



Split-Pak A2L™ Condensing Unit & Refrigeration System Installation and Operations Manual R454A and R454C Refrigerants



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INTRODUCTION

This manual contains important instructions for installation, use and service. Read all of this manual carefully before installing or servicing your refrigeration equipment.



NOTICE

Installation and service of the refrigeration and electrical components must be performed by a refrigeration mechanic or licensed electrician.

The portions of this manual covering refrigeration and electrical components contain technical instructions intended only for persons qualified to perform refrigeration and electrical work.



DANGER

Equipment **MUST** be properly grounded.

Improper or faulty hook-up of electrical components of the refrigeration units can result in severe injury or death.

All electrical wiring hook-ups must be done in accordance with all applicable local, regional or national standards.



NOTICE

Read this manual before installing your refrigeration. Keep the manual and refer to it before doing any service. Failure to do so could result in personal injury or equipment damage.

This manual cannot cover every installation, use or service situation. If you need additional information, contact us at:

Parts and Technical Service Department

☎ 800-388-5253

WARNING LABELS AND SAFETY INSTRUCTIONS



This is the safety-alert symbol. When you see this symbol, be alert to the potential for personal injury or damage to your equipment.

Be sure you understand all safety messages and always follow recommended precautions and safe operating practices.



NOTICE TO EMPLOYERS

You must make sure that everyone who installs, uses, or services your refrigeration is thoroughly familiar with all safety information and procedures.

Important safety information is presented in this section and throughout the manual. The following signal words are used in the warnings and safety messages.

DANGER

Severe injury or death **WILL** occur if you ignore the message.

WARNING

Severe injury or death **CAN** occur if you ignore the message.

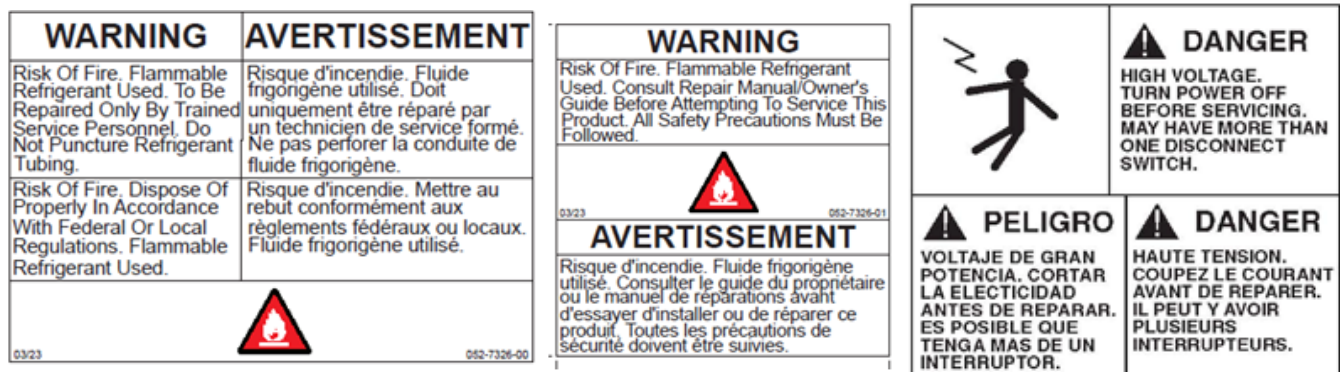
CAUTION

Minor injury or damage to refrigeration can occur if you ignore the message.

NOTICE

This is important installation, operation or service information. Damage to refrigeration may occur if you ignore the message.

The warning and safety labels shown throughout this manual are placed on your refrigeration at the factory. Follow all warning label instructions. ***If any warning or safety labels become lost or damaged, call our parts and technical service department for replacements.***



This label is located on the condensing unit.

WARNING LABELS AND SAFETY INSTRUCTIONS



WARNING

Keep clear of obstruction all ventilation openings in the appliance enclosure or in the structure for building-in.

- Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.
- Do not pierce or burn.
- Do not damage the refrigerating circuit.
- Do not store explosive substances such as aerosol cans with a flammable propellant in this appliance.

NEVER vent refrigerant, follow the proper procedure in the decommissioning section in sale and disposal.



WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an electric heater.)

Do not pierce or burn.

Be aware that refrigerants may not contain an odour.



MISE EN GARDE

Ne pas utiliser de moyens autres que ceux recommandés par le fabricant pour accélérer le processus de dégivrage ou pour nettoyer l'appareil.

L'appareil doit être entreposé dans un local ne contenant pas de sources d'inflammation permanentes (flammes nues, appareil à gaz ou dispositif de chauffage électrique en fonctionnement, par exemple).

Ne pas percer ou brûler.

Attention, les fluides frigorigènes peuvent ne pas dégager d'odeur.

CONDENSING UNIT FEATURES

STANDARD COMPONENTS (pre-wired and mounted except as noted)*

- Ke2Therm® condensing unit control
- Preset adjustable high-pressure control and preset adjustable low-pressure control**
- Preset discharge line thermostat**
- Crankcase heater
- Head pressure control (flooding valve)
- Heavy gauge, galvanized steel mechanically fastened weather hood
- Suction service valve
- Heavy-duty angle leg base
- Liquid line filter/drier
- Pre-wired electrical control panel
- Sight glass
- Liquid and suction line kit with service valve
- Compressor contactor (A2L compliant)
- Generously sized condenser (rated up to 120° ambient)
- Rifled tubes in condenser for greater efficiency
- Liquid line shut-off valve for easy change of filter
- Variable speed fan motors
- Large liquid receiver (good for maximum 100 ft. line run)
- One-year limited compressor warranty
- Factory pre-assembled evaporator coil (equipped with LogiTemp® electronic controller, pressure sensors, electronic expansion valve, and suction transducer)
- Pre-mounted solenoid at evaporator
- Fan cycling switch

* Components may vary depending on horsepower and application. Consult our factory to verify standard and optional components.

** These are temperature sensors connected to the Ke2Therm Condensing Unit Control.

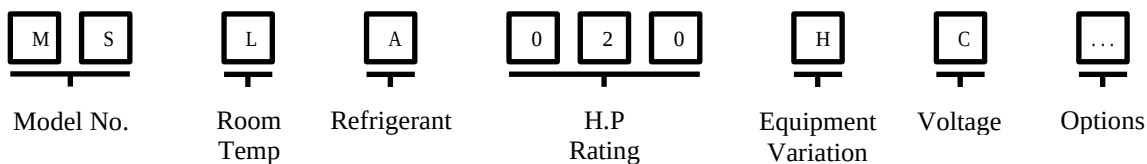
OPTIONALLY AVAILABLE

- Reverse cycle defrost
- Special voltages
- Insulated and heated receiver (thermostatically controlled)
- Suction accumulator
- Coated condenser coils
- Oil separator
- Phase loss/low voltage monitor
- Pre-charged system with quick connect liquid and suction line sets **up to 40 ft.** (specify on order)
- Circuit breaker
- Suction filter
- Extended four years limited compressor warranty

REFRIGERATION MODEL NOMENCLATURE

EXAMPLE:

MSLA020HC



MODEL NUMBER EXPLANATION (CONVENTIONAL = ACCESSIBLE HERMETIC)

MS = Scroll Condensing Unit

MC = Conventional Condensing Unit

ROOM TEMPERATURE EXPLANATION

L = 0° F. Thru -30° F. Room Temperature

M = 0° Thru +55° F. Room Temperature

REFRIGERANT EXPLANATION

A = R-454A

C = R-454C

HORSEPOWER RATING EXPLANATION

Nomenclature	HP	Nomenclature	HP
020	2	045	4.5
025	2.5	050	5
030	3	060	6
035	3.5	075	7.5
040	4	100	10

EQUIPMENT VARIATION EXPLANATION

A = STANDARD UNIT

R = REVERSING VALVE

H = HEATED AND INSULATED RECEIVER

M = FLOATING HEAD + LOGITEMP

VOLTAGE EXPLANATION

A = 115/60/1

F = 200-220/50/3

B = 230/60/1 or 208-230/60/1 (As Applicable)

G = 380-420/50/3

C = 208-230/60/3

J = 380/50/1

D = 460/60/1

K = 200-220/50/1 or 220/50/1

E = 460/60/3

PRE-INSTALLATION

I. General Information

Please read this manual prior to installing your equipment. This information is based on good refrigeration practice and should be used as a guide for installation and operation.

To complete the installation, please record the data requested on the **installation data sheet** on page 30 of the manual and return this manual to the owner.

II. Delivery Inspection

You are responsible for filing all freight claims with the delivery truck line. Inspect all cartons and crates for damage as soon as they arrive. If damage is noted to shipping crates, cartons or if a shortage is found; note this on the bill of lading (all copies) prior to signing.

If damage is discovered when the cabinet is uncrated, immediately call the delivery truck line and follow up the call with a written report indicating concealed damage to your shipment. Ask for an immediate inspection of your concealed damage item. Crating material **MUST** be retained to show the inspector from the truck line.

INSTALLATION INSTRUCTIONS

I. Handling and Placement of Condensing Unit

To minimize damage to the unit housing, it is recommended **not** to remove the crate until the unit is moved to its final location.

The following should be considered when placing the unit:

- A. The condenser coil (air inlet) should **not** restrict air flow into the coil. A minimum of 18" is required between the face of the coil and a wall or other vertical obstruction.
- B. A minimum of 12" is required on the sides to allow access to the housing clamps.
- C. A minimum of 24" is required at the louvered end (air outlet) for clearance when opening housing and for ease of maintenance.
- D. Do **not** position multiple units so that the air discharge of one is into the condenser air intake of another.

Holes are provided in the base supports for mounting bolts and for bridle lift rods.

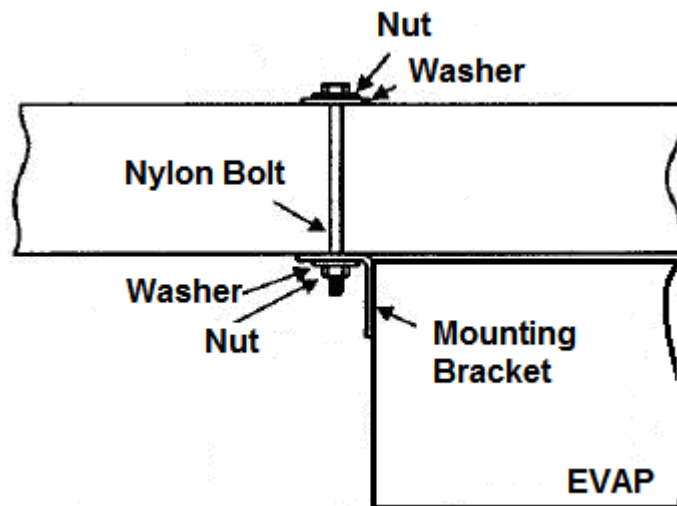
Systems are designed for outdoor use only. Mitigation systems are not on board for leak monitoring in an indoor environment with A2L refrigerants.

II. Handling and Placement of Evaporator Coil in Walk-In

To minimize damage to the evaporator coil, it is recommended **not** to remove the carton (or crate) until the evaporator coil is moved close to its final location. When the container is removed from the evaporator coil, extreme care must be taken when lifting and mounting to the ceiling, to prevent sheet metal damage.

