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HOW TO WEATHERSTRIP AND CAULK YOUR HOME



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HOW TO WEATHERSTRIP AND CAULK YOUR HOME

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HOW TO WEATHERSTRIP AND CAULK YOUR HOME

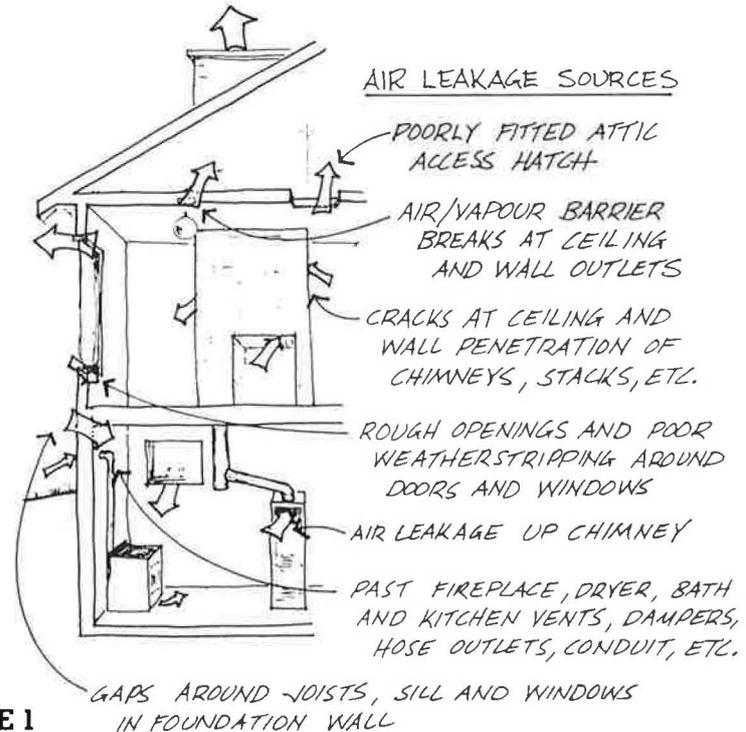


FIGURE 1

Your home loses heat both by **transmission** and by **air leakage**. Transmission loss occurs by conduction, radiation and convection of heat through walls, ceilings or floors and is controlled by the amount of insulation. Loss of heat also occurs when warm air leaks from the inside of your home to the outside or when cold air leaks in. **Weatherstripping** and **caulking** are the materials specifically designed to stop these air leakage heat losses.

Air leakage can account for one-third of the total heat loss in an average home. Warmed air leaking out must be replaced with cold air drawn in. This air must then be heated. Excessive air leakage may be costing you \$100 to \$200 every year! Moisture is carried out on the warm air as well, and if it is allowed to condense inside the walls or in your attic, serious structural damage could result.

Typical sources of air leakage are shown in Figure 1. Add up these small cracks and holes and you'll probably have the equivalent of a 600 mm-square (2 ft.-square) hole — or even larger in older homes. This is like leaving a large window open all winter!

Enough weatherstripping and caulking materials to cut air leakage heat losses by at least one-half can be purchased for \$100 to \$200. The payback period on your investment could be less than two years if the installation is done with care.

A. WEATHERSTRIPPING

Weatherstripping can be used to control air leakage at joints where two surfaces meet and move relative to each other — windows and doors, for example (see Figure 1). It is often the easiest and least costly step in controlling heat losses by air leakage, and improves indoor comfort by reducing drafts.

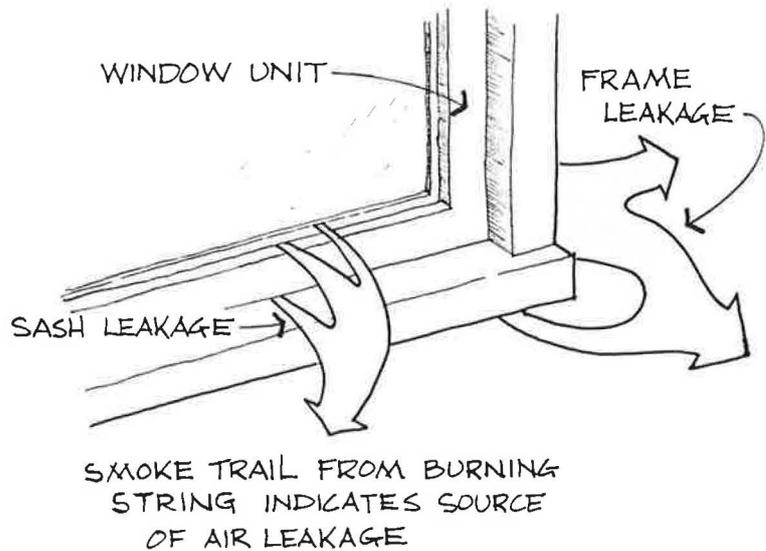


FIGURE 2

The first step is to determine where air leakage is occurring. Check by using a "draft indicator," such as:

- A smouldering piece of cotton string (Air movement causes the smoke to follow currents.) Or,
- Smoke from a cigarette or "smoke pencil" (a commercially available smoke-generating device). Or,
- A piece of tissue or light kitchen wrap taped to a coat hanger. (Excess air movement will cause fluttering but this technique may not indicate small air leaks.)

