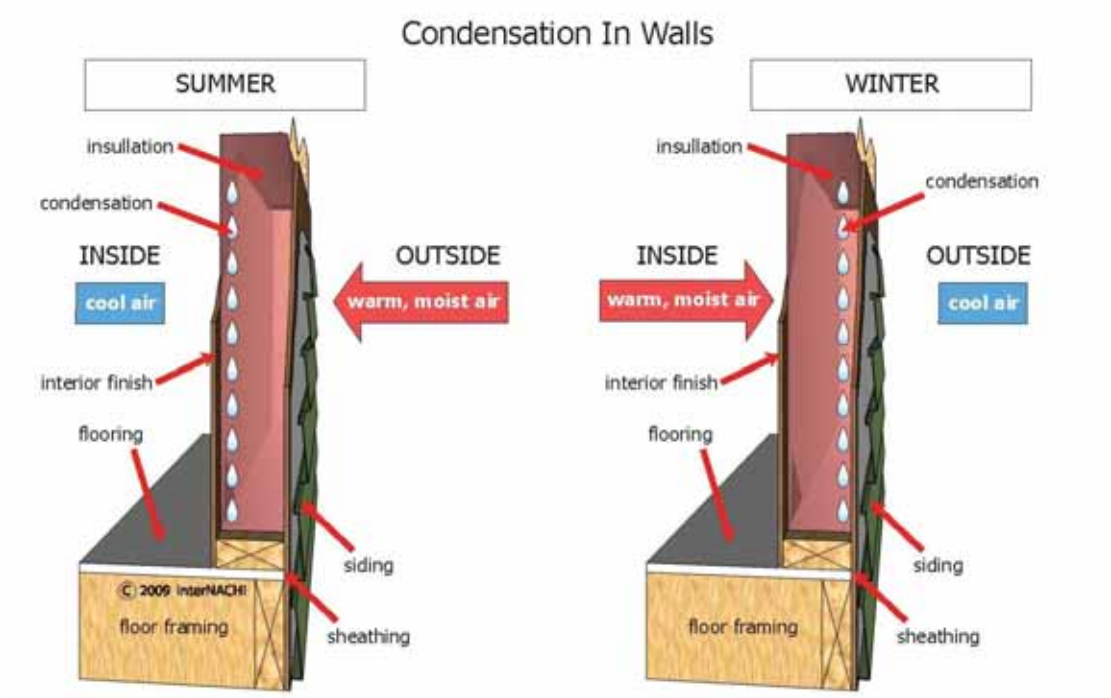
Inspecting Insulation

By Ben Gromicko



As a property inspector you are required to inspect and report upon the insulation. Let's learn about insulation, how it functions to keep the building durable and the occupants comfortable. Heating and cooling takes accounts for 50 to 70% of the energy used in the average home in the United States. Inadequate insulation and air leakage causes a lot of waste of energy in most homes. Insulation does the following things:

- Helps us save money
- Helps to save our limited energy resources
- Makes a house comfortable
- Maintains uniform temperatures throughout a house
- Makes a house warm in the winter
- Makes a house cool in the summer

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How Insulation Works

Insulation provides resistance to heat flow. The more heat flow resistance the insulation provides, the lower the heating and cooling costs.

Heat flows naturally from a warm to a cool – from a warmer space to a cooler space. In the cold winter, this heat flow moves directly from all heated living spaces to adjacent unheated spaces such as attics, garages, basements, under-floor crawlspaces, and even to the outdoors. Heat flow can also move indirectly through interior ceilings, walls, and floors—wherever there is a difference in temperature. During the cooling season, heat flows from the exterior to the interior of a building.

To keep the occupants of the building comfortable, the heat lost in the winter must be replaced by the heating system, and the heat gained in the summer must be removed by the cooling system. A properly insulated home will decrease this heat flow by providing an effective resistance to the flow of heat.

Batts, blankets, loose fill, and low-density foams all work by limiting air movement. The still air inside the insulation is an effective insulator because it eliminates convection. Still air also has low conduction, so heat doesn't flow very well via conduction through insulation. Some foams are filled with special gases that provide additional resistance to heat flow.

Reflective insulation limits heat that travels in the form of radiation. Some reflective insulation also reduce air movement, but not as much as other insulation types.

Don't confuse insulation's ability to limit air movement with "air sealing." Insulation reduces air movement only within the space it occupies. It cannot limit air movement through other pathways nearby. For example, the insulation in the wall cavity does not affect the air leakage that may take place around a window frame. Adding insulation will not likely have the same affect as air sealing.

An insulation's resistance to heat flow is measured or rated in terms of its thermal resistance or better known by inspectors as the "R-value." Let's learn about R-value.