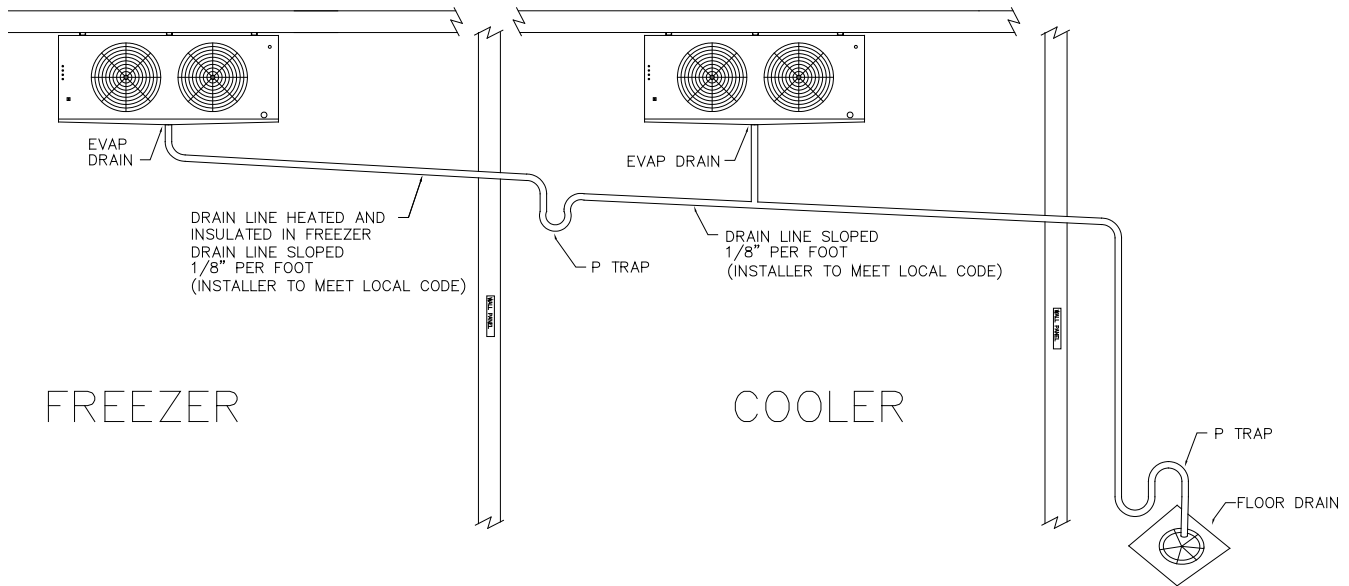
EVAPORATOR INSTALLATION INSTRUCTIONS

- A. Do not install the evaporator too close to door openings to prevent icing problems.
- B. The minimum clearance between evaporator and the walls is equal to or greater than the coil height for proper air flow and service access.
- C. Refer to the evaporator coil drawing dimension for mounting hole locations.
- D. Install washers and secure with nuts. Tighten until the coil is firm against the ceiling. The evaporator coil must be level.



- E. **Solenoid and check valve** are shipped loose with evaporator. These **must be located outside the box** for mitigation/safety purposes.

EVAPORATOR DRAIN LINE INSTALLATION:



III. Electrical

Electric power supply must match the condensing unit power requirements indicated on the unit data plate. **A WIRING DIAGRAM IS LOCATED ON THE INSIDE OF THE ELECTRICAL BOX COVER.** All field wiring may enter the holes provided in left side, back and bottom of the electrical box. All field wiring should be done in a professional manner, in accordance with all governing codes. Double check all wiring connections, including factory terminals, before start-up of condensing unit.



DANGER

Installation of the refrigeration and electrical components must be performed only by a refrigeration mechanic or licensed electrician.

Improper or faulty hook-up of electrical components can result in death.

IV. Evaporator Size Check

Each chart lists a minimum square foot of floor space required, dependent on ceiling height, for a particular model of evaporator to be qualified to be present in the room.

For instance, if a 10'x10'x6'7" walkin is selected for a WAL6E148DDA using R454A, then this would be compliant. It can be seen from Table 2, that the minimum square foot requirement for a WAL6E148DDA with a 6'7" ceiling is 96.2 square feet. This evaporator would also work if the ceiling was only 6'4" since that would require 100 square feet.

To calculate the square feet of the box, multiply the length times the width. In the example above that would be 10 feet by 10 feet, which is 100 feet.



NOTICE

Refer to pages 31-44, for comprehensive evaporator mitigation charts.

V. Refrigerant Piping



NOTICE

The condensing unit must remain sealed and pressurized from the manufacturer until the piping is complete and final connections are ready to be made.

Minimize the amount of flux used to prevent internal contamination of the system.

Use only refrigeration grade copper tubing, (ACR), type "L", bright annealed, dehydrated, and properly sealed against contamination. Soft temper tubing may not be used for field interconnection of refrigeration components (condensing unit to evaporator assembly). Take extreme care to keep refrigeration tubing clean and dry prior to installation. Use an appropriate size tube cutter, **not** a saw.

Note: *The liquid line and suction line size is determined by the chart on pages 13-15.*

Note: *If more than 50 ft of rise is required, **contact RSG Engineering** before piping and starting up.*

Suction lines should slope down 1/2 inch for each 10 feet of horizontal run towards the compressor. If any portion of the suction line rises above the exit elevation of the evaporator, P-type oil traps should be located at the base of each suction riser for proper oil return to the compressor. An inverted trap should be positioned at the top of the riser and intermediate traps should be installed in every ten feet of rise to the condenser.

When brazing, dry nitrogen **must** be passed through the lines at low pressure to prevent scaling and oxidation inside the tubing and fittings. Remove all flux from the joints after brazing by cleaning with a wet cloth and use

silver brazing wire (high temperature alloy of 15% silver content on all copper-to-copper connections, and high temperature alloy of 45% silver content on all dissimilar metal connections).

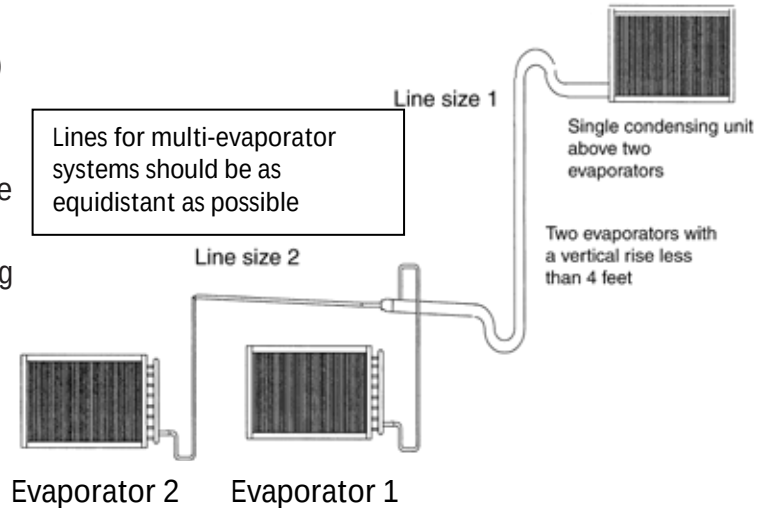
Note: The equipment shall be piped with the size lines found in tables 1 and 2 on pages 13-15.

VI. Suction And Liquid Line Sizes

A. Determining Line Set Length

Given: **-10°F Freezer** with one system having (2) evaporators

- One condensing unit MSLA060MC1
- Two evaporators sized by RSG to pair with the condensing unit
- 95 feet of actual line run between condensing unit to the tee. 10 feet to first evaporator and 20 feet of actual line run between the tee and the second evaporator (see figure).



B. Fittings in this system:

- Six 90-degree elbows in main line plus a 90 degree turn through a tee.
- Additional 5 90-degree elbows to first evaporator.
- Additional 4 90-degree elbows to second evaporator

C. Determine line 1 (main line from condenser to tee):

1. The condensing unit has 20800 Btu/hr. So, according to the pipe sizing chart at 95 feet we have a suction line of 1 1/8" and liquid of 1/2".
2. 6 elbows and one tee at 1 1/8" add approximately 13 feet. This is not enough to upsize to 1 3/8".
3. 6 elbows and one line tee at 1/2" add approximately 8 feet. Liquid line will stay at 1/2".

D. Determine line 2 (main line from tee to evaporator 1):

1. The evaporator capacity will be considered half of the condenser capacity at 10,400 Btu/hr. The total line length of the main line is 95+13(equivalent length of fittings) = 108 feet.
2. We then add the total length of each evaporator to find their line size. 108+10=118 feet. This indicates a 7/8 suction and 3/8 liquid.
3. Evaporator 1 has an additional length of 10 feet with 5 ells and a branch tee. Considering a 7/8 suction, this is an additional 11 feet of line. Not enough to upsize to 1 1/8". Considering a 3/8 liquid, this is an additional 5 feet of line. Not enough to upsize to 1/2".

E. Determine line 2 (main line from tee to evaporator 2):

1. The evaporator capacity will be considered half of the condenser capacity at 10,400 Btu/hr. The total line length of the main line is 95+13(equivalent length of fittings) = 108 feet.

2. We then add the total length of each evaporator to find their line size. $108+20 = 128$ feet. This indicates a 7/8 suction and 3/8 liquid.
3. Evaporator 1 has an additional length of 20 feet with 4 ells and a branch tee. Considering a 7/8 suction, this is an additional 10 feet of line. Not enough to upsize to 1 1/8". Considering a 3/8 liquid, this is an additional 4 feet of line. Not enough to upsize to 1/2

VII. Line Sizing Charts



NOTICE REGARDING LINE SIZING

- Sizes that are highlighted indicate maximum suction line sizes for risers. Riser size should not exceed horizontal size. Properly placed suction traps must also be used for adequate oil return.
- All the sizes shown are for O.D. Type L copper tubing.
- Suction line sizes selected at pressure drop equivalent to 2°F. Reduce the system capacity estimate accordingly.
- Recommended liquid line size may increase with reverse cycle hot gas systems.
- If system load drops below 40% of design, consider installing double suction risers

Table 1: Line Sizing R454A (see notice above)

Capacity BTUH	Suction Line Size																							
	Suction Temperature																							
	+20°F Equivalent Lengths						+10°F Equivalent Lengths						-10°F Equivalent Lengths						-20°F Equivalent Lengths					
	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'
6,000	1/2	1/2	5/8	5/8	5/8	3/4	1/2	5/8	5/8	5/8	3/4	3/4	5/8	3/4	3/4	3/4	7/8	7/8	5/8	3/4	3/4	7/8	7/8	1-1/8
9,000	5/8	5/8	5/8	3/4	3/4	7/8	5/8	5/8	3/4	3/4	7/8	7/8	3/4	3/4	7/8	7/8	1-1/8	1-1/8	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8
12,000	5/8	3/4	3/4	3/4	7/8	7/8	5/8	3/4	3/4	7/8	7/8	1-1/8	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8
15,000	5/8	3/4	3/4	7/8	7/8	1-1/8	3/4	3/4	7/8	7/8	1-1/8	1-1/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
18,000	3/4	3/4	7/8	7/8	1-1/8	1-1/8	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8
24,000	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8
30,000	7/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8
36,000	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8
42,000	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8
48,000	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8
54,000	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8
60,000	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8
66,000	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8
72,000	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8
78,000	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8
84,000	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8
90,000	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8
120,000	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	2-5/8

Capacity BTUH	Suction Line Size												Liquid Line Size						
	Suction Temperature												Receiver to Expansion Valve Equivalent Lengths						
	-30°F Equivalent Lengths						-40°F Equivalent Lengths												
	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	
6,000	3/4	3/4	7/8	7/8	1-1/8	1-1/8	3/4	7/8	1-1/8	1-1/8	1-1/8	1-1/8	3/8	3/8	3/8	3/8	3/8	3/8	
9,000	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	3/8	3/8	3/8	3/8	3/8	3/8	
12,000	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-3/8	3/8	3/8	3/8	3/8	3/8	3/8	
15,000	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	3/8	3/8	3/8	3/8	3/8	1/2	
18,000	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	3/8	3/8	3/8	3/8	1/2	1/2	
24,000	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	3/8	3/8	3/8	1/2	1/2	1/2	
30,000	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	3/8	3/8	1/2	1/2	1/2	1/2	
36,000	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	3/8	1/2	1/2	1/2	1/2	5/8	
42,000	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	3/8	1/2	1/2	1/2	5/8	5/8	
48,000	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	1/2	1/2	1/2	1/2	5/8	5/8	
54,000	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	1/2	1/2	1/2	5/8	5/8	5/8	
60,000	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	1-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	1/2	1/2	5/8	5/8	5/8	5/8	