On a cool and windy day, run all the exhaust fans in the home to create the greatest pressure difference between inside and outside. Move your draft indicator around window and door edges, electrical outlets and other potential leakage areas identified in this booklet, marking the drafty spots. For the windows and doors, determine if there is any weatherstripping, if the weatherstripping is worn out and should be replaced, or if the weatherstripping in place can be adjusted (if it has slotted holes or can easily be removed and repositioned).

1. Jamb Weatherstripping for Doors and Windows

Different types of weatherstripping materials with their respective uses and characteristics are listed below. The various types are used for different purposes as illustrated in Figures 3, 4, 5 and 6.

In extensive testing, it has been found that **tubular** weatherstripping provides the best seal. However, when used on doors or swinging windows, this type requires the most closing pressure — an important point if the users are children, the handicapped or the elderly. **Vinyl** or **rubber** strips are a good compromise in these situations.

Open cell foam and **felt** strips need to be very tightly compressed to create an adequate seal. They will keep out dust, but are inadequate as air barriers. For this reason, the installation details in this publication highlight the vinyl or rubber strip, tubular and expanded types of weatherstripping — materials which create a good air seal with minimum closing force and have long, useful lives.

The type of window has a direct bearing on the type of weatherstrip to use. **Double hung** (or **vertically sliding**) windows, still common in homes 20 to 30 years old, can be weatherstripped with tubular, strip or metal materials. Figure 3 shows the application of these products to vertically sliding windows. The permanent or non-sliding sections can have air leakage eliminated with caulking.

Spring metal is the most durable and best to use if one does not want the weatherstripping to show — but it is the most difficult to install on existing windows. Tubular or vinyl strips can be mounted on the inside or the outside (but in our extreme climate will last longer installed inside). The meeting rails (in the centre) of vertical sliders can be weatherstripped with the same type used for the sides.

TABLE 1

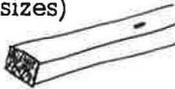
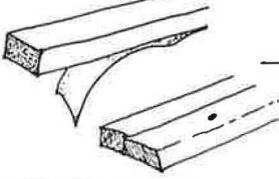
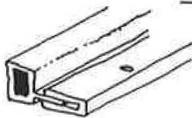
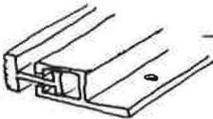
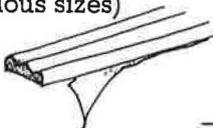
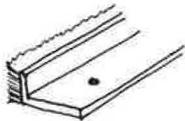
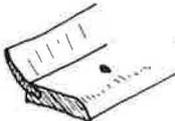
Type of Weatherstrip Material	1981 Cost per metre (foot)	Comments on Use
Weatherstrip Tape (various widths) 	— \$0.10-\$0.15 (\$0.03-\$0.05)	— Use on any window that will not be opened — Good for one season only — Easier to remove than masking tape (but hard on paint)
Felt (various sizes) 	— \$0.21 (\$0.065)	— Use on doors or windows — Poor durability — Very poor seal provided — Must be nailed or stapled
Foam (various sizes) 	— Open-cell, adhesive \$0.24 (\$0.07) — Closed-cell on attachment strip \$1.00-\$1.75 (\$0.30-\$0.53)	— Use on doors or windows — Poor durability — Very poor seal provided — Good seal with closed cells — Good durability with attachment strip
Tubular (various shapes and sizes) 	— Fabric, cotton-filled \$0.54 (\$0.16)	— Can be used on doors and windows — Poor durability — Moderate seal provided
	— Hollow, flexible \$0.50 (\$0.15)	— Must be nailed or stapled — Good seal
	— Core-filled, flexible \$1.20 (\$0.37)	— Compression difficult — Must be nailed or stapled — Very good durability
	— Hollow tube on attachment strip \$0.90-\$1.80 (\$0.27-\$0.57)	— Good seal and durability — Slotted holes allow for readjustment

TABLE 1

Type of Weatherstrip Material	1981 Cost per metre (foot)	Comments on Use
	— Magnetic strip \$5.50-\$7.00 (\$1.70-\$2.13)	— Excellent seal — Good durability — Self adjusting — Metal adhesive strip allows use on wood doors and windows
	— Spring vinyl tube \$3.50-\$4.00 (\$1.10-\$1.26)	— Excellent seal — Good durability — Self adjusting
Strip (various sizes) 	— Expanded rubber, adhesive \$0.45 (\$0.14)	— Good seal and durability
	— Polyester pile with fin seal (may have attachment strip) \$0.80-\$2.30 (\$0.25-\$0.70)	— Moderate seal and durability — Sold as replacement seal for sliding windows
	— Vinyl or rubber on attachment strip	— Good seal and durability — Must be nailed
	— Metal strip \$1.60 (\$0.50)	— Excellent durability — Good seal — Must be nailed — Subject to mechanical damage
	— Vinyl strip, adhesive \$2.00 (\$0.63)	— Excellent seal — Good durability

