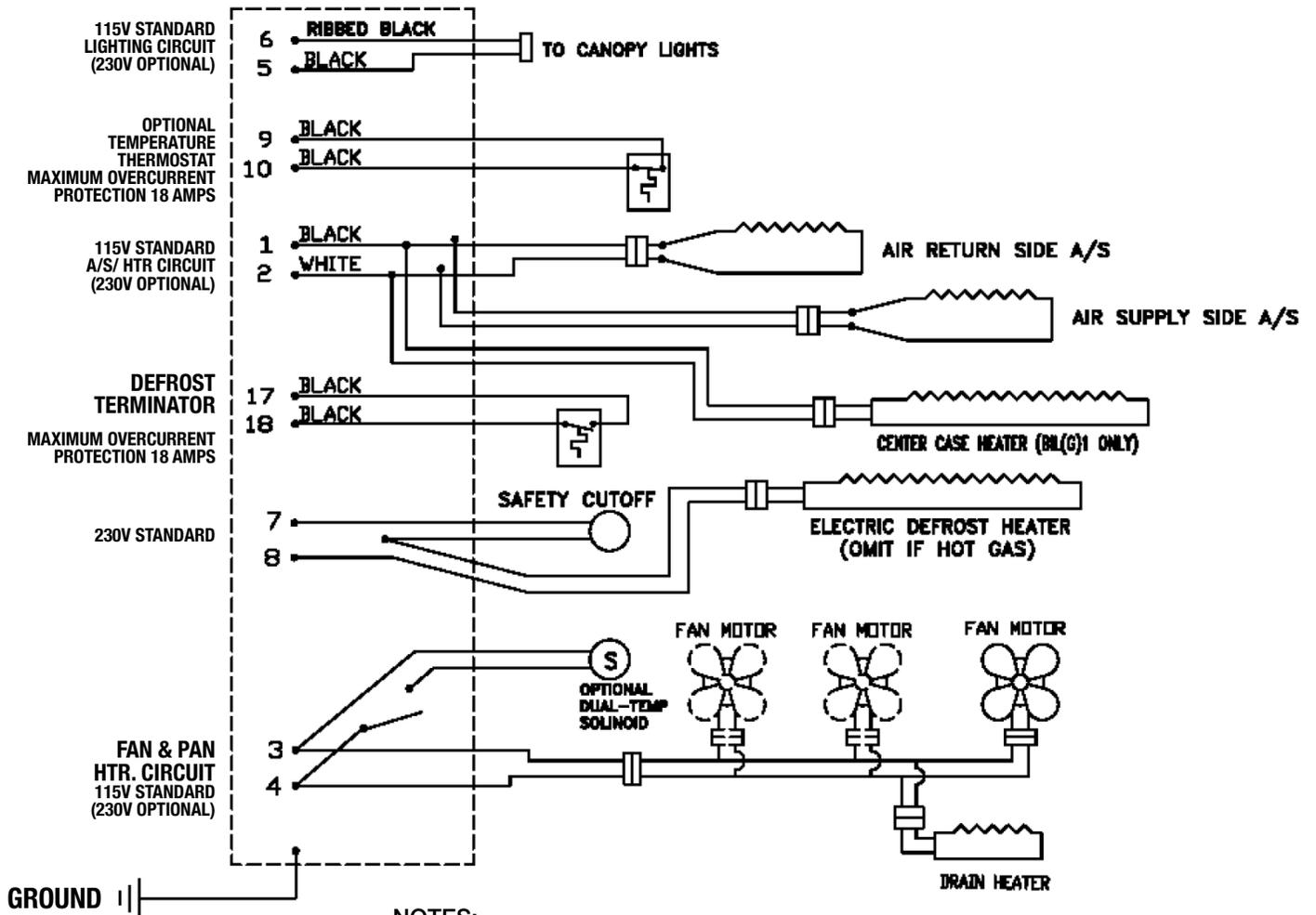
Component	Wire Number
Anti-Sweat Heater	1 and 2
Refrigerator Fan Motors and Drain Heater	3 and 4
Lighting Circuit	5 and 6
Defrost Heaters	7 and 8
Temperature Control	9 and 10
Dual Temperature	15 and 16
Defrost Termination Control	17 and 18

Installation and Operation Manual

End Case- Electric and Hot Gas Defrost



Main Case- Electric and Hot Gas Defrost



NOTES:

