

PROCEDURE FOR
LEAK TEST-EVACUATION-CHARGING

LEAK-TEST

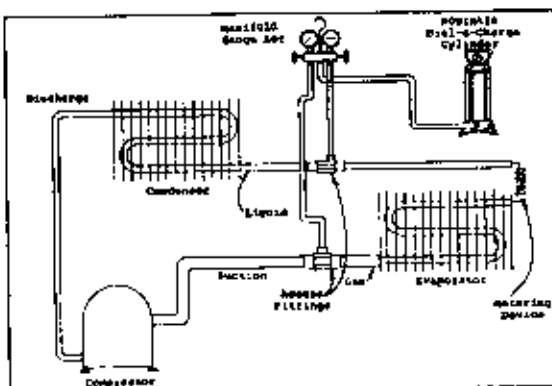
1. Remove gauge port cap from suction and liquid service valve ports and attach Manifold Gauge Hoses.
2. Pressurize the complete system with R-22 until the pressure reaches 40 psig and further pressurize with dry nitrogen to 100 psig. Do not exceed 150 psig.
3. Check all soldered joints, including those on the evaporator coil with an Electronic Leak detector or Halide Torch. If a leak is found which requires soldering, pressure in the system must be bled off since it is impossible to solder with unit pressurized. Be sure all leaks are located and marked before bleeding pressure from circuit.
4. When leaks, if any have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.

EVACUATION

1. Evacuate the system to less than 1000 microns, using a good vacuum pump and an accurate high vacuum gauge. Operate the pump at 1000 microns, or less, for several hours and then allow the system to stand for several additional hours to be sure the vacuum is maintained.
2. An alternate method of removing moisture and noncondensables from the system is:
 - A. Evacuate system to 29 inches vacuum. Break vacuum with refrigerant to be used for final charging of system and vapor charge to 35-50 lbs. gauge pressure. Leave vapor charge in system for a minimum of five minutes. Reduce pressure to zero gauge pressure.
 - B. Repeat step A.
 - C. Evacuate system to 29 inches vacuum. Charge system with the specified kind and quantity of refrigerant.

NOTE: At no time use the compressor to evacuate the system or any part of it.

3. Disconnect charging line at vacuum pump and connect to refrigerant supply. (Dial A Charge Cylinder) crack valve and purge charging line at center on manifold. Then close valve.
4. The system is now ready for the correct operating charge of Refrigerant 22.



CHARGING

1. SINGLE PACKAGE UNITS - Refer to the unit serial plate for the full operating charge.
 2. SPLIT SYSTEMS - The outdoor unit factory charge is shown on the unit serial plate. The total system charge required to re-charge the system after service repairs should be marked on the serial plate under TOTAL R-22 CHARGE. This is normally marked by the installer and is determined from the R-22 System Charge Table located on the inside of the outdoor unit access panel. There are also three System Charge Tables contained in this procedure, one for split system air conditioning and two for split system heat pumps. Use the appropriate table based upon indoor and outdoor unit model numbers.
 3. CTO ADAPTER KITS - When using CTO adapters and field tubing, use the procedure outlined in approximately the middle of each of the System Charge Tables. This determines the correct ounces of R-22 for the tubing only.
 4. FILTER-DRIER CHARGES - If a liquid line filter-drier is used, either in conjunction with field tubing and a CTO adapter kit, or as part of procedure for system clean-up after a compressor burn-out, additional R-22 must be added to the system when recharging. This is in addition to the amount determined from the R-22 System Charge Table.
- | PART NO. | MODEL NO. | OZ'S OF R-22 |
|----------|-----------|--------------|
| 5201-001 | C-083S | 8 |
| 5201-002 | C-163S | 10 |
| 5201-009 | BFK-083S | 7 |
| 5201-010 | BFK-163S | 13 |
5. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder valve and allow pressure in circuit to balance pressure of cylinder.
 6. To obtain full rated capacity the R-22 refrigerant must be accurately weighed to the system using a charging cylinder.
 - (a) Check the charge against the allowable head pressure as shown in the head pressure chart and correct if needed.
 7. Close refrigerant cylinder valve and allow unit to run for 30 minutes. Refer to Start-Up Procedure and Check List for further start-up details.

