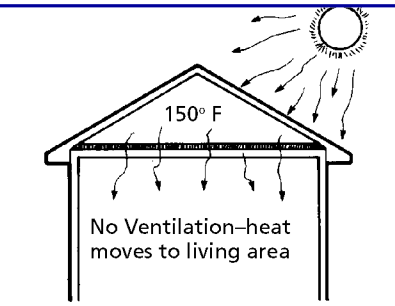
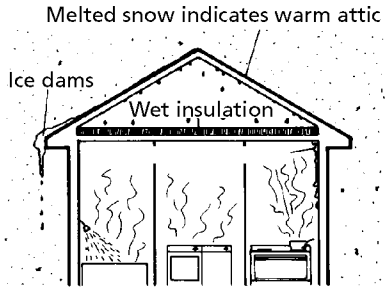
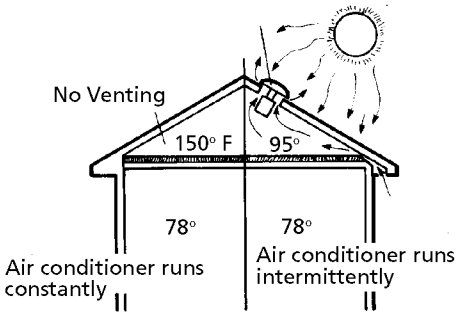
HOW-TO BOOKLET #3078

VENTING ATTICS







What vents, or lack of them, do is depicted here. Basically, venting simply removes excessive heat and humidity, which in turn lowers heating and cooling costs and helps prevent damage to your home caused by heat/humidity.

TOOL & MATERIAL CHECKLIST

- ❑ Powered Roof Vent & Parts
- ❑ Screwdriver
- ❑ Caulking Gun
- ❑ Nails
- ❑ Chalkline & Chalk
- ❑ No. 12 Gauge Wire
- ❑ Drill Bits
- ❑ Tape Measure
- ❑ Soffit System
- ❑ Sabre/Keyhole Saw
- ❑ Roofing Cement
- ❑ Carpenter's Square
- ❑ Electrical Junction Box
- ❑ Drill
- ❑ Wire Connectors
- ❑ Ladder

Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in the Basics Listed Above.

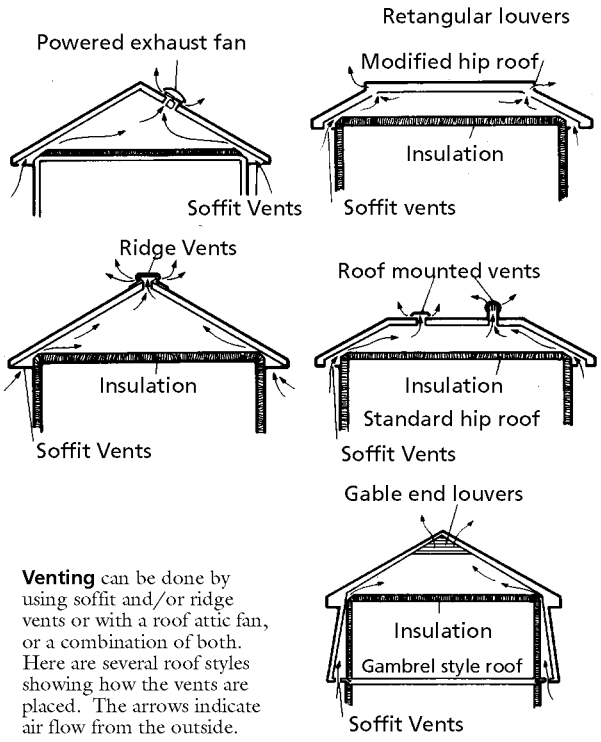
The attic in your home needs ventilation. By dealing with this area—modifying it in some way—you can cut heating and cooling bills sometimes by as much as 50 percent. In this How-To Booklet we show you a basic way to proper ventilation—how it's done—with a powered, roof-mounted attic fan. But first, some basic background information about ventilation:

Summer Heat/Ventilation. In the summertime, the sun can cause the air inside an unvented attic to reach temperatures of 150 degrees—and more. When this happens, the insulation in the attic becomes a "heat sink," gradually absorbing the heat until it obeys the laws of thermodynamics and moves to the cooler living space below. Often this area is cooled by air conditioning. So an attic temperature of 135-140 degrees may force the air conditioner to run constantly to maintain 78 degrees in the living area. The situation is nearly as bad as having no insulation at all. The solution to the problem is ventilation that allows the heated air to escape from the attic before it can build up. Aided by a roof fan or ventilation that reduces the temperature in the attic to 95 degrees, the air conditioner will run intermittently and its costs will be from 10 to 30 percent less.