Table 2: Line Sizing R454C (see notice on page 13)

Capacity BTUH	Suction Line Size																							
	Suction Temperature																							
	+20°F Equivalent Lengths						+10°F Equivalent Lengths						-10°F Equivalent Lengths						-20°F Equivalent Lengths					
	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'
6,000	1/2	5/8	5/8	5/8	3/4	3/4	5/8	5/8	3/4	3/4	3/4	7/8	5/8	3/4	7/8	7/8	7/8	1-1/8	3/4	7/8	7/8	7/8	1-1/8	1-1/8
9,000	5/8	3/4	3/4	3/4	7/8	7/8	5/8	3/4	3/4	7/8	7/8	1-1/8	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8
12,000	5/8	3/4	7/8	7/8	7/8	1-1/8	3/4	7/8	7/8	7/8	1-1/8	1-1/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8
15,000	3/4	7/8	7/8	7/8	1-1/8	1-1/8	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8
18,000	3/4	7/8	7/8	1-1/8	1-1/8	1-1/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8
24,000	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8
30,000	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8
36,000	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8
42,000	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8
48,000	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8
54,000	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8
60,000	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8
66,000	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8
72,000	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8
78,000	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8
84,000	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8
90,000	1-3/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	2-5/8
120,000	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	3-1/8

Capacity BTUH	Suction Line Size												Liquid Line Size					
	Suction Temperature												Receiver to Expansion Valve Equivalent Lengths					
	-30°F Equivalent Lengths						-40°F Equivalent Lengths											
	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'	25'	50'	75'	100'	150'	200'
6,000	3/4	7/8	1-1/8	1-1/8	1-1/8	1-1/8	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	3/8	3/8	3/8	3/8	3/8	3/8
9,000	7/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	3/8	3/8	3/8	3/8	3/8	3/8
12,000	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	3/8	3/8	3/8	3/8	3/8	1/2
15,000	1-1/8	1-3/8	1-3/8	1-3/8	1-5/8	1-5/8	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	3/8	3/8	3/8	3/8	1/2	1/2
18,000	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	3/8	3/8	3/8	1/2	1/2	1/2
24,000	1-3/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	3/8	3/8	1/2	1/2	1/2	1/2
30,000	1-3/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	3/8	1/2	1/2	1/2	1/2	5/8
36,000	1-3/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	3/8	1/2	1/2	1/2	5/8	5/8
42,000	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	2-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	1/2	1/2	1/2	5/8	5/8	5/8
48,000	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	1/2	1/2	5/8	5/8	5/8	5/8
54,000	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1/2	1/2	5/8	5/8	5/8	3/4
60,000	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	1/2	5/8	5/8	5/8	5/8	3/4



NOTICE

Be sure solenoid valves are open before beginning evacuation and leak check.

VIII. Leak Check

When all refrigeration line connections have been made, the complete system, including factory connections, should be leak checked.

If the system is completely empty add the proper refrigerant to 60 psig vapor charging only, then boost to desired psig (minimum 175 maximum 300) with dry nitrogen. Leaks check all joints with an electronic leak detector or a halide torch. If leaks are found, relieve the pressure and make repairs as necessary and recheck.

IX. Evacuation, Dehydration and Start-Up

A vacuum of 500 microns or less must be pulled to properly dehydrate the system. This requires a two-stage vacuum pump with an electronic vacuum indicator.

Note: RSG recommends using a vacuum pump that is compliant with local codes regarding the use of A2L refrigerants. Brushless EC motor pumps are now available at parts houses, and these will not induce any electric ignition of refrigerants.



CAUTION

Do not use the system compressor as a vacuum pump.

Do not operate compressor while system is in a vacuum.

Evacuation Procedure:

- A. Open all condensing unit service valves and relieve system pressure. Also, open any line valves installed in the system and energize all solenoid valves to facilitate evacuation.
- B. Connect the vacuum pump to the high and low sides of the system using 1/4" or larger copper line or 1/4" ID hoses with high vacuum designation.
- C. Leaks or moisture will be indicated if the system pressure rises when the vacuum line is closed off.
- D. Pull a vacuum of 500 Microns indicated by micron gauge. System should maintain 500 microns for 30 minutes after pump is turned off. This indicates a dry tight system.
- E. If a system has been exposed to moisture, a standard triple evacuation with dry nitrogen is recommended.

Final Charging Procedures:

A. Dry Charged Systems

1. Be sure all service valves are open.
2. Loose the compressor hold-down bolts and remove shipping clips to allow the compressor to float freely on the rubber grommets supplied with the condensing unit.
3. Check evaporator fan motors after start-up. Medium temperature, air defrosts fans run continuously. Low temperature fans and coolers provided with electric defrost will be delayed by the fan control.
4. Calculate the estimated amount of working refrigerant plus the head pressure control winter charge:

The amount of refrigerant charge can be estimated by the following formula:

Liquid line charge + **Additional Winter Charge** (if head pressure control valve is present) +
Condenser Charge = Total Charge

Note: Refer to pages 45-50, for additional winter charge tables

Example: MSLA060MC with 30 ft ½" liquid line and min outdoor ambient of 10 deg F (.3 * 6.3 lbs.) for liquid line + 7.25 lbs. for low ambient charge + 7.5 lbs. for condenser = 16.64 lbs. of approximate working charge



CAUTION

Never add liquid refrigerant to the suction side of the compressor.

5. Check operating pressures while charging and on initial pull down to prevent damage if a problem occurs. See evaporator controls manual for proper superheat settings. Monitor superheat at condenser to ensure it doesn't rise over 40 degrees Fahrenheit.
6. Observe compressor amperage draw and compare to compressor nameplate to prevent damage due to high amperage. The oil sight glass should be between 1/2 and 3/4 full during normal operation.

Weight of Refrigerant in LBS per 100 ft of Liquid Line

Liquid Line Size	Refrigerant	Lbs of Refr.
3/8"	R-454A	3.2 lbs
	R-454C	3.3 lbs
1/2"	R-454A	6.3 lbs
	R-454C	6.5 lbs
5/8"	R-454A	10.2 lbs
	R-454C	10.5 lbs
7/8"	R-454A	20.5 lbs
	R-454C	21.0 lbs

Capacity/Base Chart For R-454A and R-454C Models

Condenser Model	Condenser Coil Charge	Base Size
MHMA/C005	1.75	M1
MHMA/C007	1.75	M1
MSMA/C007	1.75	M1
MSMA/C010	3.5	M1
MSMA/C012	3.5	M2
MSMA/C015	3.5	M2
MSMA/C017	3.5	M2
MSMA/C020	3.75	M3
MSMA/C025	3.75	M3
MSMA/C030	3.75	M3
MSMA/C035	3.75	M3
MSMA/C040	7.25	M5
MSMA/C050	7.25	M5
MSMA/C060	7.25	M5
MSMA/C075	11	M6
MSMA/C100	15	M7
MSMA/C130	15	M7
MSMA/C150	15	M7
MSLA/C010	2	M1
MSLA/C012	3.75	M2
MSLA/C015	3.75	M2
MSLA/C017	3.75	M2
MSLA/C020	4.25	M3
MSLA/C025	4.25	M3
MSLA/C030	4.25	M3
MSLA/C035	4.25	M3
MSLA/C040	4.25	M3
MSLA/C050	7.5	M5
MSLA/C060	7.5	M5
MSLA/C075	11.5	M6
MSLA/C100	11.5	M6
MSLA/C130	11.5	M6
MSLA/C150	11.5	M6
MSLA/C170	15	M7

Note: Refer to pages 45-50, for additional winter charge tables



NOTICE

If lines are longer than the prescribed 100 ft. max or have a vertical rise of more than 50 ft., RSG must size line sets.



DANGER

Charging of the refrigeration system must be performed only by a certified refrigeration mechanic. Improper or faulty hook-up of refrigeration electrical components can result in injury or death.

Note: Quick-Couple systems are pre-charged with the proper refrigerant at the factory.

B. Pre-Charged Remote Refrigeration Systems

- Place a steel or treated-wood spreader on the top of the walk-in to distribute the load of the coil. The spreader must be at least twice the width of the coil. The coil must be mounted away from the edge of the roof a distance equal to the height of the coil (See Figure #1).
- Uncrate the coil and through-bolt it to the ceiling of the walk-in with suitable fasteners.
- Uncrate the condensing unit and locate near coil. Be sure air movement around the unit is not restricted so the condensing unit will have a sufficient supply of air to function properly.

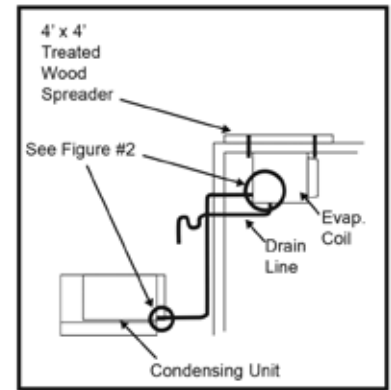


Figure 1: Quick-Couple Remote Refrigeration

Note: Install evaporator coil in accordance with the manufacturer's recommendations from inside wall or obstructions to rear of evaporator.

- Drill holes through the walk-in wall for refrigeration lines, electrical line and drain line.
- Connect liquid and suction lines to the coil and the condensing unit.
- Lubricate rubber seal in male half of coupling with refrigeration oil.
- Thread coupling halves together by hand to ensure proper mating of threads. Tighten with wrenches until coupling bodies “bottom” or a definite resistance is felt (See Figure #2.)
- Using a scribe or ink pen, mark a line lengthwise from the coupling hex to the bulkhead. Then tighten an additional 1/6 to 1/4 turn. The misalignment of the mark will show the degree of tightening for future reference. This final turn is necessary to ensure that the knife edge metal-seal bites into the brass seat of the coupling halves, forming a leak-proof joint.
- When routing refrigeration lines, special care should be taken not to “kink” the lines and restrict the flow of refrigerant.

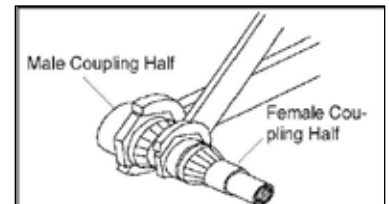


Figure 2: Quick-Couple Coupling Detail

Note: Hard copies of the wiring diagrams are located inside the pre-wired electrical panel in the condensing unit and the evaporator.



CAUTION

Be sure the electrical supply is sufficient for the quick-couple remote refrigeration system load.

- Connect correctly rated overcurrent protection device in the service line to the service line J-box on the condensing unit.
- After routing the condensate line from drain pan of evaporator coil, seal around all refrigeration, electrical and drain lines with silicone or butyl caulking.
- Start the compressor and allow it to run at least 24 hours before placing product into the walk-in.

During the testing period you should:

- Check the temperature holding range against the control setting.
- Check the defrost control system on low temperature units to see that all ice is removed from the coil during each defrost cycle.
- Perform checks of door operation and all other component operations.