SCT-1
R-22 TOTAL SYSTEM CHARGE FOR
SPLIT HEAT PUMP SYSTEMS

The following table lists the total system operating charge for split heat pump systems when using standard charged tubing lengths of 15 ft, 25 ft, 35 ft, or 45 ft. The values shown are the total amount of refrigerant received in the precharged system components, which include the outdoor unit, indoor unit, and inter-connecting tubing. This is also the amount of refrigerant required for a system recharge following any refrigeration system repairs.

Find the outdoor section and matching indoor section being used, and follow across horizontally to the correct column based on number of feet of inter-connecting tubing. This value is the TOTAL SYSTEM CHARGE.

Outdoor Unit Model	Indoor Unit Model	Outdoor Unit Basic Charge	Total System Charge For Standard Tubing Lengths			
			15 ft	25 ft	35 ft	45 ft
18HPQ1	B18EHQ	3# 8 oz	3# 14 oz	4# 2 oz	4# 6 oz	4# 10 oz
24HPQ1	B24EHQ	2# 15 oz	3# 5 oz	3# 9 oz	3# 13 oz	4# 1 oz
	H24QS	2# 15 oz	3# 5 oz	3# 9 oz	3# 13 oz	4# 1 oz
30HPQ3	B36EHQ	4# 3 oz	4# 10 oz	4# 14 oz	5# 9 oz	5# 15 oz
	H3AQ	4# 3 oz	4# 12 oz	5# 0 oz	5# 11 oz	6# 1 oz
36HPQ3	B36EHQ	5# 4 oz	5# 11 oz	5# 15 oz	6# 10 oz	7# 0 oz
	H3AQ	5# 4 oz	5# 13 oz	6# 1 oz	6# 12 oz	7# 2 oz

In the event that the installer is running his own tubing or is modifying a precharged tubing set by adding or subtracting a few feet of tubing length, the tubing set should be evacuated and charged before being connected to the outdoor and indoor sections.

To determine LINE SET ONLY charges, use the following table:

Liquid Line Size	Oz of R-22 per ft.	Less
1/4" O.D.	x .4	- 7 oz
3/8" O.D.	x .6	- 7 oz

Example: A 32 ft. line set with 3/8" liquid line is being used.

$$32 \text{ ft.} \times .6 \text{ oz/ft} = 19.2 \text{ oz} - 7 \text{ oz} = 12.2 \text{ oz}$$

After evacuating the line set, weigh in 12 oz of R-22 to line set.
Note: The 12 oz should be introduced into both the liquid line and vapor line so that there is a positive pressure in both lines when connected.

To determine a TOTAL SYSTEM CHARGE for a system that is connected with a non-standard tubing length, the outdoor unit basic charge (from above table) is added to the line set calculation based on liquid line O.D. size (.4 oz per ft of 1/4" and .6 oz per ft of 3/8"). An additional adjustment factor may be required depending on the indoor coil section used. Determine this adjustment from the following chart:

B18EHQ	
B24EHQ	0
H24QS	0
B36EHQ	+1
H3AQ	+3

IMPORTANT NOTE: All these models use 1/4" O.D. liquid lines up to and including 25 ft. Anything over 25 ft. should be 3/8" O.D. The precharged tubing sets are supplied accordingly.

Example: Model 36HPQ3 matched with model B36EHQ and connected by a 28 ft line set.

$$\text{Basic charge } 5\# 4 \text{ oz plus } .6 \times 28 \text{ ft plus } 1 \text{ oz adjustment factor} \\ 5\# 4 \text{ oz plus } 16.8 \text{ oz}^* \text{ plus } 1 \text{ oz} = 6\# 6 \text{ oz total}$$

*Round off to nearest whole number

SCT-2-1
R-22 TOTAL SYSTEM CHARGE FOR
SPLIT HEAT PUMP SYSTEMS

The following table lists the total system operating charge for split heat pump systems when using standard charged tubing lengths of 15 ft, 25 ft, 35 ft, or 45 ft. The values shown are the total amount of refrigerant received in the precharged system components, which include the outdoor unit, indoor unit, and inter-connecting tubing. This is also the amount of refrigerant required for a system recharge following any refrigeration system repairs.

Find the outdoor section and matching indoor section being used, and follow across horizontally to the correct column based on number of feet of inter-connecting tubing. This value is the TOTAL SYSTEM CHARGE.

