YORK
BY JOHNSON CONTROLS

Service Information

File In/With: N/A Supersedes SI0045 01-03	SI0045 Rev 1011
Equipment Affected:	YIA & YPC Absorption Chillers
Leak Detection Procedure	

General

The procedures in this document have proven to be a “best practice” when leak checking an absorption unit. It can also be used to leak check a knock-down, field re-assembled unit. Determining if a unit has an air leak is the first and most important step. Use the methods and instructions described in Service Information letter SI-0044, to determine if the chiller has an air leak.

A leak is best located by a "sniff test". This method requires the least amount of operator skill, time, and alertness to locate the leak. Basically, the unit is brought into a positive pressure with nitrogen and a tracer gas. A probe is attached to the inlet of a leak detector. The operator runs the probe over all unit joints. If the leak detector senses the tracer gas then a leak exists at that location.

Required materials

- Spindle adaptor (p/n 922-08869-001)
- Vacuum grease (p/n 011-00901-000)
- 10 mm or 3/8” Allen wrench
- Adjustable wrench
- Clear reinforced vacuum tubing (p/n 028-13535-000 - approx 50’)
- Hose barb (p/n 023-18224-000)
- Hose clamps (p/n 023-08856-000)
- Plastic containers w/lids (enough to hold entire unit charge)
- Nitrogen cylinders with regulator (enough to bring unit within 2 lbs of relief device relieving pressure)
- 15-20 lb, R-22 cylinder with regulator.
- Hoses and fittings to connect gas cylinders to unit
- Electronic Halide Leak detection device, such as the G.E. model H2 electronic leak detector outfitted with hose and sniffer-probe attachment
- Roll of 3-4 mil thick plastic sheeting and good quality duct tape

Work on this equipment should only be done by properly trained personnel who are qualified to work on this type of equipment. Failure to comply with this requirement could expose the worker, the equipment and the building and its inhabitants to the risk of injury or property damage.

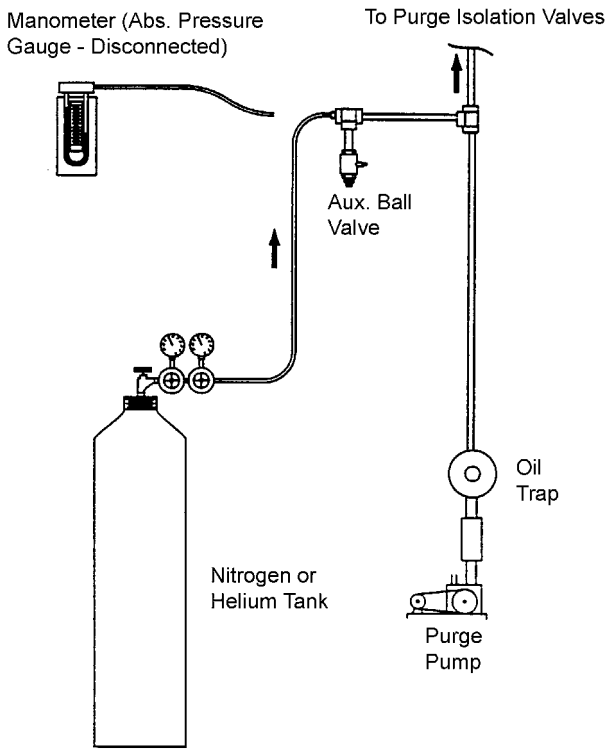
The instructions on this service bulletin are written assuming the individual who will perform this work is a fully trained HVAC & R journeyman or equivalent, certified in refrigerant handling and recovery techniques, and knowledgeable with regard to electrical lock out/tag out procedures. The individual performing this work should be aware of and comply with all Johnson Controls, national, state and local safety and environmental regulations while carrying out this work. Before attempting to work on any equipment, the individual should be thoroughly familiar with the equipment by reading and understanding the associated service literature applicable to the equipment. If you do not have this literature, you may obtain it by contacting a Johnson Controls Service Office.

Should there be any question concerning any aspect of the tasks outlined in this bulletin, please consult a Johnson Controls Service Office prior to attempting the work. Please be aware that this information may be time sensitive and that Johnson Controls reserves the right to revise this information at any time. Be certain you are working with the latest information.

Product Technical Support

Procedure for Locating Large Leaks

1. Stop the unit and allow it to run through a complete dilution cycle.
2. Using the unit disconnect switch, lock out power to the unit.
3. Close all isolation valves on the chilled water, tower water, hot water or steam (if applicable) circuits and open the drain and vent connections on the water boxes to drain the bundles. If the unit is a direct-fired, YPC with the aux heat exchanger installed, drain this heat exchanger as well. Replace all vent and drain plugs after each bundle has been completely drained.
4. Make the necessary connections to the appropriate service valves at the lowest portions of the unit for draining the solution and refrigerant out of the unit. *Do not drain any solution or refrigerant at this time.*
5. Disconnect the mercury manometer from unit.
6. If the unit is equipped with Franklin pumps, be sure to equalize the pressure from the sealed lubed circuit to the chiller. A small Allen-type plug is located on the end bell of each motor for draining the cooling fluid.
7. If unit is fitted with a safety relief device, note the burst pressure.
8. Connect the nitrogen cylinders to the unit's purge piping. This connection point can be at the manometer connection. Refer to diagram below.
9. Slowly introduce nitrogen into the chiller by opening the appropriate valves on the unit's purge piping and nitrogen cylinder. Continue to monitor the unit's internal pressure while introducing the nitrogen into the unit. Several bottles of nitrogen may be needed to bring the internal pressure out of a vacuum. **Do not over pressurize the unit! Keep the unit's internal pressure 3 psig BELOW the disk burst rating.**



Do not over-pressurize vessel.

