Attached Garages

Air Seal to Keep Car Exhaust and Fumes Out of the House

Touchstone Energy® Cooperatives

SKILL SET

Be sure you have the experience needed for these maintenance tasks. If you are in doubt, hire a contractor.

SAFETY

These upgrade tasks may require working in tight clearances and under task lighting. Exercise common sense when working on a ladder.

TOOLS

Utility knife, drywall saw/zip saw for cutting drywall

MATERIALS

Rigid foam board, caulk, spray foam sealant

COST BENEFIT

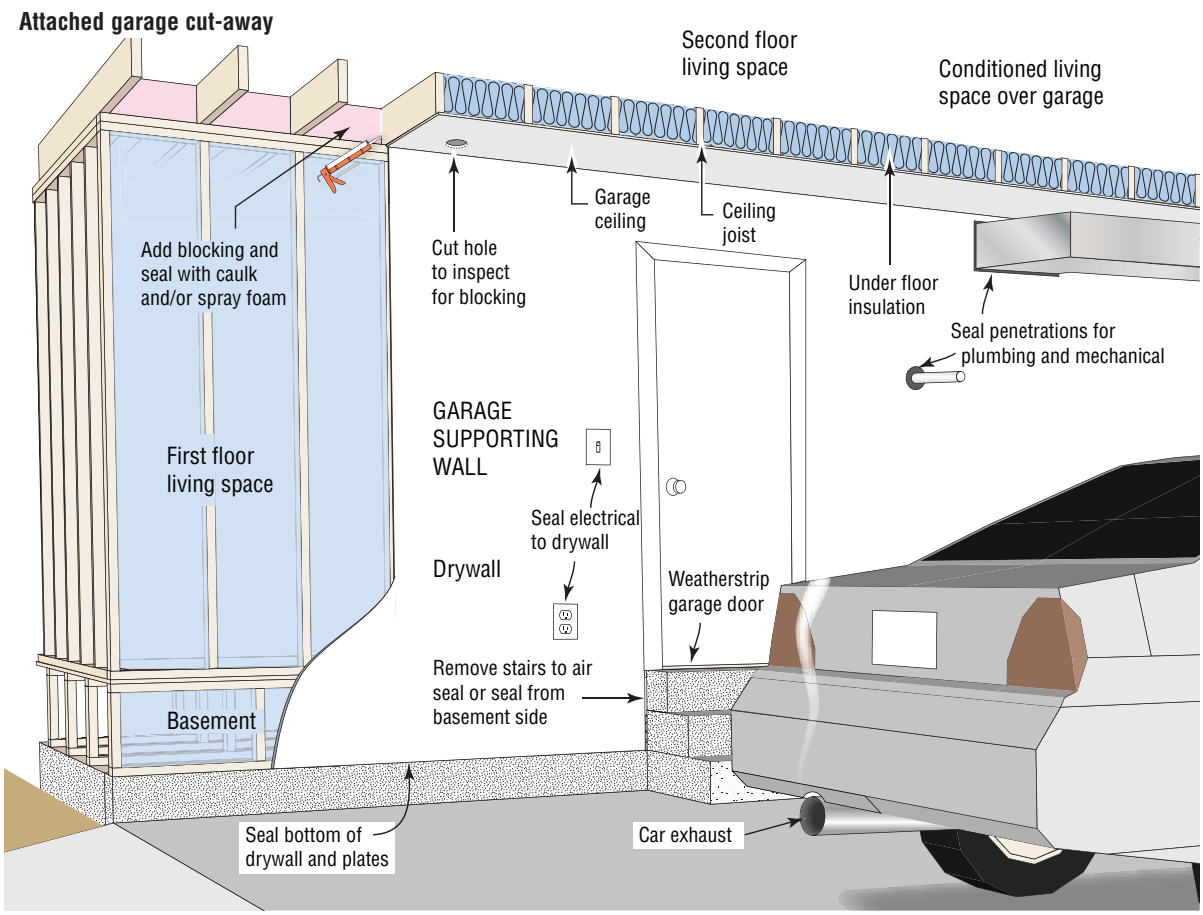
Increased energy savings and improved comfort and indoor air quality

PRIORITY LEVEL

LOW MED HIGH

SKILL LEVEL

DIY PRO



Air sealing garage penetrations can present a challenge. Easy tasks involve caulking obvious penetrations such as electrical outlets, the drywall perimeter and bottom plates of the foundation. More difficult tasks involve cutting away ceiling drywall in the garage to check for and provide blocking between the garage and the floor system adjacent to the garage.