These systems are pre-charged at the factory with proper refrigerant, but should be operationally checked as per page 21

X. Final Check List for All Models

- A. Check high-low pressure control settings.
- B. Check operating pressure.
- C. Check electrical requirements of unit to power supply voltage.
- D. Set temperature control for desired temperature range.
- E. Check electronic expansion valve for proper operation.
- F. Check again that the charge added is in conformance with the units charging chart.
- G. Check the compressor oil level if the sight glass is present.
- H. Check system for proper defrost operation.
- I. Check condensing unit for vibrating or rubbing tubing. Dampen or clamp as required.
- J. Open all valves completely counterclockwise.
- K. Check the packing nuts on all service valves.
- L. Replace all service valve caps and latch unit covers

Table 5: Equivalent Feet of Pipe Due to Valve and Fitting Friction

Copper Tube, O.D., Type "L"	1/2	5/8	7/8	1-1/8	1-3/8	1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8	5-1/8	6-1/8
Globe Valve (Open)	14	16	22	28	36	42	57	69	83	99	118	138	168
Angle Valve (Open)	7	9	12	15	18	21	28	34	42	49	57	70	83
90° Turn Through Tee	3	4	5	6	8	9	12	14	17	20	22	28	34
Tee (Straight Through) or Sweep Below	.75	1	1.5	2	2.5	3	3.5	4	5	6	7	9	11
90° Elbow or Reducing Tee (Straight Through)	1	2	2	3	4	4	5	7	8	10	12	14	16

EQUIVALENT LENGTH ALLOWANCE FOR FITTINGS

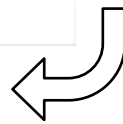
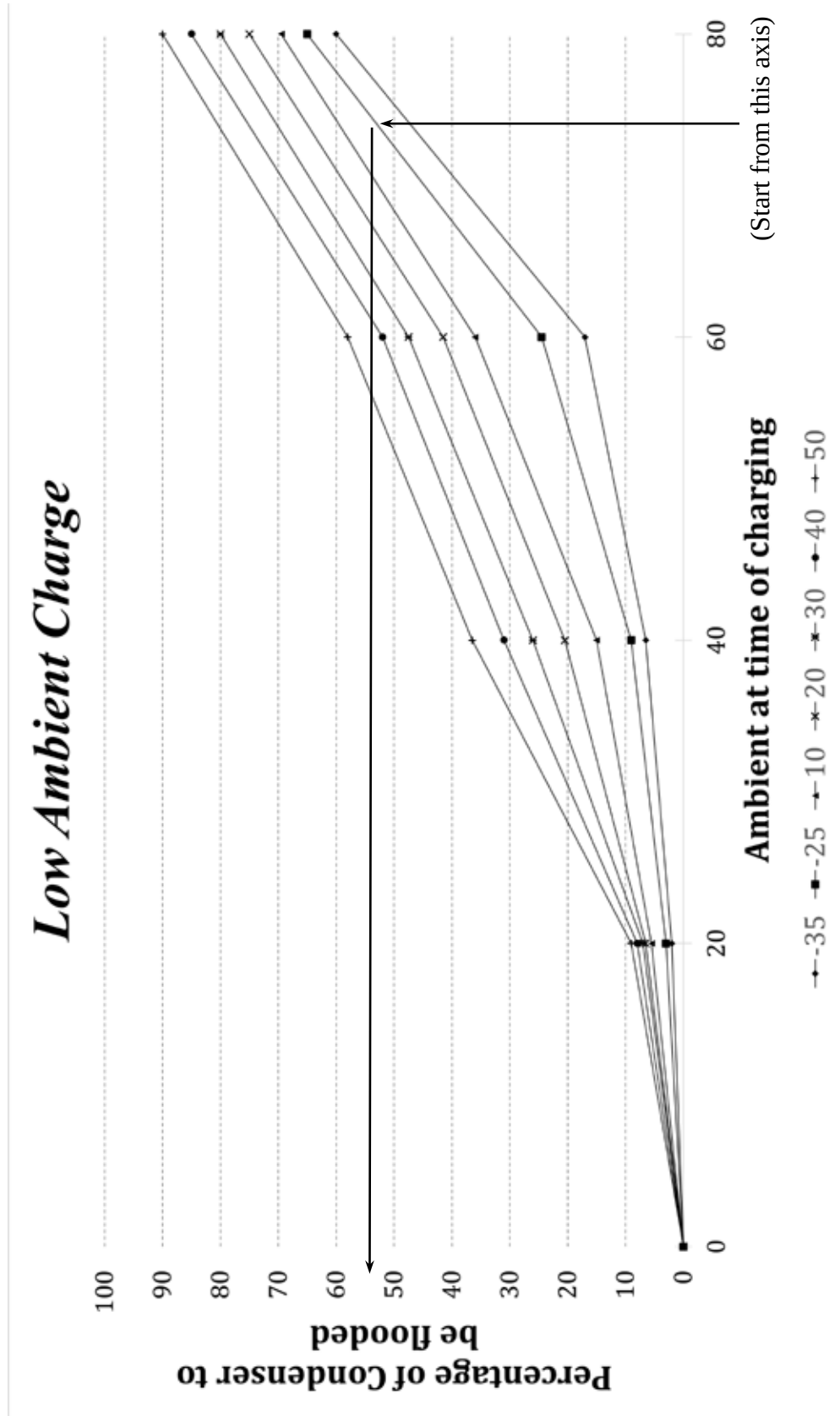
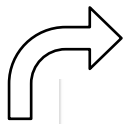
Equivalent length in feet:

Fitting Size	90° Ell	45° Ell	Tee (Line)	Tee (Branch)
1/2"	0.9	0.4	0.8	2.0
5/8"	1.0	0.5	1.0	2.5
7/8"	1.5	0.7	1.5	3.5
1-1/8"	1.8	0.9	1.5	4.5
1-3/8"	2.4	1.2	1.8	6.0
1-5/8"	2.8	1.4	2.0	7.0
2-1/8"	3.9	1.8	3.8	10.0

GENERAL INFORMATION

1. Suction lines should be pitched down in the direction of flow, 1/2" per 10 feet of line.
2. Refrigerant lines should be supported and fastened properly to prevent leaks and for professional-looking installation. Supports should be every 5 feet for lines to 7/8" OD, 7 feet for 1-1/8" to 1-3/8" OD lines, and 10 feet for 1-5/8" and 2-1/8" OD lines.
3. Where condensation dripping would be objectionable, insulate suction lines, and where the sun could adversely affect performance, insulate both the liquid and suction lines. Insulation thickness of 1/2" will usually be adequate.
4. A "P" trap must be installed at the bottom of the riser in all vertical suction lines rising 4" or more. To ensure proper oil return to the condensing unit, the trap should be the same size as the horizontal line and the riser should be sized per the line sizing charts on pages 13-15.

In installations where condensate can accumulate on the vibrasorber, a covering of heat shrink PVC tubing or waterproof tape may be used to prevent freezing under the ferrule, causing a rupture.



**General guidelines for systems with flammable refrigerants needing repair:**

- Maintenance should only be done by a refrigeration mechanic or licensed electrician.
- Service parts should come from the manufacturer or manufacturer-approved distributors only.
- Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized. Complete the following steps prior to working on the REFRIGERATING SYSTEM.

Work procedure:

- Work shall be done under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.

General work area:

- All maintenance staff and others working in the local area must be instructed on the nature of the work being carried out. Work in confined spaces must be avoided.

Checking for presence of refrigerant:

- The area must be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e., non-sparking, adequately sealed, or intrinsically safe.

Presence of fire extinguisher:

- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment must be available. A dry chemical or CO2 fire extinguisher should be adjacent to the charging area.

No ignition sources:

- No person working on a refrigeration system which involves exposing any pipe work shall use any ignition sources so that they create risk of fire or explosion. All possible ignition sources, including cigarettes, should be kept away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Before starting work, survey the area around the equipment to make sure there are no flammable hazards or ignition risks. "No Smoking" signs should be displayed.

Ventilated area:

- Ensure the area is in the open or adequately ventilated before breaking into the system or conducting any hot work. Continue a degree of ventilation while working. The ventilation should safely disperse any released refrigerant and preferably expel it externally.

Checks to the refrigerating equipment:

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

The following checks apply to installations using FLAMMABLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size where the refrigerant containing parts are installed
- The ventilation machinery and outlets are operating correctly and are not obstructed
- If you are using an indirect refrigerating circuit, the secondary circuit shall be checked for refrigerant
- Markings and signs on the equipment must be visible and legible—and corrected if illegible.
- When installing the refrigerating pipe or components, avoid exposure to any substance which may corrode the refrigerant containing components, unless the components are constructed of materials which are corrosion resistant or are suitably protected against corrosion.

Checks to electrical devices:

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment, so all parties are advised.

Initial safety checks shall include:

- a) that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- b) that no live electrical components and wiring are exposed while charging, recovering or purging the system;
- c) that there is continuity of earth bonding.

Repairs to sealed components:

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that the apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

Cabling:

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Detection of flammable refrigerants:

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems:

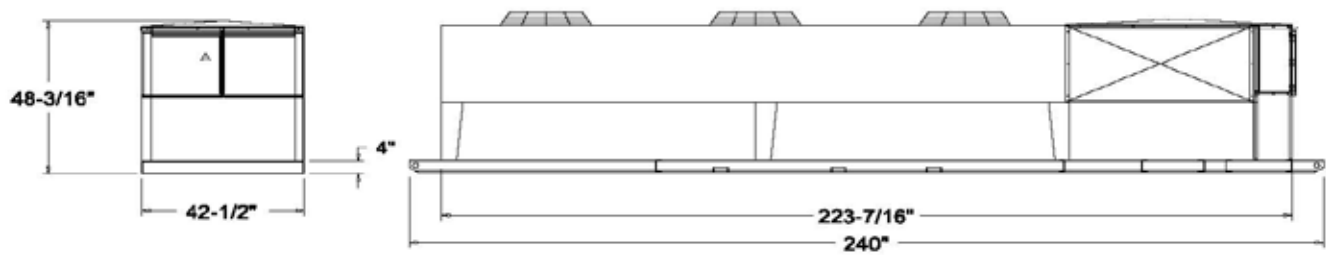
- a) Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity might not be adequate or might need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
- b) Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine can react with the refrigerant and corrode the copper pipework.
- c) If a leak is suspected, all naked flames shall be removed/extinguished.
- d) If a leakage of refrigerant is found which requires brazing, all of the refrigerants shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak

SYSTEM TROUBLESHOOTING

Problem	Cause	Correction
Compressor will not run	1. Main switch open	1. Close switch
	2. Fuse blown	2. Check circuits & motor winding for shorts, grounds or overloading, replace after correction
	3. Thermal overloads tripped	3. Wait for overload to reset
	4. Defective contactor or coil	4. Repair or replace
	5. System shut down by safety devices	5. Determine type and cause then correct before resetting safety switch
	6. No cooling required	6. Wait until system calls for cooling
	7. Liquid line solenoid will not open	7. Repair or replace solenoid coil
	8. Motor electrical trouble	8. Check motor windings
	9. Loose wiring	9. Check wire junctions, tighten terminals
	10. Phase loss monitor inoperative	10. Replace monitor
Compressor noisy/vibrating	1. Refrigerant flooding into crankcase	1. Check settings of expansion valves
	2. Improper piping support on suction/liquid	2. Relocate, add or remove hangers
	3. Worn compressor	3. Replace compressor
	4. Scroll compressor rotation reversed	4. Rewire for phase change
High discharge pressure	1. Non-condensables in system	1. Remove non-condensables
	2. System overcharge with refrigerant	2. Remove excess refrigerant charge
	3. Discharge shutoff valve partially closed	3. Open valve
	4. Fan not running	4. Check electrical circuit
	5. Head pressure control setting	5. Adjust
	6. Dirty condenser coil	6. Clean condenser
Low discharge pressure	1. Faulty condenser temp regulation	1. Check condenser control operation
	2. Suction shutoff valve partially closed	2. Open suction valve
	3. Insufficient refrigerant in system	3. Repair leaks and add charge
	4. Low suction pressure	4. See correction for low suction
	5. Head pressure valve variation	5. Check valve setting
High suction pressure	1. Excessive load	1. Reduce load or add equipments
	2. TXV overfeeding	2. Regulate TXV superheat
Low suction pressure	1. Lack of refrigerant	1. Repair leaks and recharge
	2. Dirty or iced evaporator	2. Clean evaporator
	3. Clogged filter drier	3. Replace drier
	4. Blocked suction strainer	4. Clean strainers
	5. Expansion Valve (TXV) malfunction	5. Reset for proper superheat
	6. Low condensing temperature	6. Regulate condensing temp
	7. Improper TXV	7. Check for proper sizing
Little/no oil pressure	1. Clogged suction oil strainer	1. Clean strainer
	2. Excessive liquid in crankcase	2. Check crankcase heater & reset TXV for higher superheat
	3. Faulty oil pressure switch	3. Replace switch
	4. Worn oil pump	4. Replace pump
	5. Stuck reversing gear	5. Reverse direction of compressor rotation.
	6. Worn bearings	6. Replace compressor/bearings
	7. Low oil level	7. Add oil and/or defrost thoroughly
	8. Loose fitting oil lines	8. Tighten the system
	9. Pump housing gasket leaks	9. Replace gasket
Compressor loses oil	1. Lack of refrigerant	1. Repair leaks and recharge
	2. Excessive compression ring blow-by	2. Replace compressor
	3. Refrigerant flood back	3. Maintain proper superheat at compress
	4. Improper piping or traps	4. Correct piping configuration
Thermal protector tripped	1. Running beyond design conditions	1. Add components to bring within limits (CPR/EPR, more condenser area, etc)
	2. Discharge valve partially closed	2. Open valve
	3. Blown valve plate gasket	3. Replace gasket
	4. Dirty condenser coil	4. Clean coil
	5. Overcharged system	5. Reduce refrigerant charge

