HOW WE INSTALL YOUR NEW SYSTEM

# Our Installation Standards

A new heating and cooling system is a major investment, and how it is installed matters as much as the equipment itself. According to the U.S. EPA's ENERGY STAR® program, improper installation can reduce a system's efficiency by up to 30 percent, raising your utility bills and possibly shortening the equipment's life. Our installation process is built on the principles of the industry's national quality-installation standard (ANSI/ACCA 5 QI) and the manufacturer's installation instructions for your equipment. Below is what our team does on every replacement, and why each step matters to you.

| Up to 30% | More than half | 17–23% |
|---|---|---|
| of a system's efficiency can be lost to improper installation<br>*Source: ENERGY STAR* | of U.S. home HVAC systems are believed to have one or more installation problems<br>*Source: U.S. Dept. of Energy* | more energy used by a heat pump that is 30% low on refrigerant<br>*Source: NIST study, 2014* |

## BEFORE WE START

### 1. Sized and matched for your home, not just copied from the old unit

**What we do:** We look at your home's heating and cooling needs (square footage, insulation, windows, sun exposure, and the existing ductwork) instead of simply matching the size of the old system. We then pair indoor and outdoor components that the manufacturer has rated to work together as a matched system.

**Why it matters:** An oversized system turns on and off too often ("short-cycling"), which wears out parts, wastes energy, and leaves uneven temperatures. An undersized one can't keep up on a 115° Las Vegas afternoon. A matched system is how the efficiency rating on the label is actually achieved.

### 2. Installed to code

**What we do:** We install to the adopted building codes.

**Why it matters:** Code-compliant gas, electrical, and venting work protects your family and your home.

## THE REFRIGERANT SYSTEM: WHERE LONG-TERM RELIABILITY IS WON OR LOST

*Most early compressor failures trace back to dirt, moisture, air, or the wrong amount of refrigerant inside the sealed system. These steps keep them out.*

### 3. Existing refrigerant lines inspected and properly cleaned

**What we do:** We reuse your existing line set and flush it per the manufacturer. It's only replaced if it has a leak.

**Why it matters:** Old lines can hold leftover oil, acid, and debris from the previous system, especially when replacing an older R-22 system. Cleaning them out keeps that contamination from reaching, and damaging, your new compressor.

### 4. Dry nitrogen flowing through the pipes during every braze

**What we do:** Copper joints are brazed (joined with a torch at well over 1,000°F). While we braze, we flow a gentle stream of dry nitrogen through the inside of the pipes, as equipment manufacturers instruct.

**Why it matters:** At brazing heat, oxygen inside the pipe reacts with copper and forms black flaky scale. Today's refrigerant oils act like a solvent and carry those flakes through the system, where they can clog the metering device and filter screens. That starves the system of refrigerant and the compressor of oil, a common cause of early compressor failure. Nitrogen pushes the oxygen out so the scale never forms.

### 5. Nitrogen pressure test for leaks

**What we do:** Before your system is ever charged, we pressurize the new lines and indoor coil with dry nitrogen to the manufacturer's test pressure, hold it, and watch for any drop. Every joint is checked.

**Why it matters:** A leak found now takes minutes to fix. A leak found later means lost refrigerant, a system that cools poorly and costs more to run, and repeat service calls. Nitrogen is dry and inert, so it tests safely without adding moisture.

### 6. Deep vacuum to 500 microns or below, verified with a micron gauge

**What we do:** We connect a vacuum pump and a digital micron gauge and pull the system down to 500 microns or lower, a tiny fraction of normal air pressure. Then we close off the pump and perform a decay (hold) test to confirm the vacuum holds steady.

**Why it matters:** Air and moisture are the enemies of a refrigerant system. Moisture mixes with refrigerant oil to form acids and sludge that attack the compressor's motor and bearings. Air and other non-condensable gases raise operating pressures and temperatures, cutting efficiency and stressing the compressor. The micron gauge is the only way to know the system is truly dry, and the hold test proves there are no leaks or trapped moisture.

### 7. Refrigerant charge set by measurement, not guesswork

**What we do:** We set the refrigerant charge exactly as the manufacturer's installation instructions require for your equipment, accounting for the length of your refrigerant lines. Some manufacturers require the charge to be weighed in with a precision scale; others call for verifying it after startup by measuring superheat or subcooling.

**Why it matters:** Too little or too much refrigerant lowers efficiency and capacity and can overheat or flood the compressor. In a federal NIST study, a 30% undercharge increased energy use 17–23% and a 30% overcharge increased it 10–16%.