Outdoor Unit Model	Indoor Unit Model	Outdoor Unit Basic Charge	Total System Charge For Standard Tubing Lengths			
			15 ft	25 ft	35 ft	45 ft
42HPQ	B48EQ	5# 6 oz	6# 15 oz	7# 5 oz	7# 11 oz	8# 1 oz
	H5AQ	5# 6 oz	6# 15 oz	7# 5 oz	7# 11 oz	8# 1 oz
48HPQ2	B48EQ	5# 12 oz	7# 5 oz	7# 11 oz	8# 1 oz	8# 7 oz
	H5AQ	5# 12 oz	7# 5 oz	7# 11 oz	8# 1 oz	8# 7 oz
60HPQ3	B60EQ	7# 14 oz	9# 7 oz	9# 13 oz	10# 3 oz	10# 9 oz
	H5AQ	7# 14 oz	9# 7 oz	9# 13 oz	10# 3 oz	10# 9 oz

In the event that the installer is running his own tubing or is modifying a precharged tubing set by adding or subtracting a few feet of tubing length, the tubing set should be evacuated and charged before being connected to the outdoor and indoor sections.

To determine LINE SET ONLY charges, use the following formula:

Length of 3/8" liquid line in feet x .6 -7 oz.

Example: A 32 ft. line set with 3/8" liquid line is being used.

$$32 \text{ ft.} \times .6 \text{ oz/ft} = 19.2 \text{ oz} - 7 \text{ oz} = 12.2 \text{ oz}$$

After evacuating the line set, weigh in 12 oz of R-22 to line set.
NOTE: The 12 oz should be introduced into both the liquid line and vapor line so that there is a positive pressure in both lines when connected.

To determine a TOTAL SYSTEM CHARGE for a system that is connected with a non-standard tubing length, the outdoor unit basic charge (from above table) is added to the line set calculation based on liquid line length. An additional adjustment factor may be required depending on the indoor coil section used. Determine this adjustment from the following chart:

Indoor Unit Model	Adjustment Factor
B48EQ	+16
H5AQ	+16
B60EQ	+16

Example: Model 48HPQ2 matched with Model B48EQ and connected by a 38 ft. line set.

Basic charge 5# 12 oz plus .6 x 38 ft plus 16 oz adjustment factor
5# 12 oz plus 22.8 oz* plus 16 oz = 8# 3 oz total

*Round off to nearest whole number

SCT-3-1
R-22 TOTAL SYSTEM CHARGE FOR
SPLIT AIR CONDITIONING SYSTEMS

The following table lists the total system operating charge for split air conditioning systems when using standard charged tubing lengths of 15 ft., 25 ft., 35 ft., or 45 ft. The values shown are the total amount of refrigerant received in the precharged system components, which include the outdoor unit, indoor unit, and inter-connecting tubing. This is also the amount of refrigerant required for a system recharge following any refrigeration system repairs.

Find the outdoor section and matching indoor section being used, and follow across horizontally to the correct column based on number of feet of inter-connecting tubing. This value is the TOTAL SYSTEM CHARGE.