R-Value of Insulation

Insulation is rated in terms of thermal resistance, called the “R-value.” The R-value is an indicator of an insulation's resistance to heat flow. The higher the R-value, the greater the insulating effectiveness.

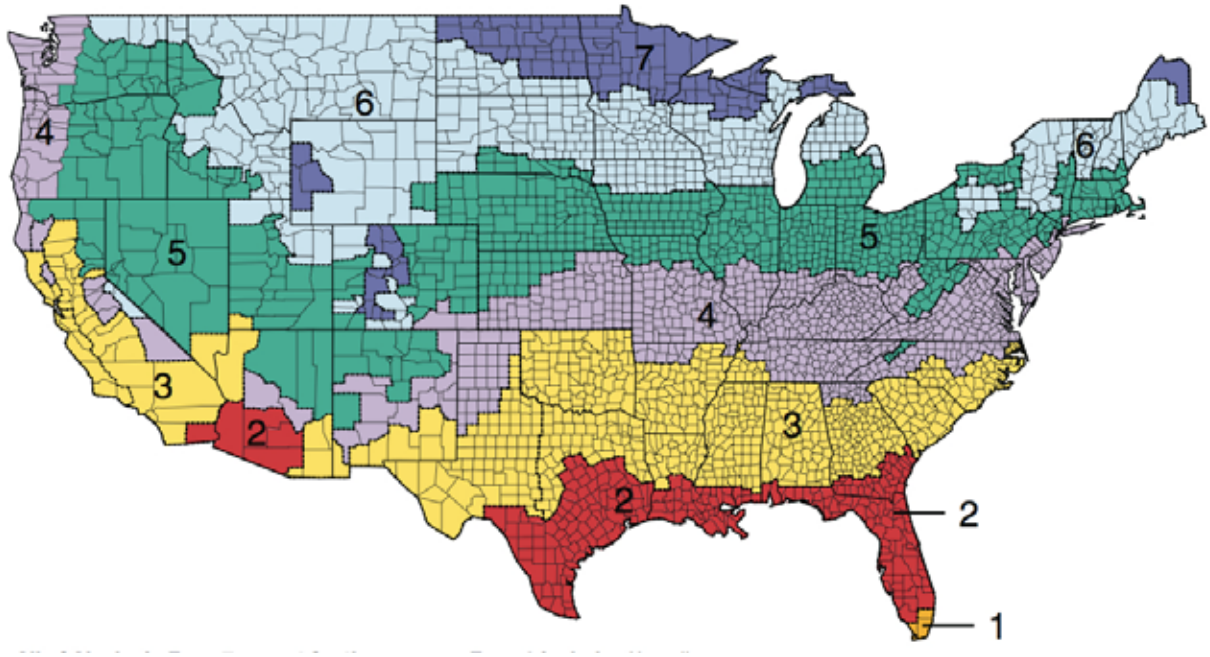
The R-value depends on the type of insulation, which includes its material, thickness, and density. If you are measuring the R-value of multiple layers of insulation whether it is in a wall or at the attic floor, add the R-values of all of individual layers together. The installation of additional insulation increases the R-value and the resistance to heat flow.

The effectiveness of an insulation's resistance to heat flow also depends on how and where the insulation is installed.

R-Values of Common Building Materials	
Material	**R-value per inch of material**
Air	1.44
Fiberglass (batt)	3.16
Fiberglass (blown)	2.20
Cellulose (blown)	3.67
Rock wool (batt)	3.38
Rock wool (blown)	2.75
Vermiculite	2.20
Perlite	2.75
Wood (pine)	1.28
Wallboard	1.0
Brick	0.11
Glass	7.2

The U.S. Department of Energy (DOE) has recommendations for new and existing homes in relation to R-value. The insulation recommendations for attics, cathedral ceilings, walls and floors have been increased overall and generally exceed those required by most building codes.

The DOE’s range of recommendations is based on comparing future energy savings to the current cost of installing insulation. You can use the map and tables below while inspecting a new or existing home as a reference or guide for your inspection and evaluation of the insulation in the home.