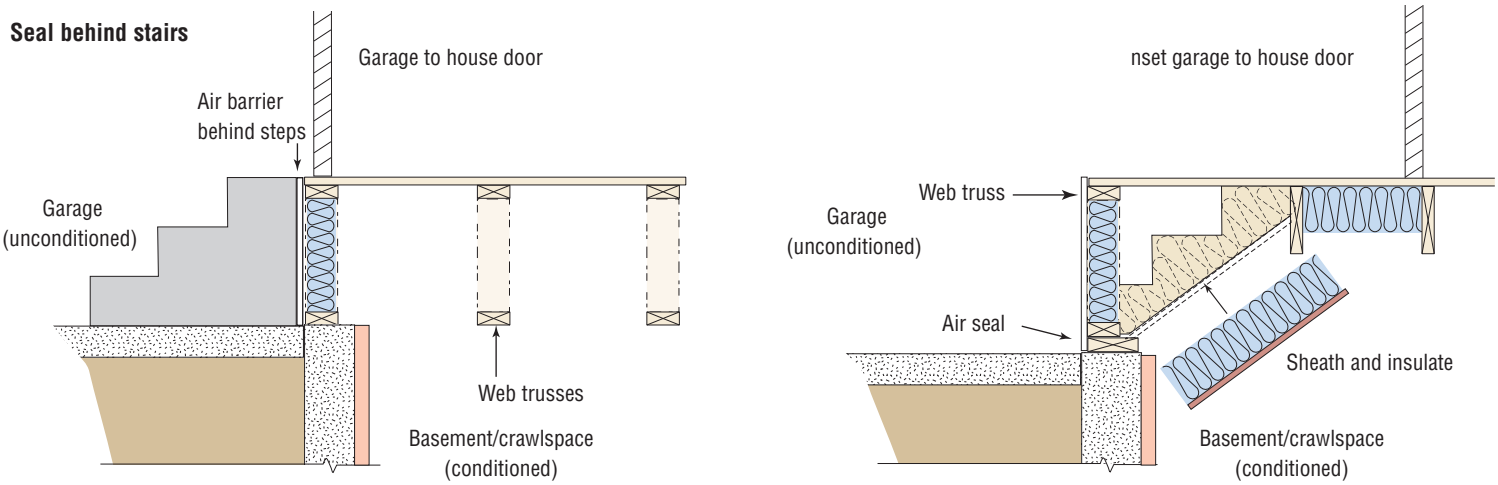
Attached Garages

Many homes feature an attached garage which is usually adjacent to a conditioned living space and may have living space above it. While certainly a convenience, an attached garage often has poor insulation and air sealing details that lead to energy waste and comfort issues for the entire home, and can even lead to health and safety hazards for the occupants. The home's thermal enclosure should always be designed to exclude an attached garage since vehicles can be significant sources of carbon monoxide (CO). Also, items commonly stored in garages such as gasoline-powered appliances, paints and stains, pesticides and fertilizers can contaminate a home. HVAC units and ductwork located in a garage should be carefully sealed to prevent drawing these contaminants into the house.

Air Sealing Attached Garages

Air sealing the conditioned area walls adjacent to an attached garage is an important first step. Start by using caulk or spray foam to seal penetrations such as for electrical and plumbing. Since many garage slabs are at a lower elevation than the connected home, carefully seal the bottom portion of any drywall that abuts conditioned space. If the garage slab is on the same level as the house, focus on the wood bottom plate connection to the slab. If the garage drywall has baseboard consider removing it, sealing the bottom portion of the drywall, and replacing the trim. Sometimes it may be easier to seal the wall from inside the house.

