MAKING CONNECTIONS
Flares and Soldering

TUBE CONNECTION BASICS

Be sure to read and understand this section BEFORE starting to bend your tubing.

Materials Required
- Harris “Stay-Brite #8" solder
- Compatible flux such as Harris “Stay-Clean”
- “Leak-Lock” refrigeration flare sealant (see installation kit)
- 1/4" ID neoprene tube insulation

Tools Required
- Drill with assorted bits and/or hole saws
- Marking pencil
- Tape measure
- Tubing cutter
- Tube flaring tool
- #11 X-acto knife (or similar)
- Assorted wrenches - open end and adjustable

Patience (and extra tubing) is the key to success. Once tubing is bent it "work hardens" and will resist any further manipulation. If tubing is improperly bent or kinked during installation you will be far better off to remove it and start again with new tubing than to try to "make do" with the old piece.

RParts systems are designed to be installed using soldered connections. Soldering is both faster and more reliable then flare and compression connections. A limited number of “flare” connections are maintained to enable the system to be easily connected.

1. Harris Stay-Brite #8 solder should be the only solder used on all connections. DO NOT USE ANY SOLDER WHICH REQUIRES THE USE OF AN ACETYLENE TORCH.
2. Tubing runs should not have any rubber hose or fittings in the middle. If you need to extend your tubing, always solder on a new piece.

Tubing type
All tubing should be clean/dehydrated soft copper refrigeration tubing. If more tubing is needed, it is available directly from RParts or any refrigeration equipment supplier. Do not use copper tubing designed for fuel or water - there is a difference.

Making Connections - Soldered
Soldering connections are the preferred method among experienced refrigeration system installers. Once the technique is developed, soldering is both fast and extremely reliable. If you are not confident in your soldering ability, buy 10 or so extra fittings of various sizes from the hardware store and practice your technique. To ensure good solder connections observe the following recommendations:

1. De-burr the ends of the tubing in the same manner described for flared connections so that refrigerant will flow smoothly through it. Ensure that the mating surfaces are clean and free of oxidation by cleaning them with steel wool before applying flux.

2. To prevent flux from entering the system, always apply flux to the outside of the male half of the connection only - never the female half.

3. Use the proper solder and flux. DO NOT USE HIGH TEMPERATURE BRAZE MATERIALS.* Also, avoid using solder from a plumbing supply store as these alloys are not designed to withstand the operating pressures of your refrigeration system. The recommended solder is manufactured by the Harris Company and is called “Stay-Brite #8". The compatible paste flux for copper to copper connections is called “Stay-Clean”. (JW Harris Company, 800-773-4533, Intl 937-778-8515 or www.jwharris.com) Alternate solders can be used but must contain 2% to 4% silver and/or nickel. These make considerably stronger joints than do common “50/50" and “95/5" solders. Fluxes should be of the non-acid paste type. Do not use liquid acid-based fluxes. (*Exception - Canadian and some European jurisdictions require the use of high temperature braze materials)

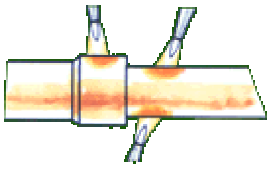
4. All soldering should be done with a propane torch. DO NOT USE ACETYLENE*. Protect surrounding cabinetry and sensitive components from heat damage by covering them with a wet (not just moist) heavy cotton rag. Be sure to cover everything near the joint to be soldered as proper soldering technique requires that the joint be heated all the way around. To protect overhead areas (such as the top of the ice box) place a wet rag behind a piece of sheet metal which can, in turn, then be wedged into place. (*Exception - Canadian and some European jurisdictions require the use of high temperature braze materials)

Soldering Technique

Caution - Do not overheat the joint as too much heat will burn the flux. If the flux burns, the joint must be disassembled and thoroughly cleaned or it will be impossible to solder. The flux itself is a good temperature guide. Heat the tube until the flux passes the "bubbling" temperature range and becomes completely fluid and transparent.

1. Start heating the tube, first applying the flame at a point just adjacent to the fitting. Work the flame alternately around the tube and fitting until both reach soldering temperature (as indicated by the flux becoming clear and fluid) before applying the solder.