### The three steps that protect your compressor

**Flowing nitrogen while brazing** keeps scale out of the system.

**Nitrogen pressure test** proves the system is leak-free before refrigerant goes in.

**Deep vacuum to 500 microns or below, plus a hold test,** removes the moisture and air that destroy compressors from the inside.

They take extra time and specialized tools, so they are often skipped. We do all three on every system we install.

## AIRFLOW AND DUCTWORK

### 8. Airflow and static pressure check

**What we do:** We measure the system's static pressure (think of it as the "blood pressure" of your duct system), set the blower speed to the airflow the manufacturer requires, and confirm the system is heating and cooling the air as it should.

**Why it matters:** Too little airflow can freeze the indoor coil, reduce cooling, overheat a furnace, and shorten blower motor life. Correct airflow is what delivers the comfort and efficiency you paid for.

### 9. Sealed connections between the equipment and your ducts

**What we do:** Where the new equipment connects to your ductwork (plenums, transitions, and the return), we seal the joints with both duct mastic and foil tape.

**Why it matters:** Leaks at the equipment can pull hot, dusty attic or garage air into your home and waste cooled air. The NIST study found duct leakage to be the single largest energy penalty among the installation faults it studied, and ENERGY STAR notes that sealing ducts can improve efficiency by as much as 20 percent.

## WATER, POWER, AND MOUNTING

### 10. Level, secure equipment with proper clearances

**What we do:** The outdoor unit is set level on a solid pad or stand and secured. Indoor equipment is properly supported, and we keep the manufacturer's required clearances for airflow and future service.

**Why it matters:** A level unit drains and returns oil properly and runs with less vibration and noise. Proper clearance lets the outdoor unit breathe in our desert heat and keeps it easy to service.

### 11. Condensate drain and overflow safety switch

**What we do:** We install a properly sloped and trapped condensate drain line, plus a float safety switch on every install that shuts the system off if the drain ever clogs. A secondary drain pan is available as an optional add-on for extra protection.

**Why it matters:** In many Las Vegas homes the indoor unit sits in the attic or above a ceiling. A clogged drain without a safety switch can overflow and damage drywall, insulation, and belongings. Building codes require overflow protection for this reason.

### 12. Safe, code-compliant electrical connections

**What we do:** We install a properly rated disconnect within sight of the outdoor unit, sized to the breaker or fuse rating on the equipment nameplate, tighten and check all connections, and verify voltage. On inverter (variable-speed) systems, we also install surge protection to help guard the system's electronics.

**Why it matters:** Correctly sized overcurrent protection protects the compressor and wiring, and the disconnect lets the system be serviced safely. Inverter systems rely on sophisticated electronics that are especially sensitive to power surges.

## GAS FURNACES: GAS AND VENTING SAFETY

### 13. Gas supply, burner, and venting checks

**What we do:** When your system includes a gas furnace, we leak-test the gas connection, verify gas pressure and firing rate match the nameplate, confirm the temperature rise is within the manufacturer's range, inspect the venting for correct size, slope, and termination, and confirm all safety controls work.

**Why it matters:** These checks protect your family from carbon monoxide and fire hazards, make sure the furnace burns fuel efficiently, and prevent overheating that can crack a heat exchanger and shorten the furnace's life.

## FINISHING THE JOB

### 14. Clean-up and responsible removal

**What we do:** Refrigerant from the old system is recovered as federal EPA rules require. We remove the old equipment and clean up the work areas before we leave.

**Why it matters:** You get your home back the way you left it, and the old refrigerant never vents into the atmosphere.

### 15. Startup checkout and homeowner walkthrough

**What we do:** We test the system in every mode, set up the thermostat, and walk you through how to operate it, which filter it takes and how often to change it, and what routine maintenance keeps it running at its best.

**Why it matters:** A system you understand is one that gets the right care, and you'll know exactly what normal operation looks and sounds like.

### 16. Warranty registration

**What we do:** We register your new equipment with the manufacturer and provide you with your model and serial numbers and warranty information.

**Why it matters:** Many manufacturers require registration within a set time after installation to provide their full parts warranty. Registering promptly helps you keep the full coverage you're entitled to.

**Questions about how your system will be installed?**

Ask your comfort advisor or call us at **702-635-9505** • www.32degreeslv.com

*Specific procedures, test pressures, and target readings follow the manufacturer's installation instructions for the equipment installed; where those instructions are stricter, we follow them. References: ANSI/ACCA 5 QI-2015 HVAC Quality Installation Specification; ENERGY STAR, "Heat & Cool Efficiently"; U.S. Department of Energy, Building America; NIST Technical Note 1848, "Sensitivity Analysis of Installation Faults on Heat Pump Performance" (2014); manufacturer installation instructions; International Residential Code M1411.*