Winter condensation. In the winter, ventilation can remove humidity that moves through the ceiling as water vapor. In the cold attic, the vapor condenses in the insulation, which in turn loses most of its efficiency. In extreme cases, icicles can hang from the rafters or the underside of the roof.

When the weather warms or the roof is heated to above freezing, the moisture melts and soaks the insulation, possibly even leaking through the ceiling to cause stains or damage. Finally, this moisture will reveal itself in the form of rot or other structural damage to your home. Vapor barriers are designed to prevent this process, but many homes do not have ceiling vapor barriers and, in any event, you cannot be assured that they will be 100 percent effective.

Ventilation is just as important in the winter as it is in the summer, but for different reasons.



Venting can be done by using soffit and/or ridge vents or with a roof attic fan, or a combination of both. Here are several roof styles showing how the vents are placed. The arrows indicate air flow from the outside.

How to ventilate attics. Natural ventilation relies on fixed non-powered devices called ventilators, or "vents." These are located in openings in the attic—or other space to be ventilated—to take advantage of the natural flow of air. Cool air enters the lower vents, is warmed, then rises and moves out the upper vents to expel both heat and humidity.

Powered ventilation relies on turbine ventilators, electrically-powered exhaust fans mounted on the roof or in the attic, or on ceiling-mounted whole-house exhaust fans. Powered fans require sufficient vent areas in the roof to allow the air to be pulled, or exhausted, from the attic space.

How much ventilation? To determine how much ventilation is needed for your home, either natural or powered, you need to know the square footage of the attic. Then you can match the figure to the free area needed for the ventilation system that you need.

IN SEARCH OF "FREE AREA"

Free area is that area of vent that is not restricted by louvers or screen wire. It is usually related to the square footage of the attic area: 1/50 would mean one square foot of free vent area for each 150 square feet of attic floor. The amount of free area is determined by the existence, or lack of, a vapor barrier, location of the vents, and the climatic conditions since where the home is located determines its need for condensation and heat control.

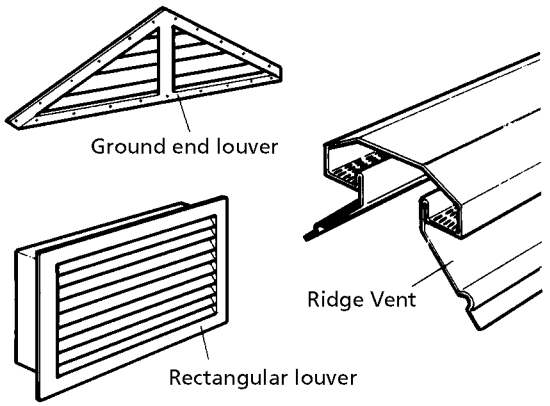
The rules recommended by the HUD (FHA) Minimum Property Standards (MPS) are those most often followed. They may be inadequate. However, they are quoted in older publications. Homes built only 10-12 years ago often have too little ventilation by today's standards. Below are the present generally accepted rules for determining the net free area for attics:

Attics without vapor barriers. One square foot of free area is needed for each 150 square foot of attic space (1/50). If half of the vents are in the eaves and half are located at least 3 feet above the attic floor, you can reduce the required free area to 1/300.