Outdoor Unit Model	Indoor Unit Model	Outdoor Unit Basic Charge	Total System Charge For Standard Tubing Lengths			
			15 ft.	25 ft.	35 ft.	45 ft.
18ECQ1	18QB3	1# 7 oz	1# 15 oz	2# 3 oz	2# 7 oz	2# 11 oz
	B18EQ1	1# 7 oz	1# 13 oz	2# 1 oz	2# 5 oz	2# 9 oz
24ECQ1	24QS	2# 1 oz	2# 5 oz	2# 9 oz	2# 13 oz	3# 1 oz
	2ACQ	2# 1 oz	2# 3 oz	2# 7 oz	2# 11 oz	2# 15 oz
	B24EQ1	2# 1 oz	2# 4 oz	2# 8 oz	2# 12 oz	3# 0 oz
30ECQ2	3ACQ3	2# 12 oz	3# 0 oz	3# 4 oz	3# 15 oz	4# 5 oz
	3HCQ	2# 12 oz	3# 2 oz	3# 6 oz	4# 1 oz	4# 7 oz
	B36EQQ	2# 12 oz	3# 3 oz	3# 7 oz	4# 2 oz	4# 8 oz
31ECQ	3ACQ3	3# 2 oz	3# 6 oz	3# 10 oz	4# 8 oz	4# 11 oz
	3HCQ	3# 2 oz	3# 8 oz	3# 12 oz	4# 7 oz	4# 13 oz
	B36EQQ	3# 2 oz	3# 9 oz	3# 13 oz	4# 8 oz	4# 14 oz
36ECQ4	3ACQ3	3# 1 oz	3# 5 oz	3# 9 oz	4# 4 oz	4# 10 oz
	3HCQ	3# 1 oz	3# 7 oz	3# 11 oz	4# 6 oz	4# 12 oz
	B36EQQ	3# 1 oz	3# 8 oz	3# 12 oz	4# 7 oz	4# 13 oz
37ECQ	3ACQ3	3# 6 oz	3# 10 oz	3# 14 oz	4# 9 oz	4# 15 oz
	3HCQ	3# 6 oz	3# 12 oz	4# 0 oz	4# 11 oz	5# 1 oz
	B36EQQ	3# 6 oz	3# 13 oz	4# 1 oz	4# 12 oz	5# 2 oz
42ECQ	4ACQ1	4# 6 oz	4# 15 oz	5# 5 oz	5# 11 oz	6# 1 oz
	4HCQ	4# 6 oz	5# 7 oz	5# 13 oz	6# 3 oz	6# 9 oz
	B48EQQ	4# 6 oz	5# 15 oz	6# 5 oz	6# 11 oz	7# 1 oz
48ECQ1	4ACQ1	4# 11 oz	5# 4 oz	5# 10 oz	6# 0 oz	6# 6 oz
	5ACQ1	4# 11 oz	5# 2 oz	5# 8 oz	5# 14 oz	6# 4 oz
	4HCQ	4# 11 oz	5# 12 oz	6# 2 oz	6# 8 oz	6# 14 oz
	B48EQQ	4# 11 oz	6# 4 oz	6# 10 oz	7# 0 oz	7# 6 oz
60ECQ1	5ACQ1	5# 3 oz	5# 10 oz	6# 0 oz	6# 6 oz	6# 12 oz
	5HCQ	5# 3 oz	5# 14 oz	6# 4 oz	6# 10 oz	7# 0 oz
	B48EQQ	5# 3 oz	7# 1 oz	7# 7 oz	7# 13 oz	8# 3 oz

In the event that the installer is running his own tubing or is modifying a precharged tubing set by adding or subtracting a few feet of tubing length, the tubing set should be evacuated and charged before being connected to the outdoor and indoor sections.

18ECQ1, 24ECQ1, 30ECQ2, 31ECQ, 36ECQ4 and 37ECQ use 1/4" liquid line up to and including 25A. These models use 3/8" liquid line over 25 ft. long, as do all 42ECQ, 48ECQ1 and 60ECQ1 for all tubing sets regardless of length.

To determine LINE SET ONLY charges, use the following table:

Liquid Line Size	Oz of R-22 per Ft.	Less
1/4" O.D.	x .4	- 7 oz
3/8" O.D.	x .6	- 7 oz

Example: A 32 ft. line set with 3/8" liquid line is being used.

$$32 \text{ ft.} \times .6 \text{ oz/ft} = 19.2 \text{ oz} - 7 \text{ oz} = 12.2 \text{ oz}$$

After evacuating the line set, weigh in 12 oz of R-22 to line set.

NOTE: The 12 oz should be introduced into both the liquid line and vapor line so that there is a positive pressure in both lines when connected.

To determine a TOTAL SYSTEM CHARGE for a system that is connected with a non-standard tubing length, the outdoor unit basic charge (from above table) is added to the line set calculation based on liquid line O.D. size (.4 oz per ft of 1/4" and .6 oz per ft of 3/8"). An additional adjustment factor may be required depending on the indoor coil section used. Determine this adjustment from the following charge:

Indoor Unit Model	Adjustment Factor
18QB3	+2
B18EQ1	0
24QS	-2
2ACQ	-4
B24EQ1	-3
3ACQ3	-2
3HCQ	0

Indoor Unit Model	Adjustment Factor
B36EQQ	+1
4ACQ1	0
4HCQ	0
B48EQQ	+16
5ACQ1	0
5HCQ	0

Example: Model 36ECQ4 matched with model 3ACQ3 and connected by a 30 ft line set.

$$\text{Basic charge} - 3\# 1 \text{ oz plus } .6 \times 30 \text{ ft} - 2 \text{ oz adjustment factor} \\ 3\# 1 \text{ oz plus } 18 \text{ oz} - 2 \text{ oz} = 4\# 1 \text{ oz total}$$

*Round off to nearest whole number if calculation does not come out even.