New Wood-Framed Houses (U.S. DOE)						
Zone	**Heating System**	**Attic**	**Cathedral Ceiling**	**Wall Cavity**	**Wall Insulation Sheathing**	**Floor**
1	All	R30 to R49	R22 to R15	R13 to R15	None	R13
2	Gas, oil, heat pump, *electric furnace	R30 to R60	R22 to R38	R13 to R15	None	R13, *R19-R25
3	Gas, oil, heat pump, *electric furnace	R30 to R60	R22 to R38	R13 to R15	None, *R2.5 to R5	R25
4	Gas, oil, heat pump, *electric furnace	R38 to R60	R30 to R38	R13 to R15	R2.5 to R6, *R5 to R6	R25 to R30
5	Gas, oil, heat pump, *electric furnace	R38 to R60	R30 to R38 *R30 to R60	R13 to R15 *R13 to R21	R2.5 to R6 *R5 to R6	R25 to R30
6	All	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 to R30
7	All	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 to R30
8	All	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 to R30

Existing Wood-Framed Houses (U.S. DOE)			
Zone	Add Insulation to Attic		Floor
	Un-insulated Attic	Existing 3-4 Inches of Insulation	
1	R30 to R49	R25 to R30	R13
2	R30 to R60	R25 to R38	R13 to R19
3	R30 to R60	R25 to R38	R19 to R25
4	R38 to R60	R38	R25 to R39
5 to 8	R49 to R60	R38 to R49	R25 to R39

International Residential Code 2006				
Zone	Ceiling (minimums)	Wood-Frame Wall Cavity (minimums)	Basement Wall	Floor
1	R30	R13	0	R13
2	R30	R13	0	R13
3	R30	R13	0	R19
4 except marine	R38	R13	R10/13[a]	R19
5 and marine 4	R38	19 or 13 + 5[b]	R10/13[a]	R30[c]
6	R49	19 or 13 + 5[b]	R10/13[a]	R30[c]
7	R49	R21	R10/13[a]	R30[c]
8	R49	R21	R10/13[a]	R30[c]

a. The first R-value applies to continuous insulation; the second to framing cavity insulation.
b. "13 + 5" means R-13 wall cavity insulation plus R-5 insulated sheathing.
c. Or insulation sufficient to fill the framing cavity, R-19 minimum.

Compressed Insulation

Insulation that is compressed will not provide its full rated R-value. The overall R-value of a wall or ceiling will be somewhat different from the R-value of the insulation itself because some heat flows around the insulation through the studs and joists. If denser, heavier insulation is installed on top of lighter insulation in an attic floor area, the overall value may be different. If R-19 batt insulation that is sized for 6 ¼ inches is stuffed inside a 5 ½-inch wall cavity, the effectiveness is decreased.

It's important that the insulation is properly installed to achieve the maximum R-value.

If the insulation is installed in a wall with electrical wires or plumbing pipes, the fiberglass batt insulation may be compressed.

The amount of insulation (or R-value) that is recommended by building standards will depend upon the local climate and the particular location of the insulation in the house.

Thermal Bridging

Insulation in between studs in a wall does not restrict the heat flow through those studs. This heat flow is called "thermal bridging." The overall R-value of that wall may be different from the R-value of the insulation itself.

It is recommended that the insulation installed in an attic cover the tops of the attic floor joists. And it is also recommended that insulation sheathing be installed on stud walls. Wood studs can transfer energy through the wall assembly. Metal studs can transfer energy much better than wood studs can. As a result, the metal wall's overall R-value can be as low as ½ of the insulation's R-value.

Inspecting the Insulation

You may be asked by your client, "Does the home I'm about to buy need more insulation?" Unless it was built with special attention, adding insulation will probably reduce the energy bills. Most houses in the U.S. were not insulated to the levels that are required or recommended today. Older homes usually will use more energy than newer homes.

Adding more insulation where you already see insulation, such as in the attic, will likely reduce energy bills.

A certified energy auditor can perform an energy audit, which might include a check of the insulation. The energy audit will identify the amount of insulation that is presently installed and make recommendations about necessary improvements.

There are a few areas in the house where the insulation is exposed and readily accessible. Those areas can be checked during a regular residential home inspection.

Check the attic, walls and floors that are adjacent to an unheated space, like a garage or a basement. The structural elements may be exposed in these areas, which makes it easy to see what type of insulation exists in the house. The depth or thickness of the insulation can be measured in those areas.

Precautions About Adding Insulation

Adding insulation might require hiring a professional contractor. If the house is old, the electrical system should be checked by an electrician if the wiring is degraded, overloaded, or uses knob &

tube wiring. It may be hazardous to add insulation when conditions such as the electrical ones previously mentioned exist. Adding thermal insulation within a closed cavity around wires could cause the wires to overheat. Code does not allow the installation of loose, rolled, or foam-in-place insulation around knob and tube wiring. Adding insulation in a mobile home is complex and usually requires expertise. Adding insulation over existing insulation must not include a vapor diffusion retarder between the two layers.

Types of Insulation

The type of insulation used, the R-value, and thickness needed is directly related to the nature and location of the spaces in the house that is insulated. Different forms of insulation can be used together. You may find batter or roll insulation over loose-fill insulation.