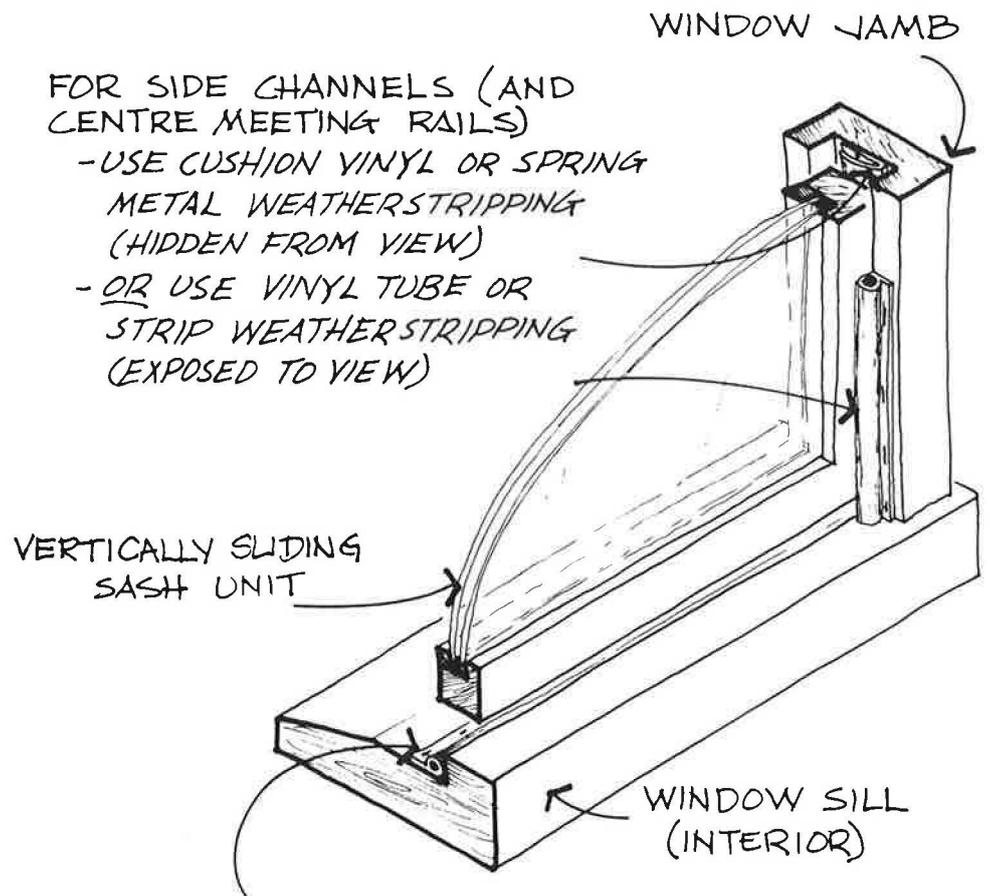


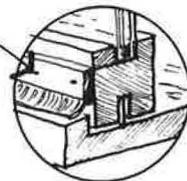
FIGURE 3

Horizontal sliders are another common window; these include sliding glass doors. The ease with which weatherstripping can be applied depends on the type of sash. If they have not previously been weatherstripped, **wood** or **vinyl-covered wood** windows are usually best fitted with tubular or angled strip materials (Figure 4). If existing weatherstripping has worn out, it should be replaced with a similar type.

VINYL TUBE OR STRIP WEATHERSTRIPPING ON TOP AND BOTTOM RAILS OF SLIDER (INTERIOR)

COMPRESSIBLE WEATHERSTRIPPING ON CLOSING AND CENTRE MEETING RAILS
 - USE SPRING METAL, CUSHION VINYL, VINYL TUBE OR CLOSED-CELL FOAM

EXAMPLE OF VINYL STRIP ON INTERIOR OF SLIDER RAIL



HORIZONTALLY SLIDING SASH UNIT

FIGURE 4

Metal or vinyl sash horizontal sliders have usually been factory-weatherstripped. However, if worn out or defective in any way, the seals can probably be replaced by sliding new material into the old channels (see Figure 5). Be sure to measure the width required so you get the correct size.

Because there are so many types of windows, some innovation may be required by the home owner. Sealing the channels with rope caulking in the fall and removing it in the spring is one way of treating sliding windows or doors with large, leaky gaps. For narrower gaps in sliding windows, a weatherstripping tape can be applied in the fall and removed in the spring.