UNIT BASE SPECIFICATIONS

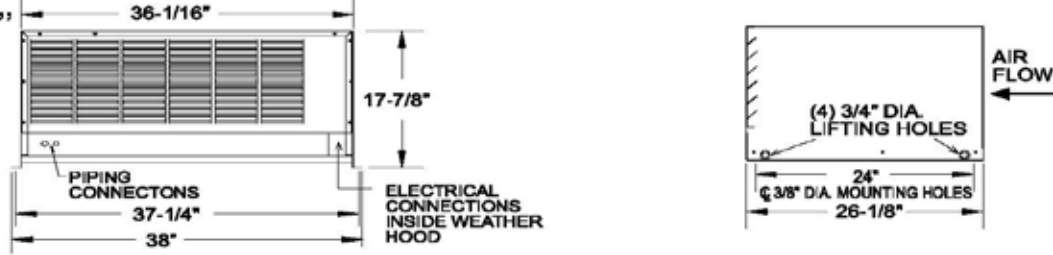
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BASE "M1"



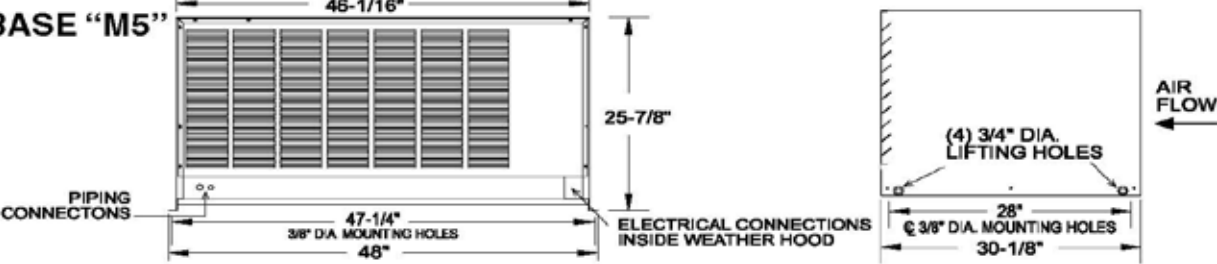
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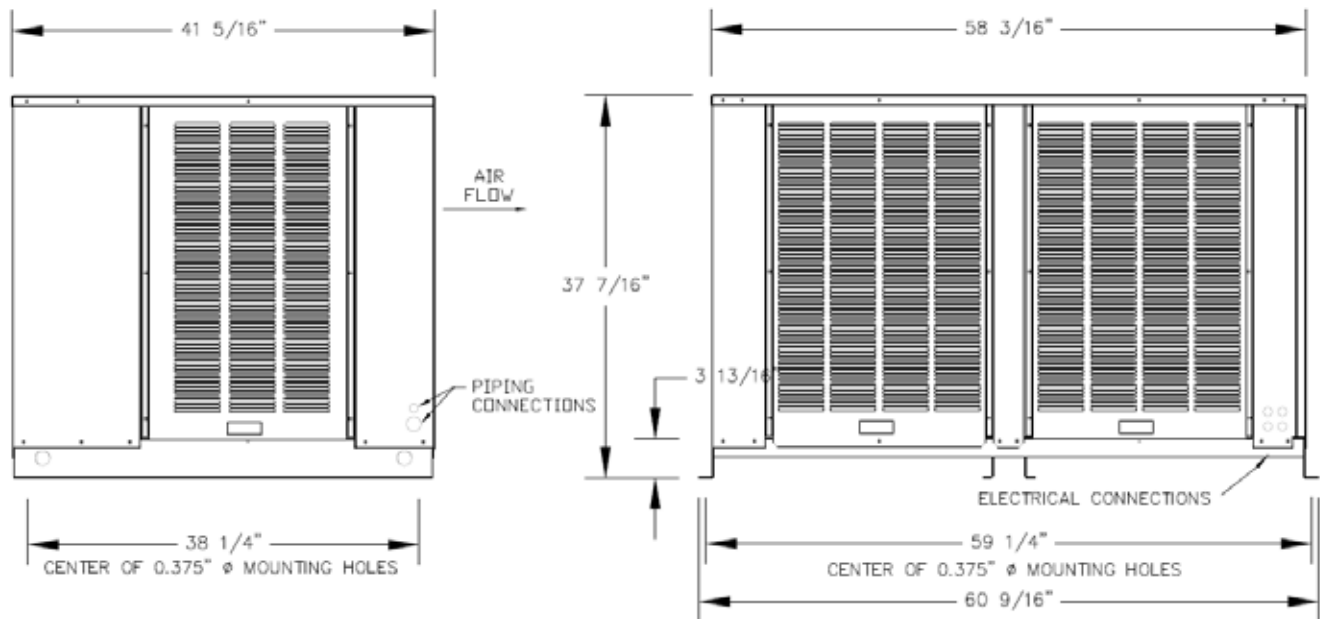
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BASE "M5"

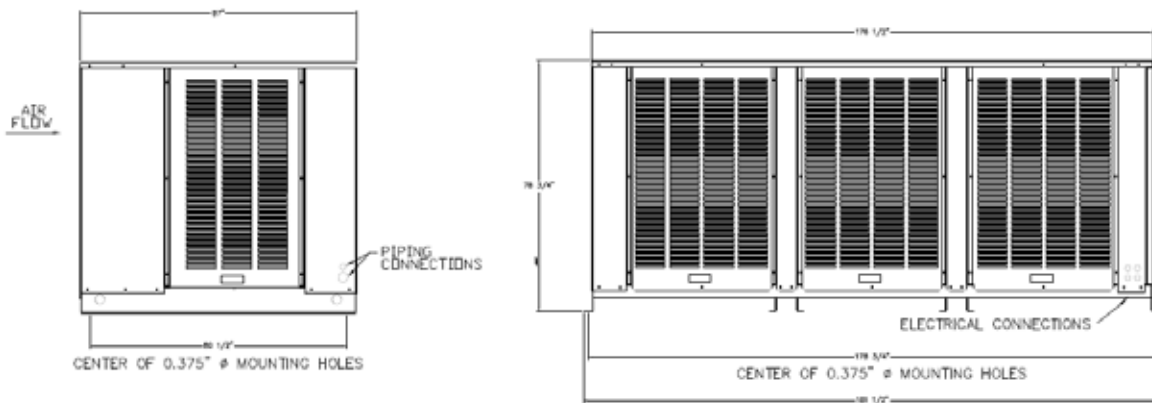


M6



M6-00000
 MASTER-BILT PRODUCTS
 NEW ALBANY, MISSISSIPPI 38652

M7



DWG. M7-00000
 MASTER-BILT PRODUCTS
 NEW ALBANY, MISSISSIPPI 38652

SALE AND DISPOSAL



If you sell or give away your walk-in refrigeration system or components, you must make sure that all safety labels and the Refrigeration Unit Installation and Operations Manual are included. If you need replacement labels or manuals, contact the parts and technical service department.

The customer service department **should** be contacted at the time of sale or disposal of your walk-in so records may be kept of its new location.

If you sell or give away your Unit and you evacuate the refrigerant charge before shipment, you **must** evacuate the refrigerant into an approved recovery and reclaim system in order to satisfy all applicable federal and state regulations regarding release of refrigerant compounds into the atmosphere.

The release of refrigerant compounds into the atmosphere is a source of ozone depletion and regulated by federal and state law.

Decommissioning:

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task commences.

- a) Become familiar with the equipment and its operation.
- b) Isolate the system electrically.
- c) Before attempting the procedure, ensure that:
 - i) mechanical handling equipment is available, if required, for handling refrigerant cylinders;
 - ii) all personal protective equipment is available and being used correctly.
 - iii) the recovery process is always supervised by a competent person;
 - iv) recovery equipment and cylinders conform to the appropriate standards.
- d) Pump down the refrigerant system, if possible.
- e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from all parts of the system.
- f) Make sure that the cylinder is situated on the scales before recovery takes place.
- g) Start the recovery machine and operate in accordance with instructions.
- h) Do not overfill cylinders (no more than 80 % volume liquid charge).
- i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Labelling:

- Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant.
- The label shall be dated and signed.



NOTICE

For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

INSTALLATION DATA SHEET

Date System Installed _____

Installer and Address _____

Phone: _____

Condensing Unit

Model _____

Serial _____

Electrical _____ Volts _____ Phase _____

Evaporator(s)

Quantity _____

Model _____

Serial _____

Thermostat Setting _____ °F

Defrost Setting _____ /24 hrs. _____ Min. Fail Safe

Electrical _____ Volts _____ Amps

Operating Pressures _____ Suction _____ Discharge

EVAPORATOR MITIGATION CHARTS

Table 01: R454A Witt Low Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2 in+
WAL6E042DDA	17.4	16.5	15.9	14.9	14.6
WAL6E051DDA	19.6	18.6	17.9	16.8	16.4
WAL6E058DDA	21.6	20.5	19.7	18.5	18.1
WAL6E079DDA	21.4	20.3	19.5	18.4	18
WAL6E092DDA	25.4	24	23.1	21.7	21.2
WAL6E110DDA	26.8	25.4	24.4	23	22.4
WAL6E129DDA	29.4	27.8	26.8	25.2	24.6
WAL6E148DDA	31.4	29.8	28.6	26.9	26.3
WAL6E173DDA	37.7	35.7	34.4	32.3	31.6
WAL6E194DDA	37.5	35.6	34.2	32.2	31.4
WAL6E218DDA	44.9	42.6	40.9	38.5	37.6
WAL6E237*DA	42.9	40.7	39.1	36.8	36
WAL6E290*DA	48.3	45.8	44.1	41.4	40.5
WAL6E343*DA	59.3	56.2	54.1	50.9	49.7

Table 02: R454A Witt Low Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAL6E042DDA	18.2	17.2	16.6	15.6	15.2
WAL6E051DDA	20.4	19.4	18.6	17.5	17.1
WAL6E058DDA	22.4	21.2	20.4	19.2	18.8
WAL6E079DDA	22.2	21.1	20.3	19.1	18.6
WAL6E092DDA	26.2	24.8	23.9	22.4	21.9
WAL6E110DDA	27.6	26.1	25.2	23.7	23.1
WAL6E129DDA	30.2	28.6	27.5	25.9	25.3
WAL6E148DDA	32.2	30.5	29.4	27.6	27
WAL6E173DDA	41.7	39.5	38	35.7	34.9
WAL6E194DDA	41.5	39.3	37.8	35.6	34.7
WAL6E218DDA	48.9	46.3	44.6	41.9	40.9
WAL6E237*DA	46.9	44.4	42.7	40.2	39.3
WAL6E290*DA	52.3	49.6	47.7	44.8	43.8
WAL6E343*DA	63.3	60	57.7	54.3	53