Blankets

Blankets are in the form of batts or rolls. They are flexible. They are made from mineral fibers, including fiberglass or rock wool. They are available in different widths and lengths. There are standard sizes (widths) for inserting in between studs and floor joists. They are available with or without vapor-retarder faces (paper face). A batt insulation when installed in the ceiling of a basement and the insulation is exposed may have a flame-resistant face.

Blown-in Loose-fill

Blown-in loose-fill insulation can be cellulose, fiberglass, rock wool or fiber pellets. The insulation can be blown-in using a pump and hose system. This type of insulation can be blown into wall cavities. You may often see it blown onto the attic floor.

When the wall is being insulated, cellulose and fiberglass can be blown onto the wall. The insulation material is mixed with an adhesive or foam to make the insulation resistant to settling.

Foam Insulation

Foam insulation can be installed by a professional using special equipment that meters, mixes, and sprays the foam insulation. Polyicynene is an open-celled foam. Polyisocyanurate and polyurethane are closed-cell foams. In general, open-celled foams allow water to move through the wall easier than closed-cell foams. Some of the closed-cell foams are therefore able to provide a better R-value where the space is limited.

Rigid Insulation

Rigid insulation is made from fibrous materials or plastic foams. They are made into boards or molded-pipe coverings. Rigid insulation boards may be faced with reflective foil that reduces heat flow when next to an air space. You'll commonly find rigid insulation installed up against foundation walls or used as an insulated wall sheathing.

Reflective Insulation

Reflective insulation is made up from aluminum foils with a bunch of different backings including kraft paper, plastic film polyethylene bubbles, or cardboard. Reflective insulation is most effective in reducing downward heat flow. You often find them located between roof rafter boards, floor joists, or wall studs. If a single reflective surface is installed, and it faces an open air space, then it is called a radiant barrier.

Radiant Barriers

Radiant barriers are intended to reduce the summer heat gain and the winter heat loss. In new homes, you may see foil-faced wood components at the roof sheathing system (installed with the foil facing down into the attic. There may be other areas with the radiant barrier is integrated into the building components and structure of the home. For existing homes, a radiant barrier will typically be found stapled across the bottom of some joists. All proper radiant barriers should have a low emittance (0.1 or less) and a high reflectance (0.9 or more).

The radiant barrier should not be laid on top of the attic floor insulation or on the attic floor anywhere, because it will soon be covered with dust and will not work.