1. CASE SHOWN IN REFRIGERATION MODE
2. USE COPPER CONDUCTORS ONLY

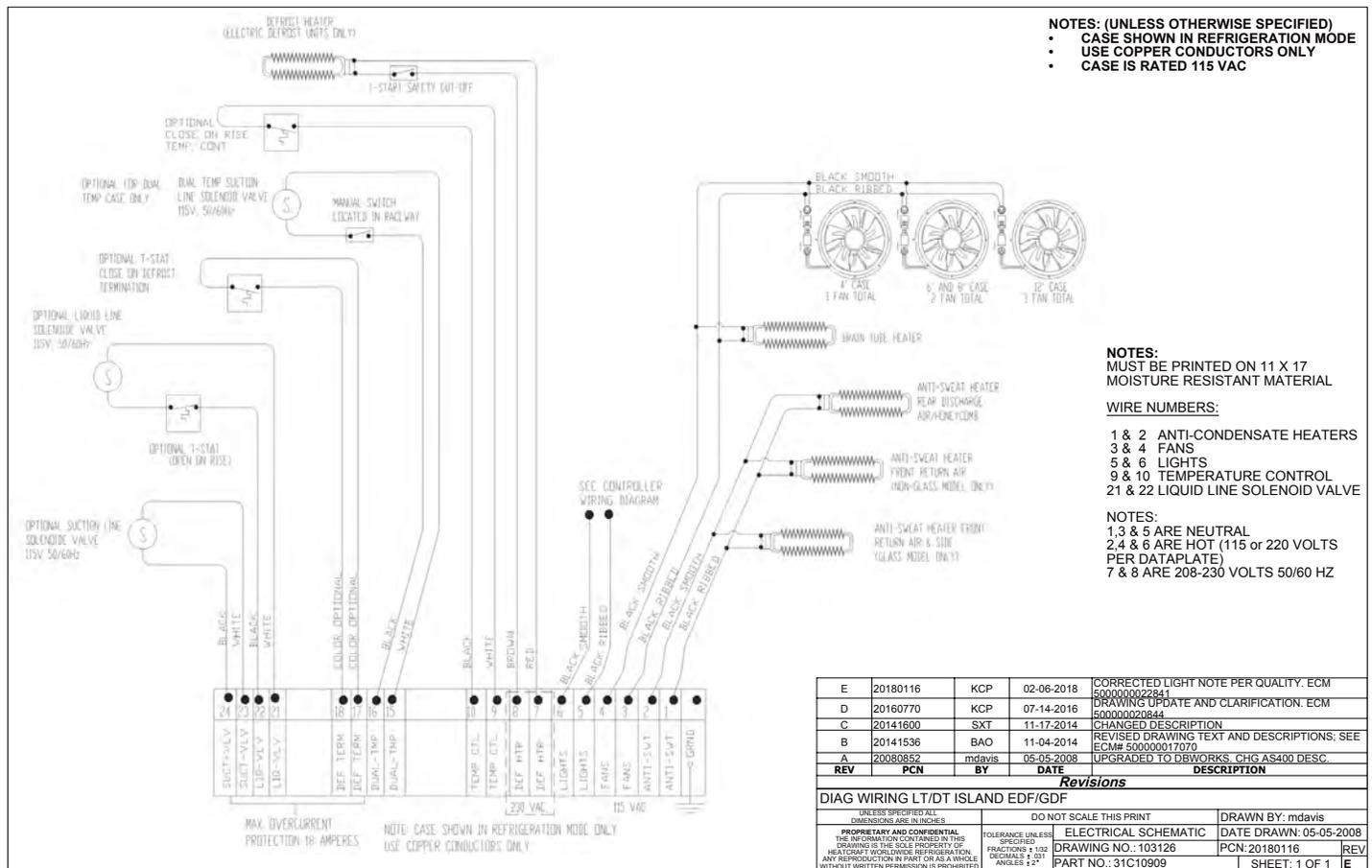
Installation and Operation Manual

Refrigeration Piping and Dehydration

Opening a Ferrule Hole

The refrigeration lines are located under the deck pans. A refrigeration outlet is provided in all four corners. All refrigeration lines need to be as close to the drain pan as possible so as not to obstruct the air pattern or block the deck pans. After refrigeration lines have been connected and pressure tested, fill case pipe penetration with spray foam. Let spray foam dry, cut excess foam flush with inside of case bottom and then add a layer of silicone sealant for a water tight seal.