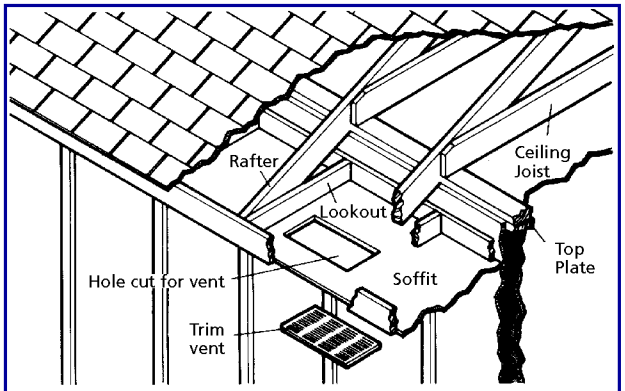
Attics with 6 mil. polyethelene. This attic calls for a free area of 1/300. This assumes that half of the vents are in the eaves and half are located at least 3 feet above the attic floor.

CONVERSION TABLE

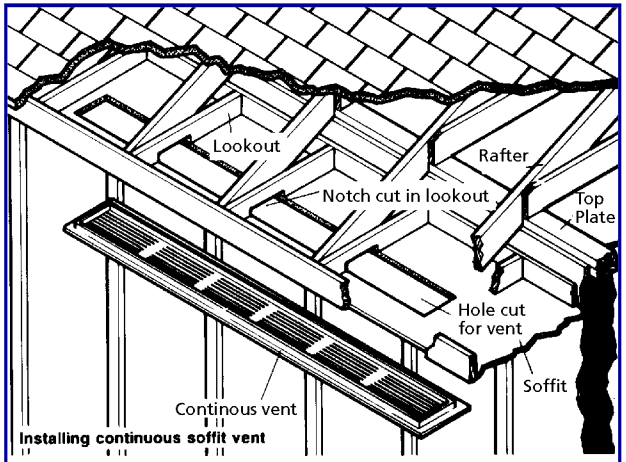
Protective Material	Net: Gross
Hardware Cloth (¼ inch mesh)	1:1
Screening (⅛ inch mesh)	1:1¼
Insect Screen (1/16 inch mesh)	1:2
Louvers and hardware cloth	1:2
Louvers and screening	1:2¼
Louvers and insect screen	1:3



Different styles and types of louvers and vents are available at building material outlets. The vents usually are manufactured from aluminum and come outfitted with screening. Many sizes are made; cost is not prohibitive



Rectangular louvers are inserted into the soffit at the overhang of the roof. The soffit usually is 1/4-in.-thick plywood or sheet material that is easily cut with a sabre or keyhole saw. The louvers are simply inserted into the cut hole and fastened with nails or (usually) screws. Wear safety glasses while sawing the holes.



Installing continuous soffit vent

Continuous soffit vent is installed the very same way as a rectangular one, except that the lookouts have to be notched with a chisel to "let in" the vent so it fits flush with the surface of the soffit. You can use a sabre saw for this cut but use a blade that won't cut deep into the lookouts.

Vaulted (Cathedral) ceiling. You will need a continuous air space above the insulation, with continuous eave vents and continuous ridge vents, or you must have individual vents in the eave as well as near the ridge for each rafter space.

Climate. In areas having a high heat gain during the summer, attics with or without a vapor barrier should have a total free area of 1/150; half of the vents should be in the eaves and half near the ridge of the roof.

Vent size. When figuring the size of the vents to be used, remember that the figures above are for the net free area, which refers to the area or the vent that is not obstructed by louvers or screen wire. Use the factors in the chart on page 2 to determine the required gross area of the vent openings. For example, if you are using gable and vents with louvers and 1/8-inch mesh screening, you will need 2-1/4 square foot of vent before you have 1 square foot of net-free area.

Powered attic fans. Powered roof or gable attic fans are rated in cubic feet per minute (cfm) at either "static air pressure" or "free air delivery." To determine the minimum cfm you home requires, multiply the attic floor area by 0.7 Add 15 percent for a dark roof. If the fan is rated in "free air delivery," discount the cfm by 25 percent to arrive at the correct figure.

For example: if you attic measures 1500 square foot, you require a fan delivering 1,050 cfm (or 1,208 cfm under a dark roof). For best results, you must also provide adequate under-eave venting; 1 square foot of attic floor space is recommended (1/150).