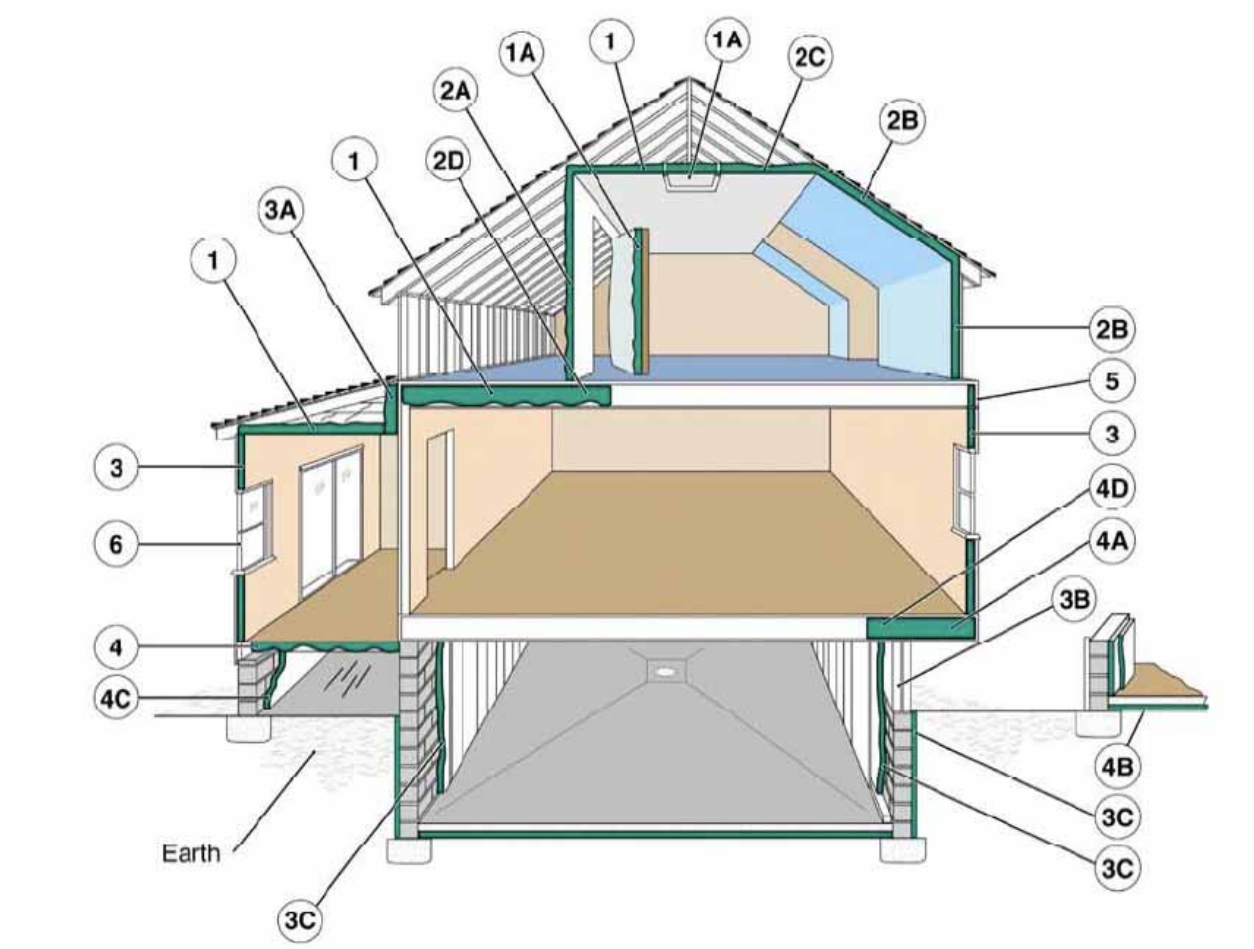
Insulation Labels

The Federal Trade Commission has clear rules about the R-value label that must be placed on all residential insulation products. The label should have a clearly stated R-value and information about health, safety, and fire-hazard issues. If you are inspecting a house during construction, you may request that the contractor provide the product label from each package. This can also tell you how many packages were used.

Types of Insulation

Form	Insulation Materials	Where Applicable	Installation Method(s)	Advantages
Blanket: batts and rolls	Fiberglass Mineral (rock or slag) wool Plastic fibers Natural fibers	Unfinished walls, including foundation walls, and floors and ceilings	Fitted between studs, joists, and beams.	Do-it-yourself. Suited for standard stud and joist spacing, which is relatively free from obstructions.
Concrete block insulation	Foam beads or liquid foam: • Polystyrene • Polyisocyanurate or polyiso • Polyurethane • Vermiculite or perlite pellets	Unfinished walls, including foundation walls, for new construction or major renovations.	Involves masonry skills.	Autoclaved aerated concrete and autoclaved cellular concrete masonry units have 10 times the insulating value of conventional concrete.
Foam board or rigid foam	Polystyrene Polyisocyanurate or polyiso Polyurethane	Unfinished walls, including foundation walls; floors and ceilings; unvented low-slope roofs.	Interior applications: must be covered with 1/2-inch gypsum board or other building-code approved material for fire safety. Exterior applications: must be covered with weatherproof facing.	High insulating value for relatively little thickness. Can block thermal short circuits when installed continuously over frames or joists.
Insulating concrete forms (ICFs)	Foam boards or foam blocks	Unfinished walls, including foundation walls, for new construction.	Installed as part of the building structure.	Insulation is literally built into the home's walls, creating high thermal resistance.
Loose-fill	Cellulose Fiberglass Mineral (rock or slag) wool	Enclosed existing wall or open new wall cavities; unfinished attic floors; hard-to-reach places.	Blown into place using special equipment; sometimes poured in.	Good for adding insulation to existing finished areas, irregularly shaped areas, and around obstructions.
Reflective system	Foil-faced kraft paper, plastic film, polyethylene bubbles, or cardboard	Unfinished walls, ceilings, and floors.	Foils, films, or papers: fitted between wood-frame studs, joists, and beams	Do-it-yourself. All suitable for framing at standard spacing. Bubble-form suitable if framing is irregular or if obstructions are present. Most effective at preventing downward heat flow; however, effectiveness depends on spacing.
Rigid fibrous or fiber insulation	Fiberglass Mineral (rock or slag) wool	Ducts in unconditioned spaces and other places requiring insulation that can withstand high temperatures.	HVAC contractors fabricate the insulation into ducts either at their shops or at the job sites.	Can withstand high temperatures.
Sprayed foam and foamed-in-place	Cementitious Phenolic Polyisocyanurate Polyurethane	Enclosed existing wall or open new wall cavities; unfinished attic floors.	Applied using small spray containers or in larger quantities as a pressure sprayed (foamed-in-place) product.	Good for adding insulation to existing finished areas, irregularly shaped areas, and around obstructions.
Structural insulated panels (SIPs)	Foam board or liquid foam insulation core Straw core insulation	Unfinished walls, ceilings, floors, and roofs for new construction.	Builders connect them together to construct a house.	SIP-built houses provide superior and uniform insulation compared to more traditional construction methods; they also take less time to build.

