

**Retrofit Application of Commercial R-22 Split Systems with R-410A Products**  
(Does NOT apply to heat pumps. Heat pumps should be changed only as a system)

The purpose of this bulletin is to assist in applying an R-410A air handler or condensing unit to an existing R-22 system.

The preferred practice is to replace the entire system and piping with a new R-410A air handler and condensing unit. Mixing and matching old with new equipment has not been tested, and therefore cannot be certified to any efficiency or capacity. There are cases where it is more economical or practical to replace only the indoor or the outdoor equipment. The guidelines in this document provide necessary information for maximum efficiency when system components are mixed.

**IMPORTANT:**

Johnson Controls Unitary Products has always recommended installing matching certified indoor and outdoor units. With approved matched indoor and outdoor units, that will provide maximum efficiency, optimum performance, and better overall system reliability.

Mix and matching equipment will not automatically void the product warranty if guidelines in this document are followed. However, if the application is determined to be the cause of component failure, JCI reserves the right to void warranty on the product affected.

**HEAT PUMP SPLIT SYSTEMS SHOULD ONLY BE INSTALLED AS A MATCHED SYSTEM.**

Generally accepted refrigeration practices must be followed to ensure a clean, dry system:

- System refrigerant must be removed with a certified recovery machine in accordance with Federal and local standards.
- An acid test should be performed to determine if additional cleanup steps are required.
- Sealed refrigerant systems must be kept clean during all stages of installation.
- De-burr all piping ends to prevent copper shavings from entering the refrigeration system and to ensure unrestricted flow.
- Lightly sand copper ends and fittings with emery cloth.
- ALWAYS run low pressure nitrogen through the system when making braze connections and any time the system is open during installation.
- Use 5% silver content brazing rods for all copper – copper connections.
- Keep all sealed components capped until ready to install.
- Leak check all brazed joints with nitrogen and soap bubbles.
- System evacuation should be completed to 300 microns. Close manifold gauge valves and check pressure rise. If the pressure rises above 500 microns in 1 minute, leak test again. Repair the leak and perform evacuation again. Use of a micron gauge is mandatory, as a manifold gauge cannot be used to accurately measure deep vacuum.
- Evacuation will not readily remove moisture from the POE oil in an R-410A system. Working cleanly and keeping the system closed until connections are made and using oversized filter-driers is the only way of

maintaining a dry system.

- Only virgin or recycled refrigerant should be used.
- **The cleaner and drier the system, the better chance is it has of performing to its fullest and lasting longer without problems.**

#### **CAUTION**

Wear required personal protection equipment to minimize risk of oil and refrigerant coming into contact with skin or eyes.

#### **CAUTION**

Mineral oil is not miscible with R-410A. Mineral oil when used in R-410A systems is pushed through the system as a liquid causing system performance issues. POE oil used in R-410A systems behaves as a solvent and will damage component seals and hoses if not designed for POE oil.

Always use gauges, hoses, connections, filter-driers, valves, etc, designed for use with R-410A refrigerant and POE oil.

### **NEW R-410A AIR HANDLER MATCHED WITH AN EXISTING R-22 CONDENSING UNIT**

#### **INSPECTION**

To perform an effective installation of an R-410A air handler applied with an older R-22 condensing unit, an evaluation of the current piping and installation must be performed. Determine if the piping and installation meets the current recommended methods for split systems. Review the following items and correct any deficiencies prior to installing the new air handler.

- Inspect electrical power supply. Wire size, breakers or fuses, conduit, grounds, and disconnects must be checked for adherence to current code requirements.
- Inspect the duct system for proper sizing, configuration, restrictions, ESP (supply static and return static) filters, registers and grilles. Correct existing airflow problems.
- Correct deficiencies prior to installing new air handler.

#### **INSTALLATION**

- Recover system refrigerant into approved containers in accordance with Federal and local codes.
- Test system oil for acid and ash content. If oil is acidic or there is ash present, the outdoor unit should be replaced.
- Using the JCI or approved piping program, determine if the refrigerant piping is sized and installed correctly. Correct piping issues before making connections to the equipment. Flush lines with RX11 or equivalent prior to making connections to the air handler. Keep condensing unit valves closed during flushing process. **DO NOT FLUSH THROUGH THE CONDENSING UNIT.**
- Keep a low pressure purge of nitrogen flowing through the lines while open and while making all connections or modifications.
- The new R-410A air handler contains R-410A expansion valves. There may also be an R-410A solenoid valve depending on the model of the air handler. JCI uses a distributor-valve assembly in the air handler coil. JCI does not offer a replacement R-22 valve assembly for the R-410A air handlers. A balanced port type adjustable expansion valve must be purchased from a supply house. Size the valve in accordance with the system tonnage of the air handler to be replaced. Some units may have multiple expansion valves i.e., a 10 ton air handler has two 5 ton valves. All valves must be replaced.
- An oxy-acetylene torch should be used to change the valve. Remove the head assembly from the new valve, wrap the body in a wet rag, and braze the valve using 15 – 50% silver rod.
- Install an oversized drier in the liquid line. Check the drier manufacturer's recommendations for sizing with

R-410A for maximum moisture removal.