Recommended Piping Instructions



Recommended Piping Instruction

1. Proper size refrigeration lines are essential to good refrigeration performance. Suction lines are more critical than liquid or discharge lines. Oversized suction lines may prevent good oil return to the compressor. Undersized lines can rob refrigeration capacity and increase operating cost. Consult the technical manual or legend sheet for proper line sizes.
2. Refrigeration lines in cases in line-ups can be reduced. However, the lines should be no smaller than the main trunk lines in at least 1/3 of the cases and no smaller than one size above the case lines to the last case. Reductions should not exceed one line size per case. It is preferred to bring the main trunk lines in at the center of line-up. Liquid lines on systems on hot gas defrost must be increased one line size above the main trunk line for the entire line-up. Individual feed lines should be at the bottom of the liquid header. (See proper liquid line piping diagram.)
3. Do not run refrigeration lines from one system through cases on another system.
4. Use dry nitrogen in lines during brazing to prevent scaling and oxidation.
5. Insulate suction lines from the cases to the compressor with 3/4" wall thickness foam on low temperature cases to provide maximum of 65-degree super heated gas back to the compressor and prevent condensation in exposed areas. Insulate suction lines on medium temperature cases with 1/2" thick insulation in exposed areas to prevent condensate drop-off.
6. Suction and liquid lines should never be taped or soldered together. Adequate heat exchanger is provided in the case. Kysor Warren recommends use of heat exchanger in all medium and low temperature cases that are not mechanically sub-cooled for proper operation.
7. Refrigeration lines should never be placed in the ground unless they are protected against moisture and electrolysis attack.
8. Always slope suction lines down toward the compressor, 2" each 10'. Do not leave dips in the line that would trap oil.
9. Provide P traps at the bottom of suction line risers, 4' or longer. Use a double P trap for each 20' of risers. P traps should be the same size as the horizontal line. Consult the technical manual or legend sheet for proper size risers.
10. Use long radius ells and avoid 45 degree ells.
11. Provide expansion loops in suction lines on systems on hot gas defrost. An expansion loop is required for each 100' of straight run.
12. Strap and support tubing to prevent excessive line vibration and noise.
13. Brazing of copper to copper should be with a minimum of 10% silver. Copper to brass or copper to steel should be with 45% silver.
14. Do not use bullhead tees in suction lines. An example is where suction gas enters both ends of the tee and exits the center. This can cause a substantial increase in pressure drop in the suction lines.
15. When connecting more than one suction line to a main trunk line, connect each branch with an inverted trap.

Suction Line

1. Pitch in direction of flow.
2. Suction lines should enter at the top of the branch line.
3. May be reduced by one size at one third of case run load and after the second third. DO NOT reduce below the case suction line size.

Installation and Operation Manual

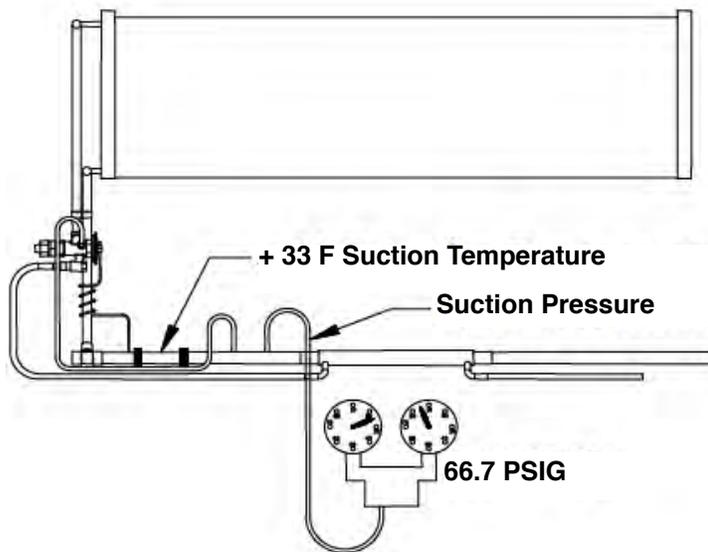
Expansion Valve and Superheat

CAUTION: During service of this equipment, precautions should be taken to prevent loss of refrigerant to the atmosphere. Always install the expansion valve stem cap after making valve adjustments.