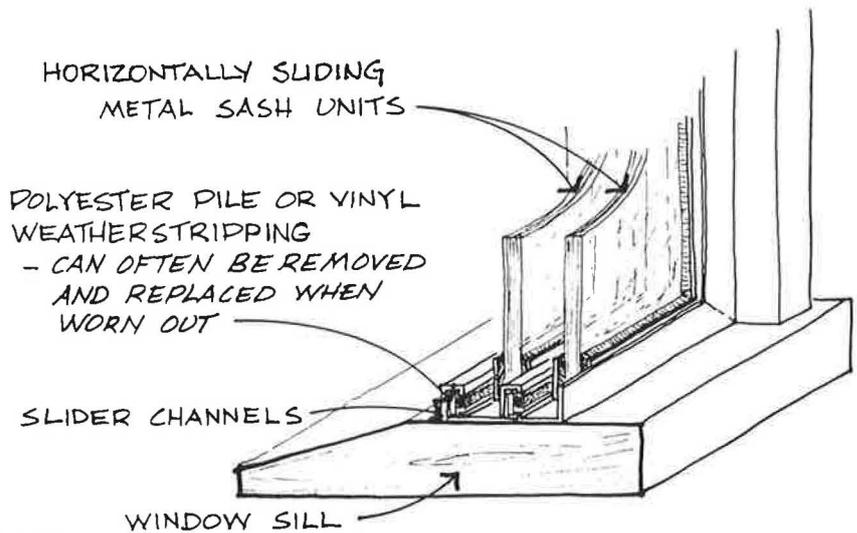
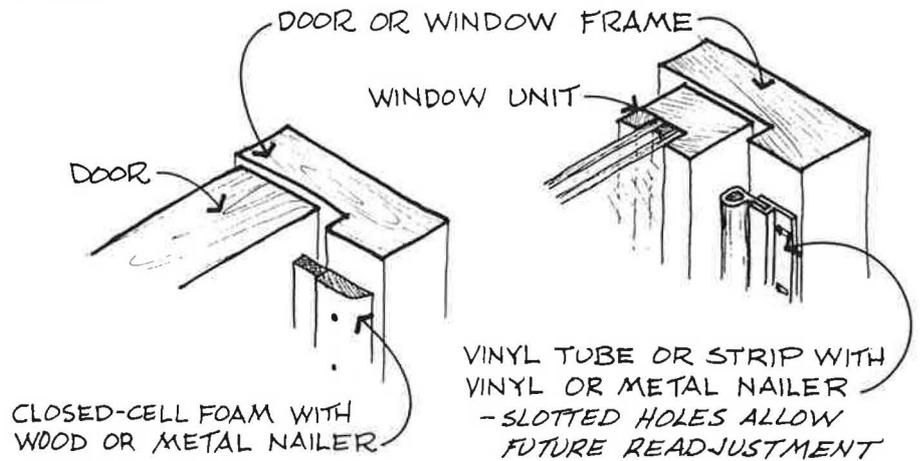


FIGURE 5

Awning, hopper or casement windows (swinging types) can be weatherstripped as doors are. To weatherstrip these units, a material is attached to the jamb, and the door or window closes against it. Figure 6 shows some types of jamb weatherstripping suitable for doors or swinging windows that have no existing seals. The illustrations apply to all sides including the hinge side.

Most windows of this type are factory-weatherstripped, but if the materials wear out, replace them with similar types. Select a material with slotted holes (or one that is self-adjusting) so that future adjustments can be made to accommodate change, slight movement, warping or shrinkage.