- Leak test all connections with soap bubbles.
- Evacuate the system to 300 microns or less. Close the manifold gauge valves and monitor for 1 minute. If pressure rises above 500 microns, repair the leak and repeat evacuation process.
- Calculate the unit charge and charge virgin or recycled refrigerant into the liquid line port.
- Operate the system for 30 to 45 minutes before checking the charge. The new TXV may need to be adjusted in order to achieve best system performance.
- Set air handler airflow to job specifications. Units are not shipped from the factory for the specific airflow requirements of the application.
- After 24 hours of system operation, check the liquid line filter-drier for pressure drop or temperature drop. If the pressure drop exceeds 3 psig, or the temperature differential is more than 2 degrees, replace the filter-drier. Check system operation and adjust as necessary.
- Complete a system start up sheet and retain for future reference.

## **INSTALLING AN R-410A CONDENSING UNIT WITH AN EXISTING R-22 AIR HANDLER / COIL**

### **INSPECTION**

To perform an effective installation of an R-410A condensing unit applied with an older R-22 air handler or coil, an evaluation of the current piping and installation must be performed. Review the following items and correct any deficiencies prior to installing the new condenser.

- Inspect electrical power supply. Wire size, breakers or fuses, conduit, grounds, disconnects must be checked for adherence to current code requirements.
- Inspect the duct system for proper sizing, configuration, restrictions, ESP, supply static, return static, filters, registers and grilles. Correct existing airflow problems.
- Using the JCI or approved piping program, determine if the refrigerant piping is sized and installed correctly. Correct any piping issues before making connections to equipment.
- Determine if the unit requires a new pad or stand.
- Check the condition of the evaporator coil. It must be clean with no airflow restrictions.
- The drain pan must be solid, with no rust or holes. The condensate line must be trapped properly.
- Verify the condition of TXV, which must be replaced with an R-410A valve. Note size of connections and size of valve. The replacement valve should be a balanced port type R-410A TXV sized to the system capacity. A unit may have multiple valves depending on capacity.
- R-410A outdoor units cannot be used to pump down system refrigerant, as scroll compressors may be damaged operating below 20 psig suction pressure. Use solenoid valves for capacity reduction only if the coil circuiting allows.
- Verify the condition of drain pan and drain piping.
- Check the condition of the blower, motor, belts and bearings. Verify that the blower is clean and moving the proper amount of air.
- Check airflow of the air handler for cfm required for new unit.
- All residual mineral oil must be purged. Oil can often times be found in piping traps, low piping runs and in the evaporator where it will be difficult to remove.

### **INSTALLATION**

With all deficiencies in the original installation corrected, the new condensing unit may be installed.

- Recover refrigerant according to Federal and local codes. All piping changes should be complete at this point.
- Perform an acid test on the oil. If oil is acidic, a suction line filter-drier is required.
- Remove old TXV(s) and solenoids from the existing air handler / coil.
- Remove old filter-driers.

- With valves, solenoids, and filter-driers removed, flush evaporator coil and lines with RX11 flush, followed by purging with dry nitrogen. Monitor the outflow to verify oil removal. If the evaporator coil is oil logged, drill a hole in a return bend at the lowest point to drain the oil. Either braze over the hole, or install a pressure tap for future oil checks.
- When the system is cleared of mineral oil, install new R-410A TXV(s) and solenoids.
- Set new condensing unit in place and connect the refrigerant piping to the service valves.
- Install new oversized filter-drier(s) in the liquid line. Follow filter-drier manufacturer's recommendations for sizing. If system contained acid, a suction filter-drier is installed at this time.
- Leak test all joints, and repair as necessary.
- Evacuate lines and air handler to 300 microns or less. Valve off and hold for 1 minute. If the vacuum level rises above 500 microns leak test again, and repair as needed.
- Calculate the system refrigerant charge using data from the condensing unit literature. Charge up to 80% of the system charge into the liquid line.
- Open the service valves.
- Start the unit and run for 45 minutes, add remaining charge into the suction line until the system is properly charged with the calculated amount. Check expansion valve operation. Superheat adjustment maybe necessary to achieve optimal system operation.
- Run system for 24–36 hours. Check pressure drop or temperature drop of the liquid line filter-drier. If suction filter-drier was installed, perform a pressure drop check. The maximum allowable pressure drop is 2 psig. Perform an acid test on the oil.
- If acid is still present or if pressure drop is excessive across the filter-drier, replace all filter-driers. Operate system(s) for another 24-36 hours and retest for acidity and pressure drop, repeat if necessary until a negative acid test and no pressure drop across the filter-drier(s) is detected. On the final test with no acid, remove suction line filter-drier from system.
- Perform a final check of the complete system operation and adjust as necessary.
- Complete a system start up sheet and retain for future reference.

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