The expansion valve furnished with your case has been sized for maximum coil efficiency. To adjust superheat, perform the following:

1. Place a thermocouple near the expansion valve bulb. Read the suction line pressure as near coil as possible. If closest is at the condensing unit, estimate suction line loss at 2 PSIG.
2. Convert coil suction pressure to temperature. The difference between coil temperature and the thermocouple temperature is superheat. Use average superheat when expansion valve is hunting.
3. Do not set the superheat until cases have pulled down to operating temperature and never open or close the valve over $\frac{1}{4}$ turn between adjustments and allow 10 minutes or more between adjustments.
4. Superheat should be set at 6–8°F.
5. After the initial setting, the superheat should be rechecked when product is stocked and at designed temperature.

Superheat Calculations



Example: R-404

+ 33 F Suction Temperature

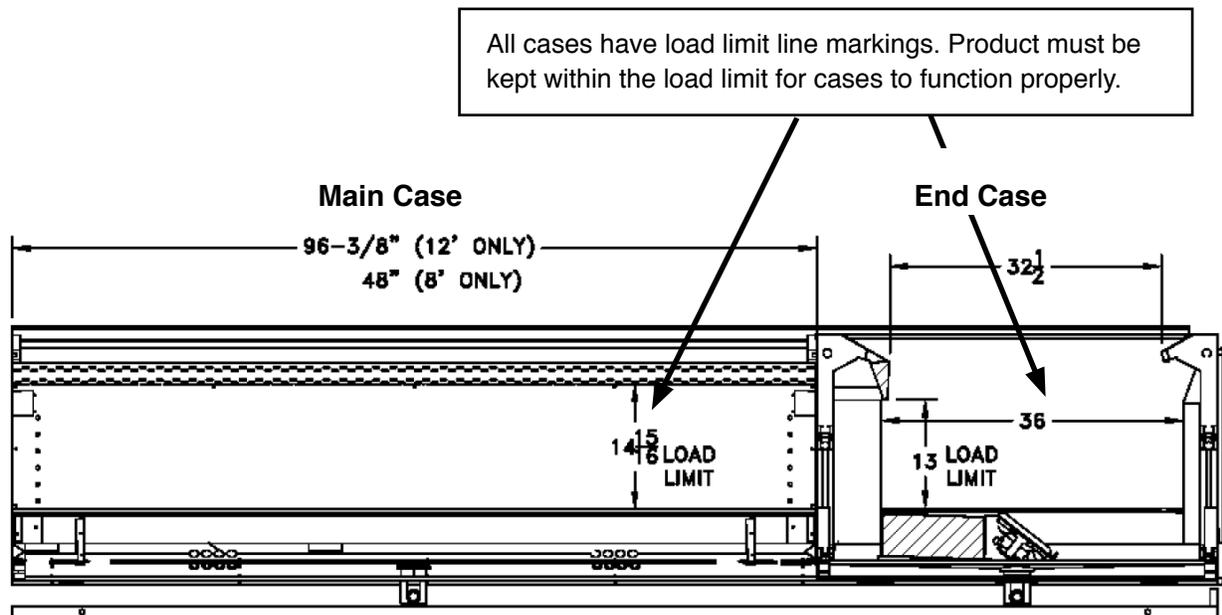
+ 28 F Suction Pressure Converted to Temperature

= +5 F Superheat

Operation

Loading

Merchandise should not be placed in the fixture until all controls have been adjusted and the case is at the proper temperature. AT NO TIME SHOULD THE CASE BE STOCKED BEYOND THE LOAD LINE OR OVER THE FRONT EDGE OF THE ADJUSTABLE SHELVES.



CAUTION: Air discharge and return flues must remain open and free of debris or obstruction at all times to provide proper refrigeration and air current performance.

CAUTION: Do not allow any product, signs, debris, etc., to block these grilles.

CAUTION: Do not use any non-approved shelving, display racks, or any accessory that could hamper air current performance.

WARNING! Do not walk on top of the cases! This could result in damage to the case and serious personal injury could occur. These cases are not designed to support excessive external weight. Do not use top of cases for storage.

