EMOND PLUMBING AND HEATING

Installing ACR (Air Conditioning and Refrigeration) piping requires precision to prevent refrigerant leaks and system contamination. The standard procedure involves planning the route, cutting and deburring the copper tubing, joining the pipes via brazing or press-fittings, and pressure-testing the completed lines.

1. Preparation and Cutting

- **Measure and Plan:** Route the piping directly with minimal bends and joints. Allow enough space for maintenance and insulation. Label the piping with apartment number or location at every interval.
- **Couplings:** If couplings are used, they will all be located on the same floor, at the same height for all runs and noted on as-builts.
- **Cut the Pipe:** Use a rotary disc tube cutter to cut the ACR tubing completely square. Do not use hacksaws or sawzalls which can leave metal shavings inside the tubing.
- **Deburr and Clean:** Use a reamer or deburring tool to clear all sharp edges from both the inside and outside of the cut. Clean the outside of the tube ends using fine-grit sandpaper or a cleaning fleece until they are bright and free of oxidation.
- **Open ends:** Do not leave open ends on refrigeration piping. **Use proper caps and keep ends capped at all times**, quick connect style caps can be used multiple times.

2. Joining the Piping

Option A: Brazing (Traditional Method)

- **Flow Nitrogen:** ACR copper requires silver-based brazing alloys. Connect a cylinder of dry nitrogen with a regulator to the line, and maintain a low, steady flow (about 3 to 5 PSI) through the pipe while brazing.

This displaces oxygen and prevents internal oxidation (scale) from forming and damaging the compressor.

- **Braze the Joint:** Heat the fitting and the opposite tube evenly. Once the copper reaches brazing temperature, touch the silver solder rod to the joint; capillary action will pull the melted alloy into the connection.
-

EMOND PLUMBING AND HEATING

- **Cool Slowly:** Let the joint cool naturally. Do not quench it with water, as this can cause the copper to become brittle.

Option B: Press Fittings (Modern Method)

- **Mark Depth:** Use a proprietary ACR press depth gauge or a tape measure to mark the correct insertion depth on the pipe.
- **Insert and Press:** Insert pipe into the press fitting until it hits the depth mark. Using proper HVAC press tool and ACR jaws, secure the jaw at a right angle over the fitting beads and press until the tool cycle is complete.

3. Support, Pressure Testing, and Evacuation

- **Support:** Install copper pipe hangers or brackets at regular intervals (every 6 to 10 feet depending on pipe diameter) to prevent sagging and vibration.
- **Pressure Test:** Seal the system and charge it with dry nitrogen to roughly 150-200 PSI to check for major leaks, then ramp it up to 350-400 PSI and hold for 10-15 minutes. Use a soap-and-water bubble solution to check every joint.
- **Evacuate:** Release the nitrogen and pull a deep vacuum (usually below 500 microns) using a vacuum pump and micron gauge to remove all moisture and non-condensables before introducing refrigerant.

Here's Emond's approved sequence:

1. Initial nitrogen purge at 50 PSI — catches major leaks fast without burning through gas.
2. Ramp to 400 PSI, hold 15 minutes — confirms structural integrity under real working stress.
3. Pull vacuum to 400 microns — evacuates moisture and non-condensables completely.

EMOND PLUMBING AND HEATING

The pressure test procedure changes based on the equipment as noted below.

Standard Split Systems & Mini-Splits: Pressurize to 450–550 PSIG with nitrogen and hold for a **minimum of 15 minutes** to ensure the system is leak-free.

Commercial VRV/VRF Systems: Requires a tiered test (150 PSIG for 3 minutes, 325 PSIG for 5 minutes, and finally 550 PSIG) held for **24 hours**.

Remove the suction-side Schrader core before connecting your vacuum pump, then isolate the system once you hit target.

If the vacuum holds without appreciable rise, release the refrigerant charge.

Too large a vacuum pump has downsides. A very high CFM pump on a very small system can sometimes pull a vacuum *too* quickly, potentially not allowing enough time for all the moisture to boil off effectively.

Look for a **two-stage vacuum pump**. The second stage pulls the vacuum deeper than a single-stage pump, which is necessary to remove water vapor effectively.

Reference chart for sizing vacuum pumps.

System Size (Tonnage)	Minimum Recommended CFM	Commonly Used CFM for Speed	Notes
Up to 3 tons	2 CFM	4-6 CFM	Faster evacuation, good for multiple small jobs.
3 to 7.5 tons	4 CFM	6-8 CFM	Good balance for most residential and light commercial.
7.5 to 15 tons	6 CFM	8-10 CFM	Necessary for reasonable evacuation times on larger systems.
Over 15 tons	8-10+ CFM	10-12+ CFM or boosters	Depends heavily on system volume and line set length.