INSTALLING A POWERED ROOF ATTIC FAN

A roof-mounted attic fan should be positioned as near as possible to the center of the attic. Place it on the back side of the roof so it is not seen from the front of the house. Here are the basic steps to follow:

Placement. Assemble the fan and carry it to the roof near one of the gables. Using a straightedge or a piece of wood as a guide, set the fan assembly so the top of the fan is level with the roof ridge. Measure this distance from the ridge to the center of the fan.

In the attic, locate the central part and measure down from the roof peak (on the back side of the roof) to a point that corresponds to the location of the fan. Locate this point halfway between the rafters. Drive a nail up through the roof at this point so it can be located from the top of the roof. See illustrations, next page.

Cutting the opening. On the outside of the roof, locate the marker nail. Using it as a center, draw a circle about 4 inches wider than the size of the hole specified in the instructions usually provided by the fan manufacturer. With a utility knife, remove the shingles and underlayment down to the wood sheathing underneath, using the guideline of the circle you drew on the roof.

Using the nail as the center point, draw another circle. It should be the size specified in the instructions. Cut a hole in the sheathing (or battens) along this circle, using a sabre saw or a keyhole saw. The specified hole size may be larger in diameter than the distance between the rafters. If so, do not cut the rafters. Instead, saw along the inner edges of the rafters.

Installing the housing. About 6 inches above and below where the fan flashing will cover the roof, hammer 4 nails into the roof to mark the location of the rafters. Remove any shingle nails within the area above the hole that may prevent insertion of the fan flashing underneath the shingles.

Apply a liberal amount of asphalt roofing cement to the exposed sheathing and underside the fan flashing. Slip the fan housing sheathing under the shingles above the hole. Line up the opening of the fan housing with the hole cut in the roof. Using the rafter marks as a guide, drive galvanized

roofing nails through the flashing at the top and along the sides at 4 to 6-inch intervals. Then use roofing cement and place a tad under any shingles that have been lifted. Seal any cut edges and exposed nail heads. Do not seal the bottom edge of the flashing.

Adding soffit vents. Calculate the vent area you will need for the attic and install soffit vents, according to the information given in this Booklet. For every 150 square foot of attic space, install 1 square foot of net free vent area.

Connecting the wiring. Fasten the fan thermostat to a rafter so that the dial is easily accessible and the temperature-sensing element is exposed to the air.

Make sure the element is not in the fan's direct air stream when the fan is operating. A 120-volt circuit using a junction box in the attic powers the fan. If there is no junction box available, run a 12-gauge copper cable through a wall to a junction box in the room on the floor below.

Turn off the power at the service entrance before making any electrical connections. If you are not familiar with wiring techniques, call in a pro to do the job. All electrical connections must be in accordance with local codes, ordinances, and National Electrical Code.

Drill a 3/4-inch hole in the top plate above an inside wall and directly above the receptacle junction you want to tap. Recheck that the power is off and remove the junction box. Fish the cable through the hole in the plate to this receptacle. Clamp the cable to the receptacle, run it from the plate in the attic along the side of a ceiling joist, up the side of a rafter, and connect it to the thermostat. Hold the cable in place with staples.

Connecting the fan thermostat. After you have extended cable up to the fan, connect the two leads in the thermostat wiring box to the two power leads, matching wire color and fastening with wire connectors. Wrap the connectors tightly with plastic electrician's tape. Connect the ground wire from the power cable to the ground screw, usually green in color, in the box. You may want to turn the power on or off manually in order to bypass the thermostat, to turn the fan on and off manually or to wire in a humidistat. With the last installation, you get automatic operation triggered by temperature and humidity, or manual operation bypassing the thermostat and humidistat, and the convenience of easily turning the fan on or off.

CAUTION: When you work on the roof outside, be sure you wear rubber-soled shoes. If the roof is steep, please let a professional install the attic fan for you. He has the necessary equipment that is too costly for you to purchase for a 1-shot fan installation.

Position the fan so it can't be seen from the front of the house. Pound a nail at the center of the proposed site—between rafters. Marker nails will remind you of the rafters' positions. Cut the opening. Fit the flashing on the high side underneath the shingles. The flashing below the fan falls on top of the shingles. Almost the same technique is used for installing a wind-driven roof turbine ventilator, if you opt for this product.