1. Off-Cycle Defrost is standard on these models. The fans run continuously and defrost termination is by termination Klixon.
2. Single Condensing Case Systems – A thermostat should be used to control case temperatures. The thermostat bulb should be mounted in the discharge air (see case data if your case is a single condensing case system).

NOTE: Where termination temperatures are given, mechanical defrost termination is required.

Installation and Operation Manual

Cleaning

As a general rule, always use mild soap and water to wipe the case down, including the sliding doors at the back of the case. Special precautions must be taken when cleaning some components of the case.

Exterior surfaces should be cleaned with warm water and mild soap to protect and maintain the finish. Do not use cleaners containing abrasive materials or ammonia, which will scratch or dull the finish. The waste outlet should be flushed with water following each cleaning.

Interior surfaces may be cleaned with most mild soap formulas, ammonia based cleaners, and sanitizing solutions with no harm to the surface.

WARNING! Always shut power off during the cleaning process. Cleaning the case with electrical power applied is a shock hazard that may cause serious injury or death.

WARNING! DO NOT USE HOT WATER ON COLD GLASS SURFACES. This could cause the glass to shatter and could result in personal injury. Glass fronts and ends should be warm before applying hot water.

CAUTION—The following could damage the case:

- Use of cleaning products containing chlorine, chloride ion, the words Bleach, is not recommended for unpainted stainless steel surfaces as it may cause rust to form. The operational warranty of the equipment will be voided if these products cause rust to form on the stainless steel parts or any other parts of the equipment.
- Do not use solvent, oil, or acidic-based cleaners on any interior surfaces as the surface may become damaged.
- Do not use abrasive cleaners and scouring pads, as these will mar the finish.
- Never introduce water into the case faster than the waste outlet can release it.
- Do not use steam or high pressure systems to clean the case, as seals may be broken which will cause the case to leak.

Shelves

Do not use a hose or submerge shelves in water. When cleaning lighted shelves wipe down the shelves with a wet sponge or cloth so that water does not enter the light rails.

Mirrors

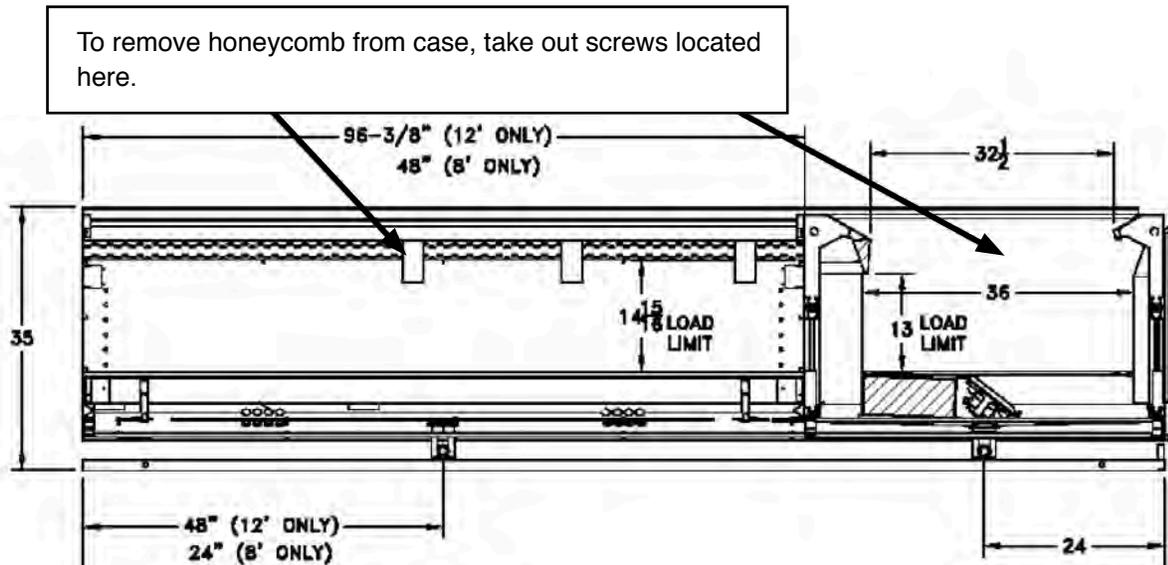
Mirrors are sheets of clear glass that have a very thin reflective coating applied to one side. These coatings are susceptible to deterioration if certain cleaning solutions and even water are allowed to come in contact with them. Every precaution should be made to keep liquids away from the coated side of the mirrors. If liquids are allowed to flow along the face side of the mirror to its edge, the liquid can seep between the coating and the glass, causing serious damage.