Table 03: R454A Witt Low Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAL6A050*DA	17.8	16.8	16.2	15.2	14.9
WAL6A062*DA	19.9	18.8	18.1	17.1	16.7
WAL6A081*DA	22.2	21	20.2	19	18.6
WAL6A088*DA	21.8	20.6	19.8	18.7	18.2
WAL6A113*DA	25.8	24.5	23.6	22.2	21.6
WAL6A141*DA	28	26.5	25.5	24	23.5
WAL6A159*DA	30	28.4	27.4	25.7	25.1
WAL6A170*DA	29.8	28.2	27.1	25.5	24.9
WAL6A196*DA	32.5	30.8	29.6	27.8	27.2
WAL6A220*DA	38.7	36.7	35.3	33.2	32.4
WAL6A234*DA	36	34.1	32.9	30.9	30.2
WAL6A289*DA	38.9	36.9	35.5	33.3	32.6
WAL6A316*DA	46.6	44.2	42.5	40	39.1
WAL6A375*DA	54.7	51.8	49.8	46.9	45.8
WAL6A404*DA	56.5	53.5	51.5	48.4	47.3
WAL6A477*DA	62.2	58.9	56.7	53.3	52.1

Table 04: R454A Keeprite® Low Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft2 in+
KLP104LE-S2E	17.6	16.7	16.1	15.1	14.8
KLP105LE-S2E	19.6	18.6	17.9	16.8	16.4
KLP106LE-S2E	21.5	20.4	19.6	18.4	18
KLP207LE-S2E	21.4	20.3	19.5	18.4	18
KLP209LE-S2E	25	23.7	22.8	21.5	21
KLP211LE-S2E	28.7	27.2	26.2	24.6	24
KLP314LE-S2E	30.2	28.6	27.5	25.9	25.3
KLP316LE-S2E	36.8	34.9	33.5	31.6	30.8
KLP418LE-S2E	36.6	34.7	33.4	31.4	30.6
KLP421LE-S2E	43.7	41.4	39.9	37.5	36.6
KLP526LE-S2E	51.4	48.7	46.8	44.1	43
KLP631LE-S2E	58.1	55.1	53	49.8	48.7

Table 05: R454A Keeprite® Low Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLP104LE-S2E	18.4	17.5	16.8	15.8	15.4
KLP105LE-S2E	20.4	19.3	18.6	17.5	17.1
KLP106LE-S2E	22.3	21.1	20.3	19.1	18.7
KLP207LE-S2E	22.2	21.1	20.3	19.1	18.6
KLP209LE-S2E	25.8	24.5	23.5	22.2	21.6
KLP211LE-S2E	29.5	28	26.9	25.3	24.7
KLP314LE-S2E	31	29.4	28.3	26.6	26
KLP316LE-S2E	40.8	38.6	37.2	35	34.1
KLP418LE-S2E	40.6	38.4	37	34.8	34
KLP421LE-S2E	47.7	45.2	43.5	40.9	39.9
KLP526LE-S2E	55.4	52.4	50.5	47.5	46.3
KLP631LE-S2E	62.1	58.8	56.6	53.2	52

Table 06: R454A Keeprite® Low Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLP104MA-S1E	18	17.1	16.4	15.4	15.1
KLP106MA-S1E	20	19	18.3	17.2	16.8
KLP107MA-S1E	22	20.9	20.1	18.9	18.5
KLP209MA-S1E	22.2	21	20.2	19	18.6
KLP211MA-S1E	26	24.6	23.7	22.3	21.8
KLP214MA-S1E	29.8	28.3	27.2	25.6	25
KLP317MA-S1E	31.4	29.8	28.6	26.9	26.3
KLP320MA-S1E	37.8	35.8	34.5	32.4	31.7
KLP422MA-S1E	38.2	36.2	34.8	32.7	32
KLP427MA-S1E	45.8	43.4	41.8	39.3	38.4
KLP534MA-S1E	54	51.2	49.2	46.3	45.2
KLP640MA-S1E	61.2	58	55.8	52.5	51.2

Table 07: R454A Witt Medium Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAM6A219*DA	29.1	27.5	26.5	24.9	24.3
WAM6A268*DA	33.6	31.9	30.7	28.8	28.2
WAM6A336*DA	34	32.2	31	29.1	28.4
WAM6A448*DA	42.4	40.2	38.7	36.4	35.5
WAM6A540*DA	54.3	51.5	49.5	46.6	45.5
WAM6A668*DA	59.1	56	53.9	50.7	49.5
WAM6A800*DA	70.9	67.2	64.6	60.8	59.4

Table 08: R454A Witt Medium Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAM6E181*DA	30.1	28.5	27.4	25.8	25.2
WAM6E217*DA	34.7	32.9	31.6	29.8	29.1
WAM6E371*DA	45	42.6	41	38.6	37.7
WAM6E446*DA	53.6	50.7	48.8	45.9	44.9
WAM6E557*DA	65.4	62	59.6	56.1	54.8
WAM6E669*DA	77.3	73.3	70.5	66.3	64.8

Table 09: R454A Witt Medium Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAM6E181*DA	34.1	32.3	31.1	29.2	28.5
WAM6E217*DA	38.7	36.6	35.3	33.2	32.4
WAM6E371*DA	48.9	46.4	44.6	42	41
WAM6E446*DA	57.5	54.5	52.4	49.3	48.2
WAM6E557*DA	75.8	71.8	69.1	65	63.5
WAM6E669*DA	87.7	83.1	80	75.2	73.5

Table 10: R454A KR Center Mount Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KTM207MA-S1/2E	24.3	23.1	22.2	20.9	20.4
KTM209MA-S1/2E	31.1	29.5	28.4	26.7	26.1
KTM313MA-S1/2E	38.9	36.8	35.4	33.3	32.5
KTM215MA-S1/2E	36.6	34.7	33.4	31.4	30.7
KTM318MA-S1/2E	38.7	36.7	35.3	33.2	32.4
KTM321MA-S1/2E	47.4	45	43.2	40.7	39.7
KTM426MA-S1/2E	47.4	45	43.2	40.7	39.7
KTM531MA-S1/2E	58.9	55.8	53.7	50.5	49.3

Table 11: R454A KR Center Mount Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KTM204LA-S2E	24.6	23.3	22.4	21.1	20.6
KTM206LA-S2E	31.1	29.5	28.4	26.7	26.1
KTM309LA-S2E	39.5	37.4	36	33.8	33
KTM212LA-S2E	31.4	29.7	28.6	26.9	26.3
KTM315LA-S2E	39.8	37.7	36.3	34.1	33.3
KTM318LA-S2E	51.4	48.7	46.9	44.1	43.1
KTM422LA-S2E	51.4	48.7	46.9	44.1	43.1
KTM526LA-S2E	60.5	57.3	55.2	51.9	50.7

Table 12: R454A KR Center Mount Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KTM204LA-S2E	28.5	27	26	24.5	23.9
KTM206LA-S2E	35.1	33.3	32	30.1	29.4
KTM309LA-S2E	43.4	41.1	39.6	37.2	36.4
KTM212LA-S2E	35.4	33.5	32.2	30.3	29.6
KTM315LA-S2E	43.7	41.4	39.9	37.5	36.6
KTM318LA-S2E	61.8	58.6	56.3	53	51.7
KTM422LA-S2E	61.8	58.6	56.3	53	51.7
KTM526LA-S2E	70.9	67.2	64.6	60.8	59.4

Table 13: R454A Witt Low Velocity Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAV6A053*DA	21.6	20.5	19.7	18.5	18.1
WAV6A066*DA	19.1	18.1	17.4	16.4	16
WAV6A105*DA	28.7	27.1	26.1	24.6	24
WAV6A131*DA	33.7	31.9	30.7	28.9	28.2
WAV6A159*DA	36.8	34.8	33.5	31.5	30.8
WAV6A196*DA	43.8	41.5	39.9	37.5	36.7
WAV6A216*DA	43.6	41.3	39.8	37.4	36.5
WAV6A270*DA	54.1	51.2	49.3	46.3	45.3
WAV6A338*DA	64.7	61.3	58.9	55.4	54.1

Table 14: R454A Witt Low Velocity Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAV6E053DDA	21.6	20.5	19.7	18.5	18.1
WAV6E066DDA	24.1	22.8	22	20.7	20.2
WAV6E105DDA	28.7	27.1	26.1	24.6	24
WAV6E131DDA	33.7	31.9	30.7	28.9	28.2
WAV6E159DDA	36.8	34.8	33.5	31.5	30.8
WAV6E196DDA	43.8	41.5	39.9	37.5	36.7
WAV6E216DDA	43.6	41.3	39.8	37.4	36.5
WAV6E270DDA	54.1	51.2	49.3	46.3	45.3
WAV6E338DDA	64.7	61.3	58.9	55.4	54.1

Table 15: R454A KR Low Velocity Medium/Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLV106MA/E-S1/2E	30.6	29	27.9	26.3	25.6
KLV109MA/E-S1/2E	40.8	38.7	37.2	35	34.2
KLV212MA/E-S1/2E	45	42.6	41	38.6	37.7
KLV217MA/E-S1/2E	58.7	55.6	53.5	50.3	49.1
KLV325MA/E-S1/2E	78.1	74	71.2	67	65.4
KLV331MA/E-S1/2E	94.4	89.4	86	80.9	79
KLV437MA/E-S1/2E	94.4	89.4	86	80.9	79
KLV441MA/E-S1/2E	114	108	103.9	97.7	95.4
KLV546MA/E-S1/2E	114	108	103.9	97.8	95.5

Table 16: R454A Witt Center Mount Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAE6A051*DA	20.7	19.6	18.9	17.7	17.3
WAE6A085*DA	23.6	22.4	21.5	20.2	19.8
WAE6A103*DA	26.8	25.4	24.5	23	22.5
WAE6A128*DA	28.7	27.1	26.1	24.6	24
WAE6A157*DA	34.1	32.3	31.1	29.2	28.5
WAE6A173*DA	35.1	33.2	32	30.1	29.4
WAE6A207*DA	41.2	39.1	37.6	35.4	34.5
WAE6A249*DA	48.3	45.8	44	41.4	40.5
WAE6A316*DA	64.3	60.9	58.6	55.1	53.8

Table 17: R454A Witt Center Mount Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAE6E045*DA	19.3	18.3	17.6	16.6	16.2
WAE6E054*DA	21	19.9	19.1	18	17.6
WAE6E090*DA	25.1	23.8	22.9	21.6	21.1
WAE6E107*DA	28.3	26.8	25.8	24.2	23.7
WAE6E129*DA	29.7	28.1	27.1	25.5	24.9
WAE6E149*DA	35.2	33.3	32	30.1	29.4
WAE6E160*DA	35.1	33.2	32	30.1	29.4
WAE6E217*DA	41.9	39.7	38.2	35.9	35.1
WAE6E265*DA	49	46.5	44.7	42	41.1
WAE6E337*DA	65.1	61.7	59.3	55.8	54.5

Table 18: R454A Witt Center Mount Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAE6E045*DA	20.1	19.1	18.4	17.3	16.9
WAE6E054*DA	21.8	20.6	19.8	18.7	18.2
WAE6E090*DA	26	24.6	23.7	22.3	21.7
WAE6E107*DA	29.1	27.5	26.5	24.9	24.4
WAE6E129*DA	30.5	28.9	27.8	26.2	25.5
WAE6E149*DA	39.1	37.1	35.7	33.5	32.8
WAE6E160*DA	39	37	35.6	33.5	32.7
WAE6E217*DA	45.8	43.4	41.8	39.3	38.4
WAE6E265*DA	53	50.2	48.3	45.4	44.4
WAE6E337*DA	69	65.4	62.9	59.2	57.8