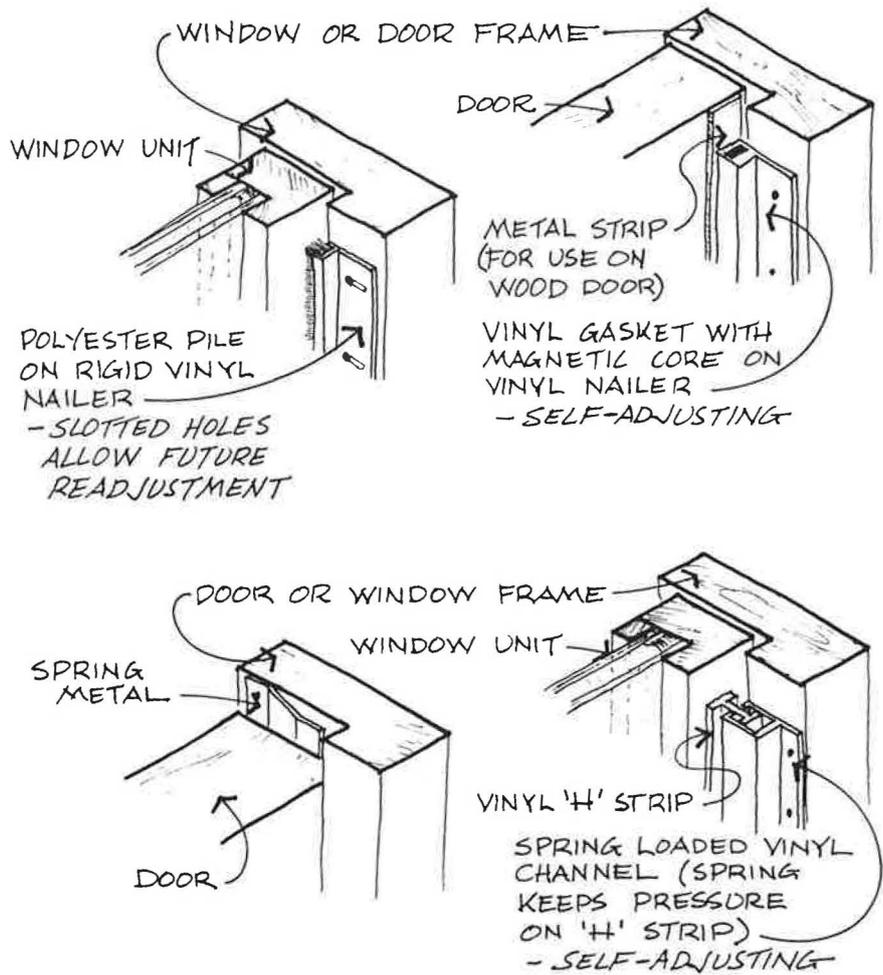


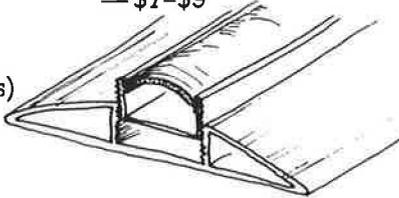
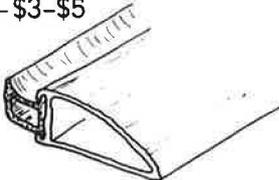
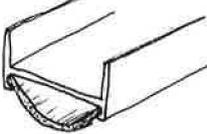
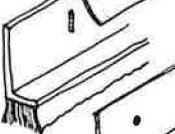
FIGURE 6

2. Weatherstripping for Door Bottoms

Door bottoms are unlike jambs because they are subject to traffic wear. For this reason, they must be more durable. There are two ways to weatherstrip a door bottom — by using a **threshold**, or by attaching a **door bottom** or **sweep**. Different types are listed below.

When choosing a threshold or door bottom, try to find one which does not require trimming the door. Measure the clearance available and select accordingly. Some types, as illustrated in Figure 7, will adjust to accommodate different heights. Others will not, while still other types work on the side of the door bottom (requiring no clearance).

TABLE 2

Type of Door Bottom Weatherstrip	1981 Cost per door	Comments on Use
Full-Width Threshold (metal with vinyl gaskets)	— \$7-\$9 	<ul style="list-style-type: none"> — Need 15 mm minimum clearance ($\frac{5}{8}$ in.) — May have adjustable insert (up to 30 mm $1\frac{1}{4}$ in.) — Check that replacement gaskets are available
Partial Threshold (vinyl or closed-cell foam)	— \$3-\$5 	<ul style="list-style-type: none"> — Do not need bottom clearance — Can be damaged by trapped stones, etc. — Check that replacement gaskets are available
Door Bottoms	<ul style="list-style-type: none"> — Metal with vinyl gasket or insert \$4-\$6  — Spring metal \$6  	<ul style="list-style-type: none"> — Required clearance of 8-13 mm ($\frac{1}{4}$ in. - $\frac{1}{2}$ in.) — Some types can also be used as a threshold — Check that replacement gaskets are available — Good durability and seal — Easily damaged by gravel, etc.
Door Sweeps	<ul style="list-style-type: none"> — Vinyl strips \$2-\$3  — Polyester pile \$3  — Automatic sweep \$8-\$9  	<ul style="list-style-type: none"> — May be adhesive-backed or nailed — Easy to attach — Good durability and seal — Adjustable — Moderate durability — Adjustable — Good to use for uneven floors — Good durability and seal — Adjustable

Thresholds are generally installed to replace existing, worn out ones. Only the vinyl or rubber weatherstripping may be defective on some existing thresholds, and not the entire assembly. Check to see if new inserts can be purchased separately. If the threshold must be replaced, select a new one which has weatherstripping that can be easily renewed as may be required in the future.