To help prolong the life of the mirrors:

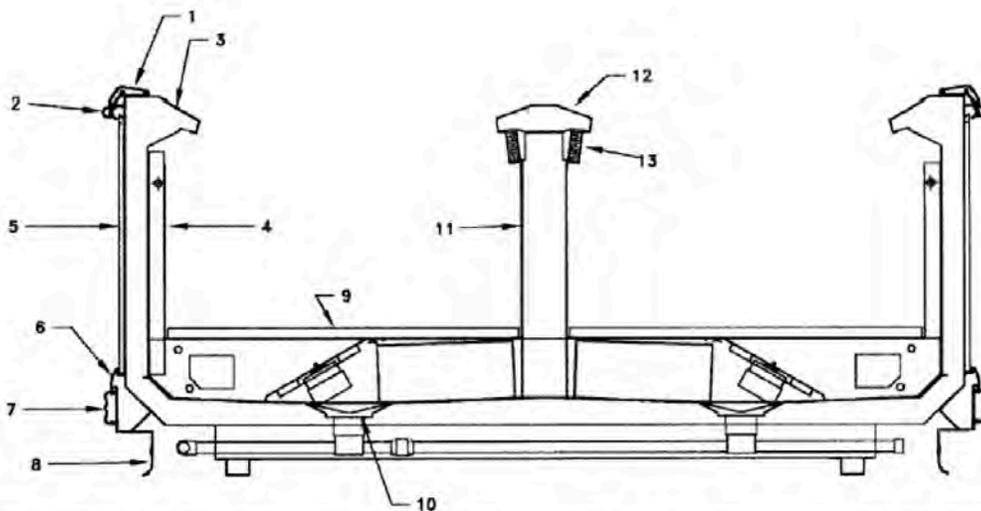
- Use only mild cleaning solutions (Windex, Solox, or a weak solution of vinegar and water).
- Do NOT spray liquids on mirrors. Dampen the cleaning cloth, and then use the cloth to wipe the mirror.
- Wipe water from the mirrors immediately to prevent difficult to remove water spots and also to prevent the water from reaching the mirrors edge.
- Never use dirty cloths, scrapers, or any other abrasive materials for cleaning.

Honeycomb Assembly

The honeycomb should be cleaned every 6–8 months, depending on store conditions. The honeycomb may be cleaned with a vacuum cleaner or removed to be washed with soap and water. The honeycomb must be completely dry before returning it to the case. Note the position and angle of the honeycomb when removing from the case. Honeycomb must be replaced at the same angle.



Parts List and Drawing



1	Rub Rail Cap	8	Kick plate
2	1" Bumper	9	Deck Pan
3	Top (Honeycomb) Retainer	10	Drain Hub
4	Return Baffle	11	Discharge Baffle
5	Upper Front Panel	12	Center Cap
6	Raceway Cap	13	Honeycomb
7	3" Bumper		

Installation and Operation Manual

Parts List

Description	Part No.	End Case	QWST-06	QWST-08	QWST-12	QWSTE-08	QWSTE-12
Expansion Valve	(See Note)						
Evaporator Coils	05A20399	1	2			1	1
	05A20400			2			2
	05A20401				2		
	05A20398					2	
Evap Fan Mtr STD 5W 115V	09A10098	2	4	4	6	2	4
Evap Fan Mtr PSC 6W 115V	09A10097	2	4	4	6	2	4
Evap Fan Blade (7"-20 Deg)	09B10013	2					
Evap Fan Blade (7"-15 Deg)	09B10045		4	4	6	2	4
Drain Pan Heater (Electric Defrost)	10K12209	2	2	2	2	4	4
Drain Pan Heater (Hot Gas Defrost)	10K12219	1	2			3	1
	10K12220			2			2
	10K12223				2		
Defrost Heater (Electric)	10K10128			2			2
	10K10198	1	2			1	1
	10K10199					2	
	10K10127				2		
Fan Wiring Harness (2 fan)	10M10151	1				1	1
Fan Wiring Harness (3 fan)	10M10148		2	2		2	2
Fan Wiring Harness (4 fan)	10M10152					2	
Deck Pan- ptd	54N18287		6	8	12	4	6
Deck Pan- brt	55M16059		6	8	12	4	6
Deck Pan- ptd (End Case)	54N18567	3				3	3
Deck Pan- brt (End Case)	55M16158	3				3	3
Honeycomb White	13A15133		2	4	6	2	4
Honeycomb Black	13A15134		2	4	6	2	4
Honeycomb White	13A15137	1				1	1
Honeycomb Black	13A15138	1				1	1

NOTE: The above diagram and list of parts is a complete listing for the basic QWST unit.