Table 19: R454A KR Medium Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KMP120MA-S2E	40.4	38.3	36.8	34.6	33.8
KMP124MA-S2E	48.3	45.8	44	41.4	40.5
KMP232MA-S2E	53.1	50.3	48.4	45.5	44.5
KMP240MA-S2E	73.1	69.3	66.7	62.7	61.2
KMP248MA-S2E	99.6	94.3	90.7	85.3	83.4
KMP360MA-S2E	108	102.7	98.8	92.9	90.8
KMP372MA-S2E	129	121.8	117.2	110.2	107.7
KMP486MA-S2E	154	146	140.4	132.1	129
KMP495MA-S2E	154	146	140.4	132.1	129

Table 20: R454A KR Medium Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KMP116L	51.8	49	47.2	44.4	43.3
KMP120L	58.5	55.4	53.3	50.1	49
KMP224L	74.2	70.3	67.6	63.6	62.1
KMP233L	87.8	83.2	80	75.2	73.5
KMP239L	102	97	93.4	87.8	85.8
KMP347L	149	141.4	136	127.9	124.9
KMP355L	169	159.8	153.7	144.6	141.2
KMP470L	200	189	181.8	171	167

Table 21: R454A KR Medium Profile Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KMP116L	66.4	62.9	60.5	56.9	55.6
KMP120L	73.1	69.3	66.6	62.7	61.2
KMP224L	96.2	91.1	87.7	82.4	80.5
KMP233L	110	104	100	94.1	91.9
KMP239L	124	117.9	113.4	106.7	104.2
KMP347L	149	141.4	136	127.9	124.9
KMP355L	169	159.8	153.7	144.6	141.2
KMP470L	200	189	181.8	171	167

Table 22: R454C Witt Low Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAL6E042DDA	18.2	17.3	16.6	15.6	15.3
WAL6E051DDA	20.6	19.5	18.7	17.6	17.2
WAL6E058DDA	22.6	21.5	20.6	19.4	19
WAL6E079DDA	22.5	21.3	20.5	19.3	18.8
WAL6E092DDA	26.6	25.2	24.3	22.8	22.3
WAL6E110DDA	28.1	26.6	25.6	24.1	23.5
WAL6E129DDA	30.8	29.2	28.1	26.4	25.8
WAL6E148DDA	33	31.3	30.1	28.3	27.6
WAL6E173DDA	39.6	37.5	36.1	34	33.2
WAL6E194DDA	39.4	37.4	36	33.8	33
WAL6E218DDA	47.2	44.7	43	40.5	39.5
WAL6E237*DA	45.1	42.8	41.1	38.7	37.8
WAL6E290*DA	50.8	48.2	46.3	43.6	42.6
WAL6E343*DA	62.4	59.1	56.9	53.5	52.3

Table 23: R454C Witt Low Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAL6E042DDA	19.1	18.1	17.4	16.4	16
WAL6E051DDA	21.4	20.3	19.5	18.4	17.9
WAL6E058DDA	23.5	22.3	21.4	20.2	19.7
WAL6E079DDA	23.3	22.1	21.3	20	19.5
WAL6E092DDA	27.5	26	25	23.6	23
WAL6E110DDA	29	27.4	26.4	24.8	24.3
WAL6E129DDA	31.7	30	28.9	27.2	26.6
WAL6E148DDA	33.9	32.1	30.9	29	28.4
WAL6E173DDA	43.8	41.5	39.9	37.6	36.7
WAL6E194DDA	43.6	41.4	39.8	37.4	36.6
WAL6E218DDA	51.4	48.7	46.9	44.1	43.1
WAL6E237*DA	49.3	46.7	45	42.3	41.3
WAL6E290*DA	55	52.1	50.2	47.2	46.1
WAL6E343*DA	66.6	63.1	60.7	57.1	55.8

Table 24: R454A Witt Low Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAL6A050*DA	18.2	17.3	16.6	15.6	15.3
WAL6A062*DA	20.3	19.2	18.5	17.4	17
WAL6A081*DA	22.6	21.4	20.6	19.4	18.9
WAL6A088*DA	22.2	21	20.2	19	18.6
WAL6A113*DA	26.1	24.7	23.8	22.4	21.8
WAL6A141*DA	28.2	26.8	25.7	24.2	23.7
WAL6A159*DA	30.2	28.6	27.5	25.9	25.3
WAL6A170*DA	30	28.4	27.3	25.7	25.1
WAL6A196*DA	32.7	31	29.8	28	27.4
WAL6A220*DA	38.9	36.9	35.5	33.4	32.6
WAL6A234*DA	36.3	34.4	33.1	31.1	30.4
WAL6A289*DA	38.9	36.9	35.5	33.4	32.6
WAL6A316*DA	46.6	44.2	42.5	40	39
WAL6A375*DA	54.6	51.7	49.8	46.8	45.7
WAL6A404*DA	56.3	53.4	51.3	48.3	47.2
WAL6A477*DA	62	58.8	56.5	53.2	51.9

Table 25: R454C Keeprite® Low Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLP104LE-S2E	18.4	17.5	16.8	15.8	15.5
KLP105LE-S2E	20.5	19.4	18.7	17.6	17.2
KLP106LE-S2E	22.5	21.3	20.5	19.3	18.9
KLP207LE-S2E	22.5	21.3	20.5	19.3	18.8
KLP209LE-S2E	26.3	24.9	23.9	22.5	22
KLP211LE-S2E	30.1	28.6	27.5	25.8	25.2
KLP314LE-S2E	31.7	30	28.9	27.2	26.6
KLP316LE-S2E	38.7	36.7	35.3	33.2	32.4
KLP418LE-S2E	38.5	36.4	35.1	33	32.2
KLP421LE-S2E	46	43.5	41.9	39.4	38.5
KLP526LE-S2E	54	51.2	49.3	46.3	45.3
KLP631LE-S2E	61.2	58	55.8	52.4	51.2

Table 26: R454C Keeprite® Low Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLP104LE-S2E	19.3	18.3	17.6	16.6	16.2
KLP105LE-S2E	21.4	20.3	19.5	18.3	17.9
KLP106LE-S2E	23.4	22.2	21.3	20	19.6
KLP207LE-S2E	23.3	22.1	21.3	20	19.5
KLP209LE-S2E	27.1	25.7	24.7	23.2	22.7
KLP211LE-S2E	31	29.4	28.3	26.6	26
KLP314LE-S2E	32.6	30.9	29.7	27.9	27.3
KLP316LE-S2E	42.9	40.6	39.1	36.8	35.9
KLP418LE-S2E	42.7	40.4	38.9	36.6	35.7
KLP421LE-S2E	50.2	47.5	45.7	43	42
KLP526LE-S2E	58.3	55.2	53.1	49.9	48.8
KLP631LE-S2E	65.4	61.9	59.6	56.1	54.7

Table 27: R454C Keeprite® Low Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLP104MA-S1E	18.4	17.5	16.8	15.8	15.5
KLP106MA-S1E	20.4	19.4	18.6	17.5	17.1
KLP107MA-S1E	22.4	21.3	20.5	19.2	18.8
KLP209MA-S1E	22.4	21.2	20.4	19.2	18.8
KLP211MA-S1E	26.3	24.9	23.9	22.5	22
KLP214MA-S1E	30	28.5	27.4	25.8	25.2
KLP317MA-S1E	31.6	29.9	28.8	27.1	26.5
KLP320MA-S1E	38	36	34.7	32.6	31.8
KLP422MA-S1E	38.4	36.3	35	32.9	32.1
KLP427MA-S1E	45.8	43.4	41.8	39.3	38.4
KLP534MA-S1E	53.9	51.1	49.1	46.2	45.1
KLP640MA-S1E	61	57.8	55.6	52.3	51.1

Table 28: R454C Witt Medium Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAM6A219*DA	29.3	27.8	26.7	25.2	24.6
WAM6A268*DA	33.7	31.9	30.7	28.9	28.2
WAM6A336*DA	34	32.2	31	29.2	28.5
WAM6A448*DA	42.1	39.9	38.4	36.1	35.3
WAM6A540*DA	54.2	51.4	49.4	46.5	45.4
WAM6A668*DA	59	55.9	53.7	50.5	49.4
WAM6A800*DA	70.7	67	64.4	60.6	59.2

Table 29: R454C Witt Medium Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAM6E181*DA	30.4	28.8	27.7	26	25.4
WAM6E217*DA	34.8	32.9	31.7	29.8	29.1
WAM6E371*DA	45	42.6	41	38.5	37.6
WAM6E446*DA	53.2	50.4	48.5	45.6	44.6
WAM6E557*DA	65.2	61.8	59.4	55.9	54.6
WAM6E669*DA	77.1	73	70.2	66.1	64.5

Table 30: R454C Witt Medium Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAM6E181*DA	34.6	32.8	31.5	29.7	29
WAM6E217*DA	39	36.9	35.5	33.4	32.6
WAM6E371*DA	49.2	46.6	44.8	42.1	41.2
WAM6E446*DA	57.4	54.4	52.3	49.2	48.1
WAM6E557*DA	76.2	72.2	69.5	65.3	63.8
WAM6E669*DA	88.1	83.4	80.3	75.5	73.7

Table 31: R454C KR Center Mount Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KTM207MA-S1/2E	24.8	23.5	22.6	21.3	20.8
KTM209MA-S1/2E	31.5	29.9	28.7	27	26.4
KTM313MA-S1/2E	39.2	37.1	35.7	33.6	32.8
KTM215MA-S1/2E	36.9	34.9	33.6	31.6	30.9
KTM318MA-S1/2E	38.9	36.9	35.5	33.3	32.6
KTM321MA-S1/2E	47.4	44.9	43.2	40.6	39.7
KTM426MA-S1/2E	47.4	44.9	43.2	40.6	39.7
KTM531MA-S1/2E	59	55.9	53.8	50.6	49.4

Table 32: R454C KR Center Mount Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KTM204LA-S2E	25	23.7	22.8	21.4	20.9
KTM206LA-S2E	31.5	29.9	28.7	27	26.4
KTM309LA-S2E	39.7	37.6	36.1	34	33.2
KTM212LA-S2E	31.7	30	28.9	27.1	26.5
KTM315LA-S2E	39.8	37.7	36.3	34.1	33.3
KTM318LA-S2E	51.6	48.9	47	44.2	43.2
KTM422LA-S2E	51.6	48.9	47	44.2	43.2
KTM526LA-S2E	60.4	57.2	55	51.8	50.5

Table 33: R454C KR Center Mount Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KTM204LA-S2E	29.2	27.7	26.6	25	24.5
KTM206LA-S2E	35.7	33.9	32.6	30.6	29.9
KTM309LA-S2E	43.9	41.5	40	37.6	36.7
KTM212LA-S2E	35.9	34	32.7	30.7	30
KTM315LA-S2E	44	41.7	40.1	37.7	36.8
KTM318LA-S2E	62.6	59.3	57.1	53.7	52.4
KTM422LA-S2E	62.6	59.3	57.1	53.7	52.4
KTM526LA-S2E	71.4	67.6	65.1	61.2	59.8

Table 34: R454C Witt Low Velocity Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAV6A053*DA	22	20.9	20.1	18.9	18.5
WAV6A066*DA	19.6	18.5	17.8	16.8	16.4
WAV6A105*DA	28.9	27.4	26.3	24.8	24.2
WAV6A131*DA	33.9	32.1	30.9	29	28.4
WAV6A159*DA	36.9	35	33.7	31.7	30.9
WAV6A196*DA	43.9	41.6	40	37.6	36.7
WAV6A216*DA	43.7	41.4	39.9	37.5	36.6
WAV6A270*DA	54	51.1	49.2	46.3	45.2
WAV6A338*DA	64.5	61.1	58.8	55.3	54

Table 35: R454C Witt Low Velocity Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAV6E053DDA	22	20.9	20.1	18.9	18.5
WAV6E066DDA	24.5	23.2	22.3	21	20.5
WAV6E105DDA	28.9	27.4	26.3	24.8	24.2
WAV6E131DDA	33.9	32.1	30.9	29	28.4
WAV6E159DDA	36.9	35	33.7	31.7	30.9
WAV6E196DDA	43.9	41.6	40	37.6	36.7
WAV6E216DDA	43.7	41.4	39.9	37.5	36.6
WAV6E270DDA	54	51.1	49.2	46.3	45.2
WAV6E338DDA	64.5	61.1	58.8	55.3	54