For the garage ceiling, if there is a conditioned floor above, use caulk or foam to air seal any penetrations such as for light fixtures. Although it is significantly more effort, it may be desirable to cut a hole in the garage ceiling drywall to



If accessible, seal and block behind the stairs from the garage side if the stairs can be pulled away from the foundation. In some instances, garage stairs can be accessed and air sealed from the inside of the basement or crawlspace. For example, recessed doors from the garage to the living space may require working behind and underneath the stairs. Use rigid foam board and insulation batts to seal and insulate this space.

inspect for areas where air from the garage can enter the home. A tool such as a borescope can fit into a very small opening, even a ½" hole, and allow for visual inspection.

Often, the conditioned floor over a garage is framed such that it uses the garage wall adjacent to the first floor as a structural support. Although an energy code requirement today, many times this support wall does not have proper blocking, creating a thermal and air bypass into the space between the home's first and second floors. If no blocking is observed, it may be necessary to remove a one foot strip of garage ceiling next to the supporting wall for access. Next, insert blocking pieces such as rigid foam board that is sealed into place. Finally, replace the removed access strip of ceiling drywall.

It may be desirable to add insulation to the drywall ceiling over the garage before replacing the access strip of drywall. One strategy is to try and pump the framed floor cavity over the garage full of insulation such as cellulose or fiberglass. Because a typical two-car garage is around 20 ft. x 20 ft., it may be necessary to drill several additional holes to facilitate complete coverage. Again, replace and finish any drywall removed from the ceiling and carefully air seal the ceiling once insulation has been installed.

Particularly on houses with basements, attached garages have often been shown to leak to these sometimes conditioned spaces. Surprisingly, the steps from a sunken garage into the main portion of the home often have no air barrier behind them and connect directly into the conditioned basement below. Consider sealing either by removing portions of the stairs or from the basement side, if applicable.

Exhausting Air Out

Even with the garage door open to outdoors and especially at startup, a car produces major amounts of poisonous exhaust, including carbon monoxide (CO) that can leak into the home. If the house is under negative pressure (such as from operating a clothes dryer) and there are leakage pathways between the garage and house, the CO can make its way into the home and poison the occupants inside. Even a slight breeze blowing against the garage can drive CO into the home.

Since a garage contains vehicles and is also a common place to store other polluting items, consider adding an exhaust fan in an attached garage that is then vented to outdoors. One strategy is to control the exhaust fan with an occupancy sensor; another is to wire the fan into the light which is on a timer controlled by an automatic door opener.

Good and Bad

- A garage is generally a good place to locate a combustion water heater since it is now outside the living space of the home. For safety, the water heater tank should be elevated off the ground by at least 18 inches and the temperature and pressure relief valve should be plumbed to outside the garage.
- Also, a garage may be an ideal location for attic access since the details of air sealing and insulating the pull down stairs are no longer needed if there is not conditioned living area above the garage ceiling.
- In some climates, adding bubble-wrap radiant insulation to the garage door may prove valuable.
- Garages are not a good location for HVAC systems, including air handling units (AHU) and supply or return ducts. Because mechanical systems generate pressure differences and can create leakage pathways, HVAC equipment should never be placed in this location. If a supply vent has been added to condition a garage, it should be completely sealed off.
- Any conditioning of the garage should be done by a separate system. For example, if a garage is used as a workshop and is desired to be heated, consider a radiant heater since it will warm occupants and surfaces rather than heat air which can quickly leak to the outside.
- For homes located in high wind zones – areas with greater risk of tornados and hurricanes – consider reinforcing the current door or replacing the standard garage door with a reinforced one. Garage roll up doors have been shown to be a home's weak link in high wind events and their failure can cause further damage to the remainder of the home. Check with insurance companies or *www.fema.gov* for additional details.

042314