Warranty—Rev. January 2015

Standard Warranty:

Seller warrants to its direct purchasers that Products, including Service Parts, shall be of a merchantable quality, free of defects in material or workmanship, under normal use and service for a period of one (1) year from date of original equipment start-up, or eighteen (18) months from date of shipment by Seller, whichever first occurs. This warranty runs to only the original purchaser of equipment or part. Any Products covered by this warranty found to Seller's satisfaction to be defective upon examination at Seller's factory will at Seller's option, be repaired or replaced and returned to Buyer via lowest common carrier Ex-Works Seller's dock. This is buyer's sole and exclusive remedy and, except as provided in the next sentence, seller's sole and exclusive liability in connection with the warranty. Or Seller may, at its sole option, grant Buyer a credit for the purchase price of the defective Product. Buyer must prepay all costs for transportation of Products to Seller's factory.

Seller shall have no liability for expenses incurred for repairs made by Buyer except by prior, written authorization. Any claim under this warranty shall be made to Seller in writing within the warranty period specified above – otherwise such claim shall be deemed waived. Seller shall have no warranty obligation whatsoever if its products have been subjected to alteration, misuse, negligence, free chemicals in system, corrosive atmosphere, accident, or if operation is contrary to Seller's or manufacturer's recommendations, or if the serial number has been altered, defaced, or removed.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF SELLER ARE HEREBY DISCLAIMED.

Additional Warranties:

The Standard Warranty specified above applies to all Products and Service Parts unless modified by the following:

THERMO-FLEX™ OR FLOATING TUBE™ DESIGN COIL

Seller warrants the Thermo-Flex/Floating Tube Design Coil of the "BM", "BH", "CM", "CH", "HM", "HH", "MM", "ML" or "LH" series of Unit Coolers; coil section of the "BLV", "BDVS", "BBV", "JLD", "JDDS", "JBD", "BDT", "BDN", "BDS", "BDB", "BZT", "BZN", "BZS", "BZB", "CDD", "CDDS", "CDT", "CDN", "CDS", "CZT", "CZN", "CZS", "HDD", "HDDS", "HDT", "HDN", "HDS", "HZT", "HZN", "HZS", "LDV", "LDVS", "LDD", "LDDS", "LDT", "LDN", "LDS", "LZT", "LZN", "LZS" condensing units; and coil section of the "BN", "CN", "HN" or "LN" models of Air-cooled Condensers for a period of five (5) years from shipping date, in the event of any documented and verified (by Seller's representative) leaks in the coil tubes containing refrigerant at the point of and caused by tube contact with the end or center coil support sheets.

Seller will also reimburse the replacement cost of lost refrigerant for a period of five years from the date of shipment from leaks specifically caused by the reasons stated above. The replacement cost will be limited to one full system charge. The warranty specifically excludes leaks at header and weld joints, split tubes or leaks caused by failure to operate the product in accordance with published guidelines for operation and installation of equipment. The cost of replacement refrigerant will be limited to Seller's indexed nationwide average of refrigerant cost per pound. The warranty excludes any fines/fees related to refrigerant leaks.

Optional EC Condenser Fan Motors EC Motors

Seven (7) Blade motor assemblies – for a period of four (4) years from date of original installation, or fifty-four (54) months from date of shipment by Seller, whichever first occurs.

Five (5) Blade motor assemblies – for a period of three (3) years from date of original installation, or forty-two (42) months from date of shipment by Seller, whichever first occurs.

Installation and Operation Manual

Unit Cooler EC Fan Motors

Seller warrants EC Motors (made by McMillan) for a period of two (2) years from date of original installation, or thirty (30) months from date of shipment by Seller, whichever first occurs.