Table 36: R454C KR Low Velocity Medium/Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KLV106MA/E-S1/2E	31	29.4	28.3	26.6	26
KLV109MA/E-S1/2E	41	38.9	37.4	35.2	34.3
KLV212MA/E-S1/2E	45.2	42.8	41.2	38.7	37.8
KLV217MA/E-S1/2E	58.5	55.5	53.4	50.2	49
KLV325MA/E-S1/2E	77.8	73.8	71	66.7	65.2
KLV331MA/E-S1/2E	94.2	89.3	85.9	80.8	78.9
KLV437MA/E-S1/2E	94.2	89.3	85.9	80.8	78.9
KLV441MA/E-S1/2E	113.4	107.4	103.3	97.2	94.9
KLV546MA/E-S1/2E	113.5	107.5	103.4	97.3	95

Table 37: R454C Witt Center Mount Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAE6A051*DA	21.1	20	19.3	18.1	17.7
WAE6A085*DA	24	22.8	21.9	20.6	20.1
WAE6A103*DA	27.2	25.8	24.8	23.3	22.8
WAE6A128*DA	28.9	27.4	26.3	24.8	24.2
WAE6A157*DA	34.3	32.5	31.2	29.4	28.7
WAE6A173*DA	35.1	33.3	32	30.1	29.4
WAE6A207*DA	41.2	39.1	37.6	35.4	34.5
WAE6A249*DA	48.3	45.7	44	41.4	40.4
WAE6A316*DA	64.1	60.7	58.4	54.9	53.7

Table 38: R454C Witt Center Mount Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAE6E045*DA	19.6	18.6	17.9	16.8	16.4
WAE6E054*DA	21.2	20.1	19.4	18.2	17.8
WAE6E090*DA	25.2	23.9	23	21.6	21.1
WAE6E107*DA	28.3	26.8	25.8	24.3	23.7
WAE6E129*DA	29.7	28.2	27.1	25.5	24.9
WAE6E149*DA	35.2	33.4	32.1	30.2	29.5
WAE6E160*DA	35.1	33.3	32	30.1	29.4
WAE6E217*DA	41.6	39.4	37.9	35.7	34.8
WAE6E265*DA	48.7	46.2	44.4	41.8	40.8
WAE6E337*DA	64.6	61.2	58.9	55.4	54.1

Table 39: R454C Witt Center Mount Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
WAE6E045*DA	20.5	19.4	18.7	17.6	17.2
WAE6E054*DA	22.1	20.9	20.2	19	18.5
WAE6E090*DA	26.1	24.7	23.8	22.4	21.8
WAE6E107*DA	29.2	27.6	26.6	25	24.4
WAE6E129*DA	30.6	29	27.9	26.2	25.6
WAE6E149*DA	39.4	37.3	35.9	33.8	33
WAE6E160*DA	39.3	37.3	35.8	33.7	32.9
WAE6E217*DA	45.8	43.4	41.8	39.3	38.4
WAE6E265*DA	52.9	50.1	48.2	45.4	44.3
WAE6E337*DA	68.8	65.2	62.7	59	57.6

Table 40: R454C KR Medium Profile Med Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KMP120MA-S2E	40.8	38.7	37.2	35	34.2
KMP124MA-S2E	48.5	46	44.2	41.6	40.6
KMP232MA-S2E	53.3	50.5	48.6	45.7	44.6
KMP240MA-S2E	73.6	69.7	67.1	63.1	61.6
KMP248MA-S2E	100.8	95.5	91.9	86.4	84.4
KMP360MA-S2E	109.4	103.6	99.7	93.8	91.6
KMP372MA-S2E	129.4	122.6	117.9	110.9	108.3
KMP486MA-S2E	154.7	146.5	141	132.6	129.5
KMP495MA-S2E	154.7	146.5	141	132.6	129.5

Table 41: R454C KR Medium Profile Low Temp

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KMP116L	52.6	49.9	48	45.1	44.1
KMP120L	59.3	56.2	54.1	50.9	49.7
KMP224L	75.6	71.6	68.9	64.8	63.3
KMP233L	89.1	84.4	81.2	76.4	74.6
KMP239L	103.4	98	94.3	88.7	86.6
KMP347L	152.6	144.6	139.1	130.8	127.8
KMP355L	171.9	162.9	156.7	147.4	143.9
KMP470L	201.8	191.2	183.9	173	169

Table 42: R454C KR Medium Profile Low Temp Reverse Cycle Defrost

Evaporator Model	6 ft	6 ft 4 in	6 ft 7 in	7 ft	7 ft 2in+
KMP116L	52.6	49.9	48	45.1	44.1
KMP120L	59.3	56.2	54.1	50.9	49.7
KMP224L	75.6	71.6	68.9	64.8	63.3
KMP233L	89.1	84.4	81.2	76.4	74.6
KMP239L	103.4	98	94.3	88.7	86.6
KMP347L	152.6	144.6	139.1	130.8	127.8
KMP355L	171.9	162.9	156.7	147.4	143.9
KMP470L	201.8	191.2	183.9	173	169

ADDITIONAL WINTER CHARGE CHARTS

Table 01: Freezers on M1 Base R454A

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Minimum Outdoor Ambient	Additional Charge
60°F	2.0 lbs
50°F	2.5 lbs
40°F	2.75 lbs
30°F	3.0 lbs
10°F	3.25 lbs
-10°F	3.25 lbs

Table 02: Freezers on M2 Base R454A

Minimum Outdoor Ambient	Additional Charge
60°F	2.5 lbs
50°F	3.0 lbs
40°F	3.25 lbs
30°F	3.5 lbs
10°F	3.75 lbs
-10°F	3.75 lbs

Table 03: Freezers on M3 Base R-454A

Minimum Outdoor Ambient	Additional Charge
60°F	2.75 lbs
50°F	3.25 lbs
40°F	3.75 lbs
30°F	4 lbs
10°F	4.25 lbs
-10°F	4.5 lbs

Table 04: Freezers on M5 Base R-454A

Minimum Outdoor Ambient	Additional Charge
60°F	5.25 lbs
50°F	6 lbs
40°F	6.5 lbs
30°F	6.75 lbs
10°F	7.25 lbs
-10°F	7.5 lbs

Table 05: Freezers on M6 Base R-454A

Minimum Outdoor Ambient	Additional Charge
60°F	7.75 lbs
50°F	9 lbs
40°F	10 lbs
30°F	10.5 lbs
10°F	11.25 lbs
-10°F	11.5 lbs

Table 06: Freezers on M7 Base R454A

Minimum Outdoor Ambient	Additional Charge
60°F	8.75 lbs
50°F	10.0 lbs
40°F	11.0 lbs
30°F	11.5 lbs
10°F	12.25 lbs
-10°F	12.5 lbs

Table 07: Coolers on M1 Base R454A

Minimum Outdoor Ambient	Additional Charge
60°F	1.5 lbs
50°F	2.0 lbs
40°F	2.25 lbs
30°F	2.5 lbs
10°F	2.75 lbs
-10°F	3.25 lbs

Table 08: Coolers on M2 Base R454A

Minimum Outdoor Ambient	Additional Charge
60°F	2.0 lbs
50°F	2.5 lbs
40°F	2.75 lbs
30°F	3.0 lbs
10°F	3.25 lbs
-10°F	3.75 lbs

Table 09: 2.5 Coolers on M3 Base R-454A

Minimum Outdoor Ambient	Additional Charge
60°F	2.25 lbs
50°F	2.75 lbs
40°F	3.25 lbs
30°F	3.5 lbs
10°F	3.75 lbs
-10°F	4 lbs

Table 10: Coolers on M5 Base R-454A

Minimum Outdoor Ambient	Additional Charge
60°F	4 lbs
50°F	5 lbs
40°F	5.75 lbs
30°F	6 lbs
10°F	6.75 lbs
-10°F	7 lbs

Table 11: Coolers on M6 Base R-454A

Minimum Outdoor Ambient	Additional Charge
60°F	6 lbs
50°F	7.75 lbs
40°F	8.75 lbs
30°F	9.5 lbs
10°F	10.5 lbs
-10°F	11 lbs

Table 12: Coolers on M7 Base R454A

Minimum Outdoor Ambient	Additional Charge
60°F	7 lbs
50°F	8.75 lbs
40°F	9.75 lbs
30°F	10.5 lbs
10°F	11.5 lbs
-10°F	12.0 lbs

Table 13: Freezers on M1 Base R454C

Minimum Outdoor Ambient	Additional Charge
60°F	2.0 lbs
50°F	2.5 lbs
40°F	3.0 lbs
30°F	3.25 lbs
10°F	3.5 lbs
-10°F	4.0 lbs

Table 14: Freezers on M2 Base R454C

Minimum Outdoor Ambient	Additional Charge
60°F	2.5 lbs
50°F	3.0 lbs
40°F	3.5 lbs
30°F	3.75 lbs
10°F	4.0 lbs
-10°F	4.25 lbs

Table 15: Freezers on M3 Base R-454C

Minimum Outdoor Ambient	Additional Charge
60°F	3 lbs
50°F	3.5 lbs
40°F	3.75 lbs
30°F	4. lbs
10°F	4.25 lbs
-10°F	4.5 lbs

Table 16: Freezers on M5 Base R-454C

Minimum Outdoor Ambient	Additional Charge
60°F	5.25 lbs
50°F	6 lbs
40°F	6.5 lbs
30°F	7 lbs
10°F	7.5 lbs
-10°F	7.75 lbs

Table 17: Freezers on M6 Base R-454C

Minimum Outdoor Ambient	Additional Charge
60°F	8 lbs
50°F	9.5 lbs
40°F	10.25 lbs
30°F	10.75 lbs
10°F	11.5 lbs
-10°F	11.75 lbs

Table 18: Freezers on M7 Base R454C

Minimum Outdoor Ambient	Additional Charge
60°F	9.0 lbs
50°F	10.5 lbs
40°F	11.25 lbs
30°F	11.75 lbs
10°F	12.5 lbs
-10°F	12.75 lbs

Table 19: Coolers on M1 Base R454C

Minimum Outdoor Ambient	Additional Charge
60°F	2.75 lbs
50°F	3.25 lbs
40°F	3.75 lbs
30°F	4 lbs
10°F	4.25 lbs
-10°F	4.5 lbs

Table 20: Coolers on M2 Base R454C

Minimum Outdoor Ambient	Additional Charge
60°F	2.0 lbs
50°F	2.5 lbs
40°F	3.0 lbs
30°F	3.25 lbs
10°F	3.5 lbs
-10°F	3.75 lbs

Table 21: 2.5 Coolers on M3 Base R-454C

Minimum Outdoor Ambient	Additional Charge
60°F	2.25 lbs
50°F	3 lbs
40°F	3.25 lbs
30°F	3.75 lbs
10°F	4 lbs
-10°F	4.25 lbs

Table 21: Coolers on M5 Base R-454C

Minimum Outdoor Ambient	Additional Charge
60°F	4 lbs
50°F	5.25 lbs
40°F	5.75 lbs
30°F	6.25 lbs
10°F	7 lbs
-10°F	7.5 lbs

Table 22: Coolers on M6 Base R-454C

Minimum Outdoor Ambient	Additional Charge
60°F	6.25 lbs
50°F	8 lbs
40°F	9 lbs
30°F	9.75 lbs
10°F	10.75 lbs
-10°F	11.25 lbs

Table 23: Coolers on M7 Base R454C

Minimum Outdoor Ambient	Additional Charge
60°F	7.25 lbs
50°F	9.0 lbs
40°F	10.0 lbs
30°F	10.75 lbs
10°F	11.75 lbs
-10°F	12.25 lbs



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800-477-5253 Norlake Scientific Sales
800-388-5253 Norlake Parts/Service
877-503-5253 Norlake Walk-In Installation

800-647-1284 Master-Bilt Sales
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