STORY-AND-A-HALF INSULATION

Insulation slows the heat flow through a building’s envelope. It works year-round to make your home more comfortable and energy efficient. In the winter it slows heat loss and in the summer reduces heat gain and helps keep your home cool.

Insulating the “story-and-a-half”
Many homes built in the middle of the 20th century were single-story with a large “expansion attic” above. These areas frequently became finished living space—and were often uninsulated or insulated improperly. Because of the complexity of the framing and the difficulty gaining access to some of the areas that need to be insulated, the story-and-a-half can present an insulation and air-sealing challenge. But, considering that so much heat can escape through the top of a building, proper air-sealing and insulating of these structures is essential.

If the attic space has never been framed or finished, insulating and air-sealing can follow the standard practices as if it were new construction. If, however, knee walls and ceilings are in place, special care must be taken to ensure a good result. (Note that the same approaches to sealing and insulating also apply to homes that have an attic above a second floor—a “two-story-and-a-half.”)

Four surfaces must be sealed and insulated
There are four parts to a typical story-and-a-half framing system (along with the vertical gable ends). Each part requires a different approach for proper air-sealing and insulation.

Ceiling
The flat ceiling is similar to an attic floor. Batts or blown-in insulation can be installed between and over the ceiling joists. Access to the space may be through an attic door or through roof vents. If the knee wall space is unheated, baffles must be installed for ventilation. Air-sealing of all penetrations (access doors, wires, fixtures, vents) must also be done.

Slants
The slanted part of the wall should be treated like a cathedral ceiling. Building out the rafters to allow for additional insulation and ventilation is the best solution. Professional installation of a spray foam is also possible, as well as rigid foam under the roof decking. If the space behind the knee wall is to be kept as heated storage, the insulation needs to extend all the way to the floor along the slants.

Walls
The vertical walls (knee walls) can be insulated and sealed just like vertical walls on the lower floor.
part of the house, with the following exceptions:

- If the knee wall space is heated storage, no knee wall insulation is required (see slants, above).

- If the knee wall space is unheated storage, the knee wall should be insulated like any vertical wall. Gypsum (or foam boards for additional insulation) can be installed over the studs on the knee wall side to protect the fiberglass. Air-sealing of all penetrations (access doors, outlets, wires, vents) must also be done. If there are built-in drawers or cabinets, a sealed and insulated box must be built around them on the knee wall (cold) side.

**Floor**
The space between the floor joists beneath the knee wall is often neglected in terms of insulation and sealing—and is often the most difficult to access. If the knee wall space is heated storage, no floor joist insulation is required. Otherwise, insulation must be installed beneath the floorboards from the outside junction with the roof to a point beyond the knee wall. The methods include:

- Removing floorboards to place batts between the joists. A “plug” of gypsum or foam insulation board should be installed beyond the knee wall, caulked or foamed to prevent air leaks.

- Drilling holes in the floorboards to install dense-packed cellulose insulation. Because dense-packed cellulose provides an air barrier, no additional air-sealing is required.