CHOOSE THE RIGHT HVAC

EQUIPMENT TO KEEP YOU COOL

www.sgvenergywise.org

Replacing your A/C system REQUIRES a permit from your city - it’s important.

WHY? Because A/C (air conditioning) is a SYSTEM, not just one piece of equipment. The thermostat, the ducts, the efficiency of the equipment all work together & must be installed correctly to get the benefit you pay for.

GET IT TESTED!

Mistakes happen, things are forgotten. A HERS (Home Energy Rating System) or BPI (Building Performance Inspection) test insures the job gets done right.

Today’s A/C systems include:

• High efficiency filters for better air quality
• Variable speed motors for better efficiency
• A SEER (Seasonal Energy Efficiency Ratio) of 14 or higher
• Mechanically attached ducts to eliminate leaks
• Quieter operation than earlier models

MAINTAIN your A/C system (even old ones)

• Replace filters at least twice a year
• Inspect the condensate drain
• Feel for cold-air leaks where the ducts enter or leave the forced-air unit (furnace)
• Have an A/C technician test your system annually

* The topic of HVAC= Heating, Ventilation, & Air Conditioning is vast. For the purpose of this handout, the main focus is A/C (air conditioning). Both terms are commonly interchangeable in this industry.
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Cooling and heating together could use more than half of the energy in a typical home in our valley.

To save money before installing a new A/C system:
- Add shade to south & west walls
- Seal gaps & cracks around doors, windows & electrical outlets
- Add film to old windows or replace with new ones
- Install additional insulation

By doing these first, your new A/C system can be “right sized” to make your home more energy efficient without paying for a larger system.

For the most efficient system:
- Shade the outdoor condensing unit
- Replace old ducts (they are probably filled with dust)
- Improve the air filters by buying the best air filter for your unit, not the cheapest

Use natural ventilation
- Whole house fan
- Ceiling fans

SIZE MATTERS. More is not always better. If you install a system that is too powerful, your home will be less comfortable. The system will cycle off and on in short bursts and won’t run long enough to reduce the indoor humidity to a comfortable level. High performance and “right-sized” HVAC equipment can reduce energy costs by 20-40% with a relatively short pay back. In fact, a home with good insulation, windows, and a cool roof, may need an even smaller A/C unit.
What are the PARTS of A/C for cooling?

**Thermostat:** Senses the temperature and tells the air handler and the condenser when to turn on and off.

**Air Ducts:** Deliver air throughout the home.

**Air Grille (also known as a Register):** Allows cooled air into the room.

**Furnace/Air Handler:** This is the fan that moves the air throughout the duct system. These are installed in closets, garages, or attics.

**Condenser/Compressor:** A motor that removes heat from indoor air. These are installed outside the home (also known as an outdoor unit).

**DID YOU KNOW?** Your A/C system comes as a split system, as shown above, or as a packaged system (all-in-one).

What is SEER?

**SEER** (Seasonal Energy Efficiency Ratio) is a measurement of efficiency for A/C units. The more efficient the system, the less expensive it is to operate throughout the year.

When shopping for Central A/C or Heat Pump, look for the manufacturer (SEER) rating for efficiency. SEER ratings between 14 and 18 are ideal. The minimum required by the California Energy Code is SEER 14. Also look for **two speed** compressors and motors. They save energy because of their ability to supply only what is needed. Variable speed compressors and motors are the next level in savings.
What is the difference between CENTRAL AIR and HEAT PUMP?

CENTRAL A/C: Uses a refrigerant that circulates between the condenser and the coils at the furnace. As air returns from the various rooms it passes over the coils, heat and moisture are removed, and then the fan (furnace) pushes the cool air back through ducts to deliver it to the rooms. In a “split system,” the furnace contains the fan and the cooling coils.

HEAT PUMP: Heat pumps also use a refrigerant, but the system is designed to either remove or add heat from the circulating air as it passes over the coils. In a sense refrigerant flows one way to cool and reverses direction to heat; the refrigerant either accepts heat or discharges heat. There is no gas-fired furnace in a heat pump system.

What System Do I Have?

**EITHER A SPLIT SYSTEM**

- CENTRAL A/C System
- Heat Pump System

**CENTRAL A/C & FURNACE**

**HEAT PUMP & AIR HANDLER**

**OR A PACKAGE SYSTEM**

- Central A/C System
- Heat Pump System

**CENTRAL A/C + FURNACE**

**HEAT PUMP + AIR HANDLER**

What improvements do you need to make?

ALTERATION - Existing A/C units sometimes need improvements. By replacing or upgrading components, it helps the system be more efficient and perform better.

ADDITION - If you add a new A/C unit because you have enlarged your home or are replacing an existing A/C unit and air ducts, the permitting requirements are more involved.