Where to Look for Insulation



The illustration shows which building spaces should be insulated. Those spaces should be properly insulated to the R-values recommended.

1. In unfinished attic spaces, the insulation should be installed between and over the floor joists to seal off the living spaces below.
1A – attic access door

2. In finished attic rooms with or without a dormer, the insulation should be installed:
2A – between the studs of "knee" walls;
2B – between the studs and rafters of exterior walls and roof;
2C – at ceilings with cols spaces above;
2D – and extended into the joist space to reduce air flows.

3. All exterior walls should have insulation, including:

3A – walls between living spaces and unheated garages, shed roofs, or storage areas;
3B – foundation walls above ground level;
3C – foundation walls in heated basements, full wall either interior or exterior.

4. Floors above cold spaces, such as vented crawlspaces and unheated garage should have insulation installed, including:
4A – any portion of the floor in a room that is cantilevered beyond the exterior wall below;
4B – slab floors built directly on the ground;
4C – as an alternative to floor insulation, foundation walls of non-vented crawlspaces;
4D – extending insulation into the joist space to reduce air flows.

1. Band joists.
2. The check condition of the storm windows. Caulking and sealing may be needed around all windows and doors.

Check the Attic

At unfinished attic floors, be careful about where you step into the attic. Walk only on the joists so that you do not fall through the ceiling.

The following table can help you determine what insulation exists in the attic and the related R-value of that apparent insulation.

What you see in the attic:		**What it probably is:**	**Total R-value**
Loose fibers	light-weight yellow, pink or white	fiberglass	= 2.5 x depth
	dense gray or near-white, may have black spots	rock wool	= 2.8 x depth
	small gray flat pieces or fibers (from newspapers)	cellulose	= 3.7 x depth
Granules	light-weight	vermiculite or perlite	= 2.7 x depth
Batts	light-weight yellow, pink, or white	fiberglass	= 3.2 x depth

If there isn't any insulation in the attic space, then insulation should be installed and fit between the joists. If the existing insulation is near the top of the joists, then a good practice is to install the new batts perpendicular to the old ones. That will help to cover the tops of the joists and reduce thermal bridging through the framing members.

Attic Access

The attic access hatch or door should be insulated. A non-insulated attic door will reduce energy savings substantially. Ideally, the attic access would be located in an unconditioned part of the house if possible. Otherwise, the attic access should have weather-stripping and insulation. The access opening could be covered by an insulated cover box.