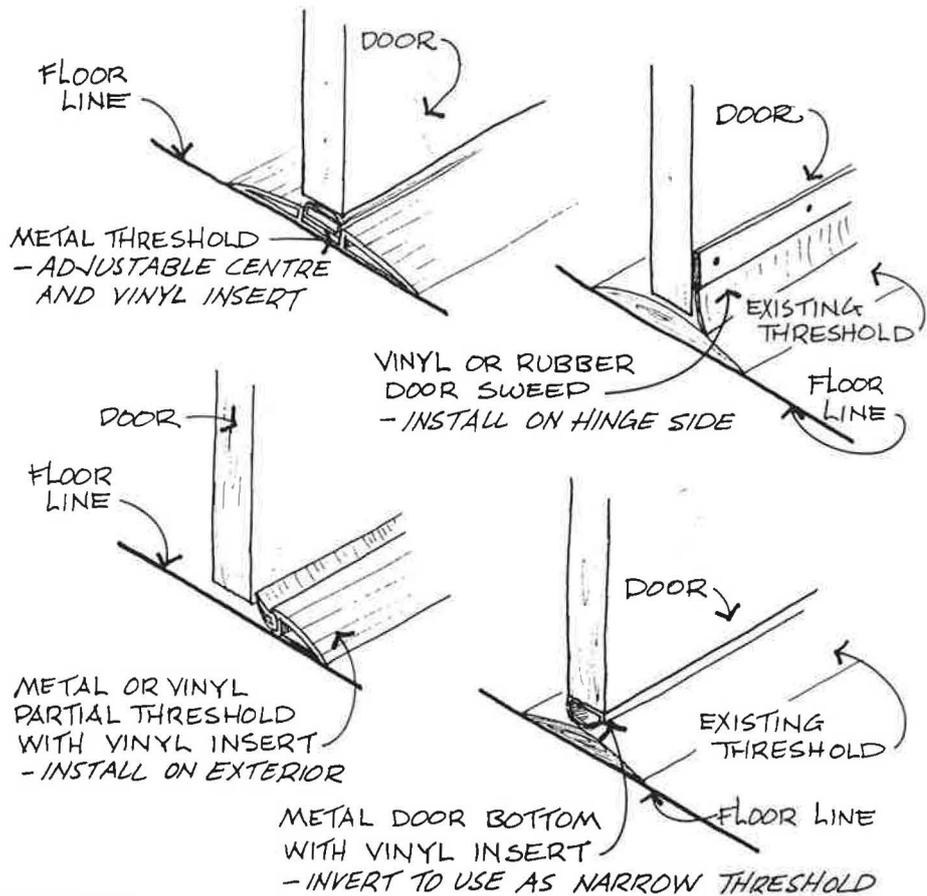


FIGURE 7

Door bottoms or sweeps are usually installed on existing doors with little or no bottom weatherstripping. Depending on the type, they can be installed flush with the floor of the existing sill and provide a positive seal against the floor or sill to stop air movement. Select a sweep or door bottom that can be adjusted in the future to compensate for wear and movement.

3. Weatherstripping for Other Openings

Other "door-type" openings in your home include attic hatches and milk chutes. The door (or doors) of a milk chute can be weatherstripped with the same jamb materials as discussed for windows and doors. If the chute is no longer in use, fill the box with insulation and seal the inside door with caulking.

Attic access hatches can best be weatherstripped by using compressible tube or strip products installed as shown in Figure 8. If the hatch is not heavy enough for a tight seal, add fasteners or screw the hatch securely closed. The hatch must also be insulated adequately.

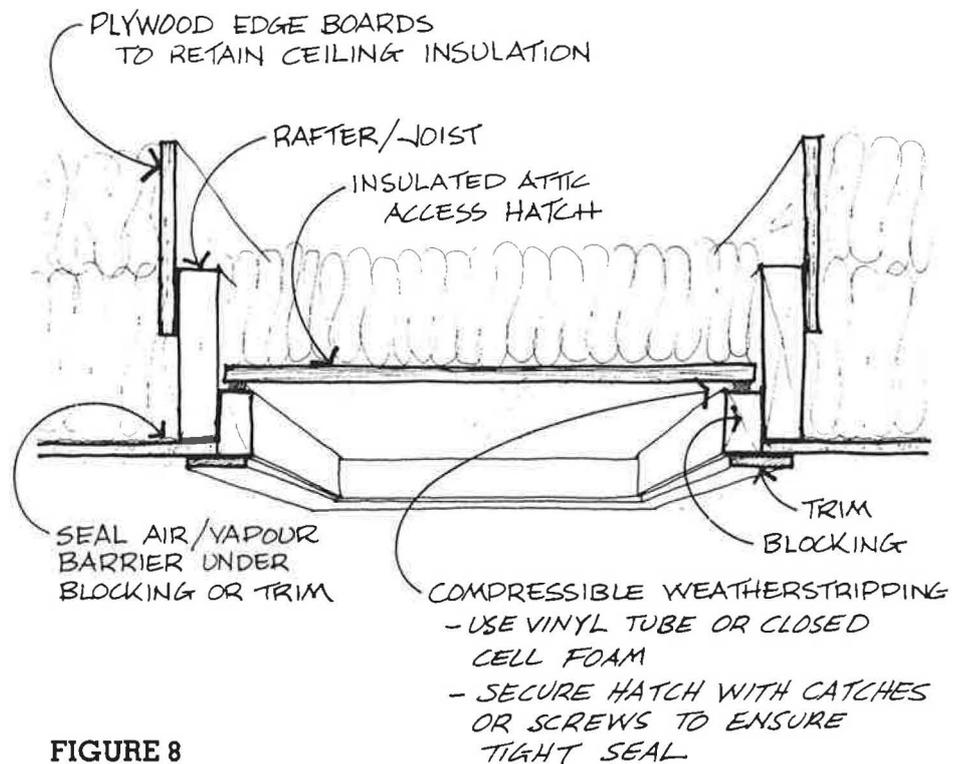


FIGURE 8

Other "doors" to the exterior include exhaust fan dampers. These cannot be weatherstripped, but make sure they are closed when not in use by feeling for any backdrafts. A dust or lint build-up around the closing flap, or a bent, sticking hinge may be preventing the flap from closing completely. Clean and adjust the dampers to correct this problem. The complete duct run from your clothes dryer should be cleaned regularly as well. This will help prevent a lint build-up; the damper will then remain closed.