Additional Info:
To start your project you will need to complete **HERS form CF2R-MCH-01-H Certificate of Compliance**.

When your project is finished, your Contractor will need to complete **HERS form CF1R-ALT-02-E Certificate of Installation**, as an overview of all the work that has been done.

There are additional forms required for specific tests. The following two pages give an overview of those forms that may be required to complete your project.

**HERS (Home Energy Rating System) is an analysis of a home’s energy efficiency.** It uses tests such as the blower door test and the duct leakage test to measure the amount and location of air leaks in the home and any existing/potential combustion safety issues.

Each of these tests is important, so they each require two reports. One is the Certificate of Installation (**forms beginning with CF2R**) done by your Contractor. The other is the Field Verification (**forms beginning with CF3R**) done by a registered HERS Rater.

An improperly installed A/C can make a SEER 14 system work like a SEER 10 or worse! There goes all of your energy and money savings.

**Know the forms required for starting and finishing your project**

To start your project you will need to complete **HERS form CF2R-MCH-01-H Certificate of Compliance**.

When your project is finished, your Contractor will need to complete **HERS form CF1R-ALT-02-E Certificate of Installation**, as an overview of all the work that has been done.

There are additional forms required for specific tests. The following two pages give an overview of those forms that may be required to complete your project.

**HVAC Equipment is only as good as its efficiency and proper installation. The Energy Code realizes the importance of well installed units: that’s why it requires HERS testing to correct any mistakes before the system is operational.**
FOR ALTERATIONS

When replacing a split or packaged system, the Energy Code requires the following:

1. **Setback Thermostat**: A programmable thermostat that adjusts the temperature at different times of the day.

2. **Duct Sealing and Testing**: Diagnostic tool to measure the airtightness of the air ducts. Also important for air quality.
   - HERS form CF2R-MCH-20: Duct Leakage Test (installation)
   - HERS form CF3R-MCH-20: Duct Leakage Test (verification)

3. **Refrigerant Charge Measurement**: Measures the actual amount of refrigerant (fluid which absorbs and transfers heat) in the system. Too much or too little reduces efficiency.
   - HERS form CF2R-MCH-25: Refrigerant Charge Verification (installation)
   - HERS form CF3R-MCH-25: Refrigerant Charge Verification (verification)
What are the requirements when you...?

• add a new A/C system and air ducts

FOR ADDITIONS

When adding a new system (split or packaged) including all new ducts, the Energy Code requires the following in addition to the requirements for alteration:

4. Duct insulation: Insulation surrounding ducts to minimize energy loss.

5. Cooling Load Calculations: The calculations will determine the quantity of conditioned air and the size of the equipment necessary to maintain your home at a desired temperature.

6. Airflow (fan flow) and fan watt draw: Measures how much electricity the fan within an A/C uses at full power.

HERS form CF2R-MCH-22: Fan Efficacy (installation)
HERS form CF3R-MCH-22: Fan Efficacy (verification)
HERS form CF2R-MCH-23: Airflow Rate (installation)
HERS form CF3R-MCH-23: Airflow Rate (verification)
What should YOU do when replacing a HVAC System?

• Evaluate the type of HVAC system you have.
• Select the right contractor – one who knows your A/C system and understands Energy Code requirements and all HERS tests.
• Submit Certificates, Application and Plans as a part of getting a permit from your local building department.
• Schedule inspections with your local building inspector to review paperwork including certificates and work completed. Inspections may include pre-inspection, tests, and final inspection.

A/C Energy Saving Checklist

The best combination of A/C equipment includes:

• A good building envelope (the shell of the home, designed to keep heat out).
• Smaller, but still comfortable, condensing units (“right-sized” after checking the building envelope).
• A higher SEER rated system.
• Two speed compressor and motors (so that only on the hottest days will the more energy consuming stage be used).
• A properly installed and (HERS) tested system.

This will ensure the entire home is cool and you receive the most energy and money savings.
Building Department Checklist  
Plans, Permit, and Inspection

For PLANS and PERMIT  
TO OBTAIN a PERMIT, submit:

1. Building Permit Application and Fees.
2. Initial project registration Certificate of Compliance Form CF1R-ALT-02-E or Form CF1R-ALT-03-E or Form CF1R-ALT-04-E.
3. Cooling Load Calculations.

For CLOSEOUT  
TO COMPLETE THE PROJECT:

1. Schedule inspections with the City.
2. Complete ALL applicable Certificates of Installation and Field Verification forms. During the final inspection, make all forms, product information and labels available to the Inspector, including HERS form CF2R-MCH-01-H for ducts and fans.

Visit your local Building and Planning Department for very helpful information including specific requirements for permit submittal and approvals. Design approval submittal may be required.
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Check out other improvement ideas...

Windows
Cool Roof
Kitchen
Addition

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