2. Move the flame to the fitting and apply solder with a “wiping action” directly on the connection to ensure that it flows evenly into the joint. The molten solder should be spread evenly around the entire fitting. Do not keep adding solder and heat in an attempt to “fill the joint” as this can allow liquid solder to flow into the system. (Indeed, we have seen solenoid valves completely filled with solder by well intended installers trying to ensure a good connection.) A properly soldered joint requires very little solder.



3. Sweep the flame back and forth along the axis of assembled joint...tube and fitting...to achieve uniform heat in both parts.

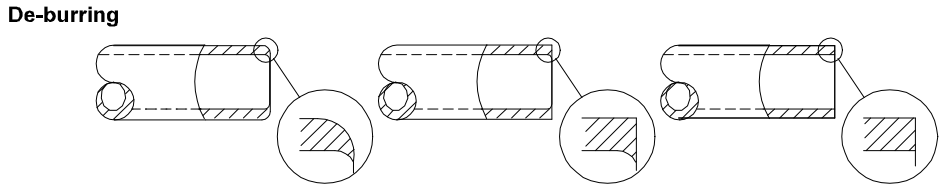
4. After the joint is soldered, with the tube still warm, throughly clean joint of all excess flux using water and a rag.

Making Connections - Flare Fittings

The number of flared tubing connections in your system is intentionally limited by design. Flare connections are far more likely to leak than a properly soldered one. However, the fact remains that the most readily available "after-market" refrigeration components use flare connections rather than solder. Therefore, to ensure that replacements can be readily obtained when traveling, RParts systems use refrigeration industry standard 45^0 flare fittings on the expansion valve(s), and the condensor/compressor assembly. To make a reliable leak-free flare fitting, closely follow the instruction given below.

1. Carefully prepare the cut end of the tubing. Ensure that the end is straight and square with the tube.

2. Use a reamer or #11 X-Acto knife to smoothly remove the burr from the inside and end of the tube. Be extra careful to keep shavings out of the tube.

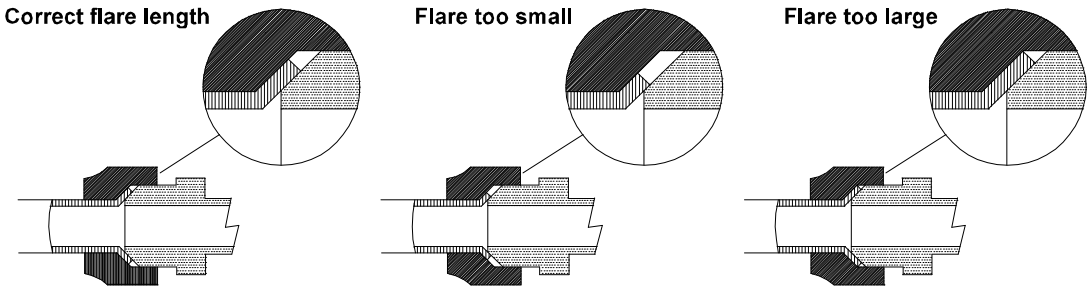


3. Place the flare nut (use refrigeration grade only) on the tube with the open threaded end facing the end to be flared.

4. Observe the die of the 45^0 flaring tool and note the depth of the flare machined into the tool. To ensure the proper size of your finished flare, clamp the die to the tube so that it protrudes beyond the surface of the die 1/3rd farther again than the depth of the machined flare.

5. Couple the flaring spinner to the die and slowly screw it down far enough to just barely complete formation of the flare. *Do not over tighten!*

6. Examine the finished flare closely. It should be even, smooth and polished on the inside with no signs of cracking around the edge. Now slide the nut over the flare to check for sizing. A properly sized flare will easily clear the threads of the nut and will seat securely. A flare which is too small will "pinch-off" when tightened, while one that is too large will leak.



7. Immediately before attaching the flare to the component, apply a small amount of "Leak-Lock" sealant (the blue tube provided in the installation kit) to both sides of the flare. The sealant on the face of the flare will help ensure a leak free connection while that between the back side of the flare and the flare nut itself acts as a lubricant to prevent galling and twisting of the soft copper as the nut is tightened.