10. For a more precise leak check, you may remove or peel back insulation at the following areas:

    Single-Stage Unit

    - both ends of the solution heat exchanger,
    - small piping where it connects into larger lines,
    - refrigerant pump isolation valves (if applicable)
    - evaporator spray header piping.

    Two Stage Unit

    - both ends of solution heat exchangers
    - second stage generator inlet and outlet boxes,
    - first stage generator inlet and outlet boxes (refrigerant side and solution side),
    - pump isolation valves,
    - small piping joints where it connects into larger lines,
    - sight glasses.

11. Before removing any solution or refrigerant from the unit, take a minute to walk around the unit while looking underneath for any wet spots or puddles of solution. Pay particular attention to the areas around the solution heat exchanger(s).

12. Open the necessary unit service valves to allow the solution/refrigerant to flow out of the unit and into the plastic containers. Keep the solution separate from the refrigerant in the barrels and mark them appropriately. Keep all containers closed during storage.

13. On single-stage units, open the generator dump valve located at the bottom center of the generator to allow the solution to escape the generator.

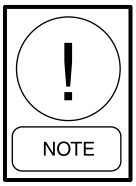
    On two-stage units, solution is removed via a dip tube that is either factory installed (all model steam units and "S" model direct-fired units) or field installed ("G" model direct-fired units). A dip tube for "G" model direct-fired units can be fabricated using a ball valve and a piece of stainless tubing. The stainless tubing should be brazed onto the inside of the valve and then cut to length. The end should be cut at a 45 degree angle to help prevent blockage..

    a. Connect a ball valve or field fabricated dip tube assembly ("G" model direct-fired units) to the dip tube connection. The location of the dip tube connection is described below. All connections are either 1/2" or 3/4" NPT with factory installed cap or plug.

       ►"S" model direct-fired units - side of generator (burner end)
       ►"S" model steam units - generator end opposite steam inlet
       ►"G" model direct-fired units - top of the generator between the generator and main shell, where the generator slopes down. It is also positioned closest to the exhaust end of the unit.
       ►"G" model steam units - top of generator opposite steam inlet next to float box.

    b. Connect a hose from the outlet side of the valve to a storage drum.

    c. With unit pressurized, solution will start to flow out of the dip tube. If the solution does not flow from the machine, it is possible the line is plugged with debris or crystallized solution.

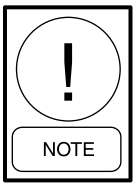


An alternative method would be to pump out the solution with a Teel Pump.

d. Close the valve as needed to change storage containers.

e. Remove valve after leak repair and reinstall plug/cap using the proper thread sealing procedures.

14. Connect the R-22 cylinder to the inlet connection where the nitrogen was introduced into the unit. Add a small trace of R-22 into the unit then close all valves.
15. Prepare the halide leak detector unit for leak checking.
16. Using the plastic and duct tape, cut small portions of plastic and form a "bag" around various components on the unit such as flanges, gasket joints, sight glasses, transducers, high pressure safety cutout device, threaded connections, diaphram valves and other possible locations where leaks may occur. Keep the bags as small and as tight as possbile to the unit or component. Do not use garbage bags for this step.
17. Using the probe on the electronic halide leak detection device, “sniff” all weld joints on the unit. Pay particular attention to areas where different size materials and thicknesses meet. Move the probe at a rate of about 1 inch per second when checking long continuous welds. **Hint**, *if you get a slight response at a weld joint, form a bag using the plastic and duct tape over the joint and allow the R-22 to accumulate in the bag for a period of time. Check the bag after some elapsed time with the probe to determine if the response is stronger.*
18. After sniffing all the weld joints, insert the sniffer probe into any bags to see if R-22 is present.



Make sure the weld joints are "sniffed" first. This will allow enough time for the R-22 to accumulate in the bag if the component is leaking.

19. To check the tube bundles for leaks, open the drain connection on the water box and insert the sniffer probe. If R-22 is present, both water boxes must be removed at each end of the bundle to locate which tube(s) are leaking. Every tube must be plugged at each end and left undisturbed for a while so pressure will build within the tube. If a tube is leaking, it will “pop” the cork on the leaking tube(s). If no cork has "popped", it is possible that a rolled joint between the tube and the endsheet is leaking. In that case each tube roll will have to be checked with the sniffer probe. If you find that a tube rolled joint is leaking, refer to SI0048 for repair procedures.

If the procedures described above fail to locate a leak, or if the R-22 signal is too faint to pinpoint the leak, a different tracer gas may have to be used. Contact YORK factory service for instructions.

Notes for all leak checking:

- For amount of unit charge:
  Single-stage units, refer to YORK Form 155.16-N3, page 43, Table 5.
  Two-stage units, refer to YORK Form 155.17-N1, Appendix page A2.
- All leaks found during the leak check process must be corrected immediately or temporarily coated with vacuum sealant until a more permanent fixed can be done, this will act to isolate the leak. Otherwise, the leak could interfere with the remainder of the leak checking.
- Verify all repaired leaks for air tightness before re-commissioning the unit.

- When repairing a leak, care must be exercised to limit the amount of air entering the system. Never leave the unit open to the atmosphere during leak repair. Refer to York manual 155.17-M3 for all welding and service procedures. If the leak repair will be an extensive time consuming task, a lithium hydroxide wash must be preformed. Refer to York manual 155.00-CH1 for this procedure.
- For unit evacuation, charging and re-startup, refer to the unit service manual.