MOTOR COMPRESSORS:

Motor compressor replacements or exchanges shall be made through the nearest authorized wholesaler of the motor compressor manufacturer (not at Seller's factory) and no freight shall be allowed for transportation of the motor compressor to and from the wholesaler. The replacement motor compressor shall be identical to the model of the motor compressor being replaced. Additional charges which may be incurred throughout the substitution of other than identical replacements are not covered by this warranty. An optional, non-assignable, three (3) or four (4) year extended compressor warranty may be purchased for extra cost within the boundaries of the United States of America, its territories and possessions, and Canada. With this extended compressor warranty, replacements are administered by an authorized compressor distributor only. Replacements within the time period of the standard Warranty (as modified in some instances as stated above) are available through the distributor; for the remaining years, the purchaser must submit a proof-of-purchase of a compressor and supply it to Kysor Warren Warranty Claims for reimbursement.

THIS WARRANTY SHALL NOT APPLY:

1. Glass is not guaranteed against breakage. If this refrigerator is equipped with a glazing assembly carrying the manufacturer's brand name (Thermopane, Twindow, etc.), the manufacturer's glazing warranty in effect at the time of this shipment is extended to that assembly.
2. BULBS: Light bulbs, fluorescent lamp tubes and LEDs are not covered by any warranty for length of life or for any type of breakage.
3. To the condensing unit used with refrigerated equipment unless same was sold and shipped by Seller
4. When this equipment or any part thereof is damaged by accident, fire, flood, act of God, alteration, abuse, misuse, tampering, when the original model and serial number plate has been altered, defaced, or removed or used other than the recommended application by Seller.
5. When this equipment or any part thereof is subject to operation on low, high or improper voltages. Low and high voltage is defined as more than a 5% drop below or 10% higher than name plate voltage ratings. NOTE: Proper field supply voltage to the equipment is the responsibility of the owner (end user).
6. To damage caused by overloading shelves or wire racks beyond the specified weight limits. The maximum weight limit for Seller's standard shelves and wire racks is 30lbs per square foot.
7. When this equipment or any part thereof is damaged, or when operation is impaired, due to failure to follow installation manual. NOTE: Proper installation is the responsibility of the installer, owner (end user).
8. Operational issues caused by ambient environmental conditions outside of the specified limits. Seller's indoor equipment is specified to operate in a conditioned ambient environment not to exceed 75 degrees Fahrenheit or 55% relative humidity. NOTE: Providing specified ambient environmental conditions are the responsibility of the owner (end user).
9. To equipment with final destinations unknown to seller as indicated on the original sales order.
10. To labor cost for repair or replacement of parts.
11. To special or expedited freight or shipping charges or to customs duties to any country.
12. If the Warranty holder fails to comply with all the provisions, terms and conditions of this Warranty.

Parts replaced under this Warranty are warranted only through the remainder of the original Warranty.

Extended Service Agreements are provided by a third party not affiliated with Seller. The services provided by the third party are subject to the terms and conditions of the Extended Service Agreements and Seller is not responsible for those services or the third party's performance of its obligations.

IT IS EXPRESSLY UNDERSTOOD AND AGREED THAT SELLER SHALL NOT BE LIABLE TO BUYER, OR ANY CUSTOMER OF BUYER, FOR INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING LOSS OF PROFITS, ADDITIONAL LABOR COSTS, LOSS OF REFRIGERANTS OR FOOD PRODUCT, OR ANY INJURY TO PERSON OR PROPERTY CAUSED BY DEFECTIVE MATERIAL OR PARTS OR FOR ANY DELAY OR MISPERFORMANCE IN THE PERFORMANCE DUE TO CAUSES BEYOND ITS CONTROL OR FOR ANY EXPENSES INCURRED BY REASON OF THE USE OR MISUSE BY BUYER OR THIRD PARTIES OF THE PRODUCTS. SELLER'S MAXIMUM LIABILITY FOR DIRECT DAMAGES IS LIMITED TO THE AMOUNT PAID BY THE BUYER FOR THE PARTICULAR ITEM OF EQUIPMENT OR PART INVOLVED.

NOTE: IN THE CONSTANT EFFORT TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO CHANGE AT ANY TIME SPECIFICATIONS, DESIGN, OR PRICES WITHOUT INCURRING OBLIGATION.



KYSOR WARREN

5201 Transport Blvd.
Columbus, GA 31907
P: 800.866.5596
F: 706.568.8990



www.kysorwarren.com