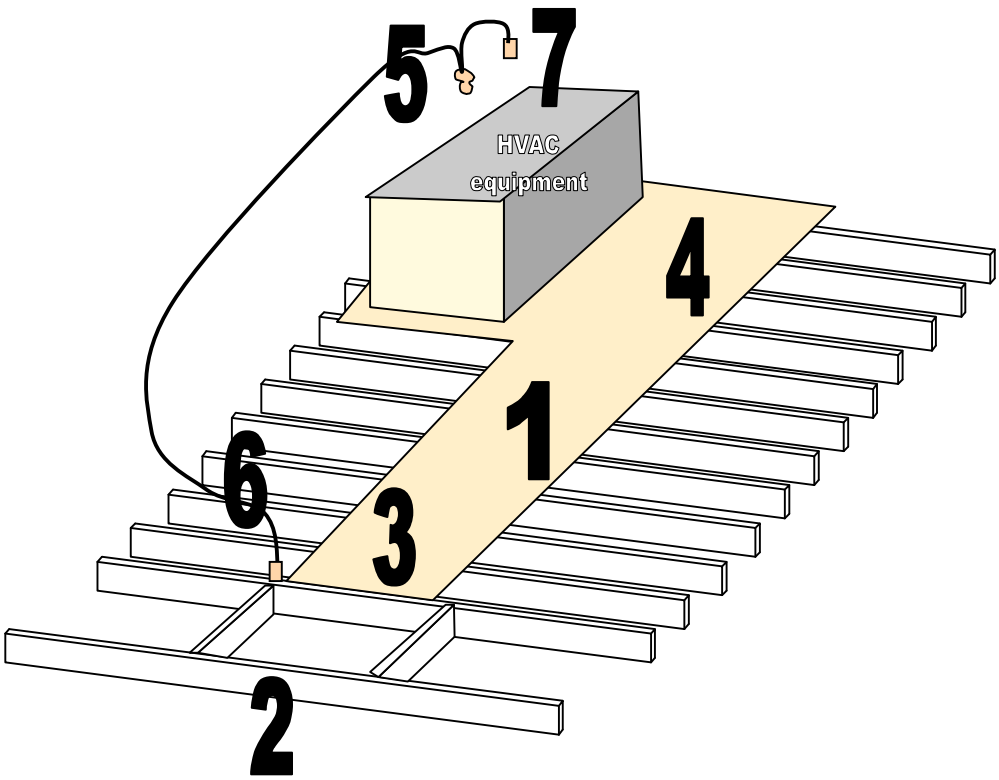


Illustration by Ben Gromicko

There should be access openings to all attic spaces that exceed 30 square feet and have a vertical height of 30 inches or more. The rough-framed opening should be at least 22 inches by 30 inches. It should be located in a hallway or other readily accessible location. An attic access that is located in a clothes closet is often inaccessible due to permanent shelving installed. There should be a 30-inch minimum headroom space above the attic access.

If there is plumbing or electrical systems or mechanical equipment in the attic space (or for in the under-floor crawlspace), the space should be accessible for inspection, service and removal.

1. In addition to an adequately sized access opening, a passageway should be provided. In an attic, the passageway should be made of solid flooring.

2. There should be an opening to the space and a clear unobstructed passageway large enough to allow removal of the mechanical appliance. The opening should be at least 22 inches by 30 inches. The opening should be large enough for a person to get through it or equipment to be removed.

3. The passageway should be at least 30 inches high, at least 22 inches wide, and not more than 20 feet in length when measured along the centerline of the passageway from the opening to the appliance. There are some exceptions.

4. A service area is required in front of the mechanical equipment with a minimum dimension of 30 inches by 30 inches.

5. A light fixture should be installed to illuminate the passageway and the mechanical appliance.

6. A control switch should be installed near the entry to the passageway.

7. An electrical receptacle should be installed at or near the mechanical appliance to allow for safe and convenient maintenance or service of the appliance.

Attic Pull-Down Stairs

Attic pull-down ladders, also called attic pull-down stairways, are collapsible ladders that are permanently attached to the attic floor. Occupants can use these ladders to access their attics without being required to carry a portable ladder.

Common Defects for Attic Pull-Down Stairs

Homeowners, not professional carpenters, usually install attic pull-down ladders. Evidence of this distinction can be observed in consistently shoddy and dangerous work that rarely meets safety standards. Some of the more common defective conditions observed by inspectors include:

- cut bottom cord of structural truss. Often, homeowners will cut through a structural member in the field while installing a pull-down ladder, unknowingly weakening the structure. Structural members should not be modified in the field without an engineer's approval;
- fastened with improper nails or screws. Homeowners often use drywall or deck screws rather than the standard 16d penny nails or ¼" x 3" lag screws. Nails and screws that are intended for other purposes may have reduced shear strength and they may not support pull-down ladders;

- fastened with an insufficient number of nails or screws. Manufacturers provide a certain number of nails with instructions that they all be used, and they probably do this for a good reason. Inspectors should be wary of “place nail here” notices that are nowhere near any nails;
- lack of insulation. Hatches in many houses (especially older ones) are not likely to be weather-stripped and/or insulated. An uninsulated attic hatch allows air from the attic to flow freely into the home, which may cause the heating or cooling system to run overtime. An attic hatch cover box can be installed to increase energy savings;
- loose mounting bolts. This condition is more often caused by age rather than installation, although improper installation will hasten the loosening process;
- attic pull-down ladders are cut too short. Stairs should reach the floor;
- attic pull-down ladders are cut too long. This causes pressure at the folding hinge, which can cause breakage;
- improper or missing fasteners;
- compromised fire barrier when installed in the garage;
- attic ladder frame is not properly secured to the ceiling opening;
- closed ladder is covered with debris, such as blown insulation or roofing material shed during roof work. Inspectors can place a sheet on the floor beneath the ladder to catch whatever debris may fall onto the floor; and
- cracked steps. This defect is a problem with wooden ladders.

In sliding pull-down ladders, there is a potential for the ladder to slide down quickly without notice. Always pull the ladder down slowly and cautiously.

Safety tip for inspectors: Place an "InterNACHI Inspector at work!" stop sign nearby while mounting the ladder.

Relevant Codes

The 2009 edition of the *International Building Code* (IBC) and the 2006 edition of the *International Residential Code* (IRC) offer guidelines regarding attic access, although not specifically pull-down ladders. Still, the information might be of some interest to inspectors.