The exhausts should be used as little as possible in the winter since it is heated air which is being exhausted. Consider limiting the use of your clothes dryer and drying more items on racks or lines in the utility or basement area (especially in winter). You may also consider replacing your range hood with a recirculating charcoal-filter type (remembering to insulate and seal the old vent system).

Another damper which should fit very tightly is the one in the fireplace chimney. Using a light, check to see if there are any gaps caused by debris build-up, warping or poor construction. This damper cannot be weatherstripped but can often be cleaned or adjusted for a better fit. If not, consider plugging the opening in the winter (or permanently, if the fireplace is never used). One can also build a decorative and insulated fireplace "plug" (the size of the firebox opening) which can be inserted after the fireplace cools down (as shown in Figure 9). This "plug" will prevent heated room air from constantly rising up the fireplace chimney around a poorly fitting damper.

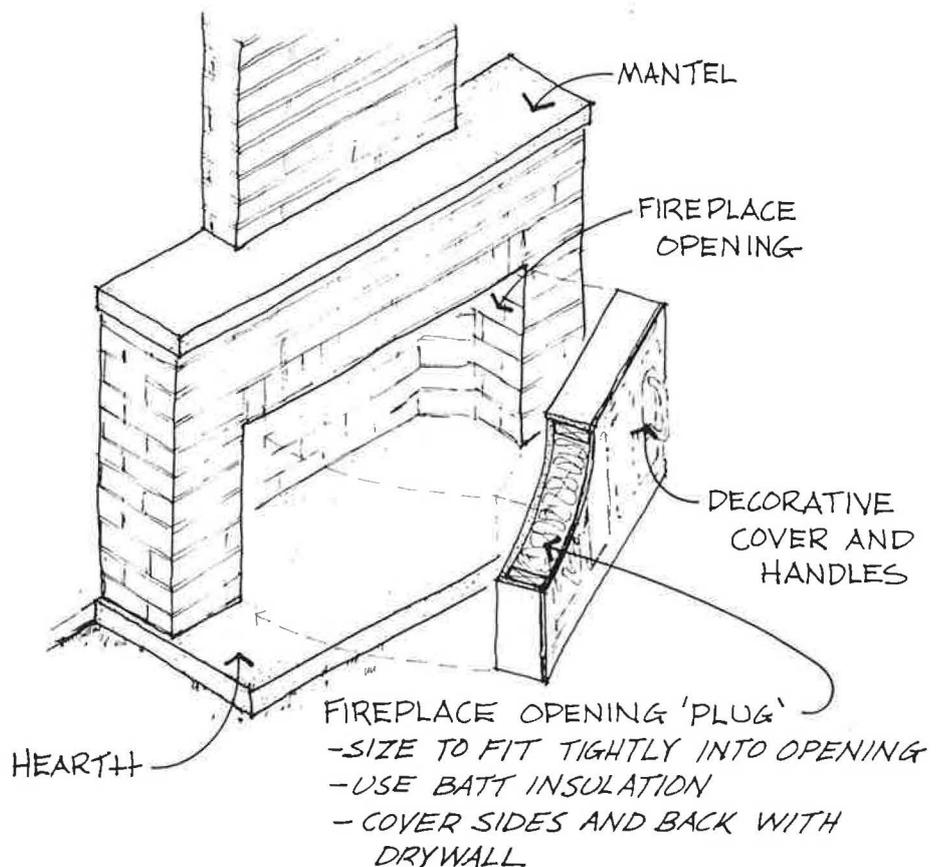


FIGURE 9

B. CAULKING

Caulking is applied where two surfaces meet but do not move — at sill plates or duct outlets, for example (see Figure 1). Application of caulking requires a little more effort and skill than weatherstripping but is just as effective in cutting heat losses. Specialized or combination weatherstripping and caulking techniques are required to reduce air leakage around some other areas such as plumbing stacks, chimneys or electrical outlets.

Houses are built of a number of different materials. Because these materials expand and contract at different rates with temperature and moisture changes, cracks and gaps may occur. **Exterior** gaps are a concern because water can penetrate structural components, causing deterioration. **Interior** gaps are a concern because air leakage causes heat loss and, the heated air carries moisture which may condense in the structure of the wall, causing damage.

The emphasis in this publication is on preventing air leakage by sealing from the inside. The same product information can be applied to exterior caulking. Interior sealants, though not subject to the same severe weather conditions as exterior types, are still required to maintain a good degree of flexibility and adhesion over a long period of time.

The preferred type of interior sealant will depend on its use — whether exposed or concealed, the width of gap, adjacent materials, whether a high degree of flexibility is required, etc. The following chart gives the characteristics of available caulking materials.