2009 IBC (Commercial Construction):
1209.2 Attic Spaces. An opening not less than 20 inches by 30 inches (559 mm by 762 mm) shall be provided to any attic area having a clear height of over 30 inches (762 mm). A 30-inch (762 mm) minimum clear headroom in the attic space shall be provided at or above the access opening.

2006 IRC (Residential Construction):
R807.1 Attic Access. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that exceed 30 square feet (2.8m squared) and have a vertical height of 30 inches (762 mm) or more. The rough-framed opening shall not be less than 22 inches by 30 inches, and shall be located in a hallway or readily accessible location. A 30-inch

(762 mm) minimum unobstructed headroom in the attic space shall be provided at some point above the access opening.

Tips that inspectors can pass on to their clients:

- Do not allow children to enter the attic through an attic access. The lanyard attached to the attic stairs should be short enough that children cannot reach it. Parents can also lock the attic ladder so that a key or combination is required to access it.
- If possible, avoid carrying large loads into the attic. While properly installed stairways may safely support an adult man, they might fail if he is carrying, for instance, a bag full of bowling balls. Such trips can be split up to reduce the weight load.
- Replace an old, rickety wooden ladder with a new one. Newer aluminum models are often lightweight, sturdy and easy to install.

In summary, attic pull-down ladders are prone to a number of defects, most of which are due to improper installation.

Attic Insulation Rulers and Thicknesses

A professional installer will attach vertical rulers (or attic rulers) to the joists of the attic prior to installing blown-in insulation. The installer should provide a signed and dated statement describing the insulation installed, the thickness, coverage area, R-value, and the number of bags installed in the attic. When this statement is located in an attic, it might be called an “attic card.”

The following is a sample chart that might be used by a professional installer of blown-in fiberglass insulation.

R-value	Minimum # of bags/1,000 square feet	Maximum coverage/bad (net sq. ft.)	Minimum weight/sq./ft. (lbs.)	Minimum thickness (inches)
R-49	25.0	40	0.878	19.50
R-44	22.2	45	0.786	17.75
R-38	19.2	52	0.676	15.50
R-30	15.2	66	0.531	12.25
R-26	13.2	76	0.459	10.75
R-22	11.1	90	0.388	9.25
R-19	9.5	105	0.334	8.00
R-11	5.5	182	0.193	4.75

Manufacturers provide similar charts on their insulation bags. The chart states the minimum number of bags that need to be installed per 1000 square feet of area to obtain a specific R-value. For example, to install R-38 in an attic with 3200 square feet of area use the following formula: 3200 ft2 ÷ 1000 = 3.2, and 19.2 (bags per 1000 ft2 for R-38) x 3.2 = 61.4 bags

Building inspectors typically check the insulation depth to verify compliance with local codes.

To make sure the correct amount of insulation is installed requires a bag count, or a comparison with the recommendations on an attic card.

Difficult Areas to Check in the Attic

When the attic has blown-in insulation, check the back corners, the hard-to-see and hard-to-access areas. It is common to have those areas too thin. It should be evenly distributed throughout the attic with the correct density and depth. Baffles should be installed to prevent blocking the airflow through the attic vents, particularly at the eaves. The insulation should be blown all of the way to the top plate of the exterior wall. The recessed lights should be properly filled-in and covered (insulated contact rated fixtures). Only IC-rated recessed lights should be installed because they are airtight and can be covered with insulation. Check underneath any pieces of plywood or platforms in the attic. Those areas need to be insulated. Check around ducts, wires, and plumbing.

If mechanical equipment or storage areas are located in the attic, the flooring or platform decking should be elevated to allow full-height or thickness of the insulation to be installed.

Attic Knee Walls

Knee walls are vertical walls with an attic space directly behind them. You'll often find them in houses with finished attic spaces and dormer windows, as with 1-½ story houses.

There are a couple ways that you may see a knee wall insulated. The most important areas, and most overlooked areas, to insulate are the open joist ends below the knee wall. The open joist ends below a knee wall should be "plugged" or stuffed with:

- Squares of cardboard, metal flashing or rigid insulation;
- Cellulose insulation blown at high density; or
- Batt insulation stuffed into plastic bags.

The "plugs" should be sealed to the joists using caulk, sealant or spray foam. The knee wall and attic floor in the attic space behind the knee wall should be insulated. Sometimes string, wire, or cardboard is used to hold the insulation in place at the backside of the knee wall.

Another way to insulate this area is to seal and insulate the rafter spaces along the sloping ceiling of the knee wall attic space. The rafters should have proper insulation and ventilation as required. One advantage of this approach is that now any ductwork that was in that small space is now inside a conditioned space.

For more information about performing property inspections, visit
http://www.bengromicko.com