TABLE 3

Caulking Type	1981 Cost	Comments on Use
Oil/Resin Base	— \$1-\$2/310 ml	<ul style="list-style-type: none"> — Durability less than 5 years — May stain unprimed wood surfaces — Takes up to 1 year to cure — Forms hard surface when dry
Latex Base (acrylic or non-acrylic)	— \$2-\$3/310 ml	<ul style="list-style-type: none"> — Durability about 10 years — Will not bond to metal — Use only on indoor surfaces — Cleans up with water — Can be applied to damp surfaces — Can be painted — Forms hard surface when dry

TABLE 3

Sealing Type	1981 Cost	Comments on Use
Butyl Rubber	— \$3-\$4/310 ml	<ul style="list-style-type: none"> — Durability about 10 years — Excellent adhesion to all surfaces — Excellent moisture resistance — Can be painted — Flexible when dry — Will stick to air/vapour barrier
Elastomeric (silicone, polysulphide)	— \$6-\$8/310 ml	<ul style="list-style-type: none"> — Durability in excess of 20 years — Takes up to 3 days to harden — High moisture resistance — Needs special cleaners for tools, hands, etc. — Non-toxic when cured (7-day cure) — May be irritating during application and curing — Flexible when dry — Sticks to air/vapour barrier — Some types cannot be used on concrete
Polyurethane Foam	— \$8-\$10/aerosol can	<ul style="list-style-type: none"> — Specialized product for large gaps — Difficult to install — Flammable (must be covered by drywall on interior)
Acoustical Sealants	— \$9-\$10/810 ml	<ul style="list-style-type: none"> — Durability in excess of 20 years — Interior use only — Non-hardening (must be covered) — Needs special cleaners for tools, hands, etc. — Sticks to air/vapour barrier (excellent sealant for same)
Rope or Cord	— \$0.25-\$0.30/m (\$0.08-\$0.10/ft.)	<ul style="list-style-type: none"> — Specialized product for large gaps — Must be protected by sealant or covering — Can be used temporarily, then removed for reuse (if not sealed)

The most common and easiest form of caulking to use comes in 310 ml (11 oz.) tubes and is applied using a standard caulking gun. As shown in Figure 10, large-sized tubes are also available, as well as knife-grade caulks which come in a can and must be applied with a putty knife.

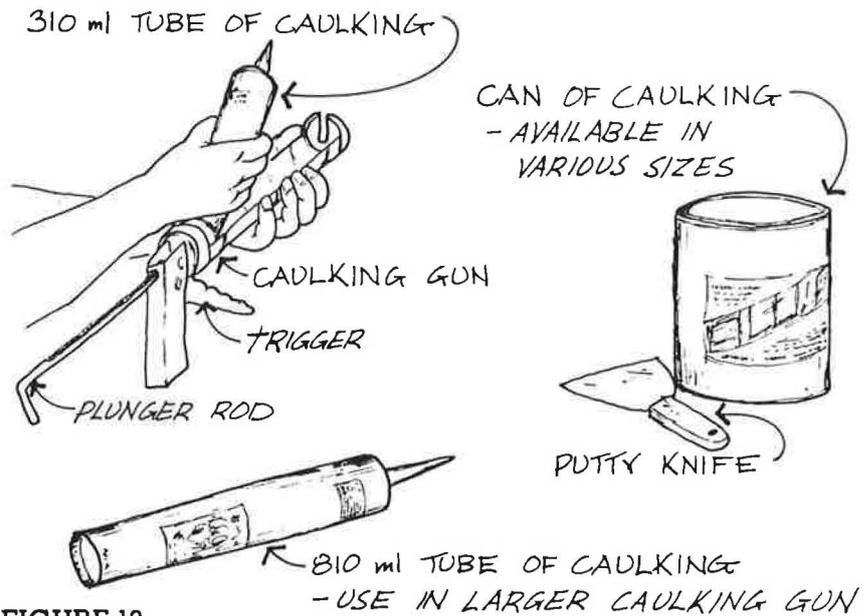


FIGURE 10

Before using caulking materials, keep in mind the following points:

- Make sure all surfaces are clean.
- Make sure all surfaces are dry.
- Do not apply caulking at temperatures below 10°C unless otherwise specified on label.
- Check to see if the caulk you are using is flammable, irritating to the skin or gives off dangerous vapours and handle it accordingly.
- Choose a caulk suitable to the size of the crack to be filled and compatible with the materials it is to adhere to.

A bit of practice may be required before you can create a neat uniform bead when using a caulking gun. The nozzle should be cut at a 45° angle. Since the nozzle is tapered, cut it at the width you require — near the narrow end for a small bead, farther up for a wider bead, etc. The caulking material should be pushed ahead of the nozzle as you are applying steady pressure on the trigger, holding the angle of the gun

constant and moving along at an even rate. The resulting "bead" should provide a good seal — be careful to leave enough caulking to accommodate for shrinkage or joint movement (as in Figure 11).

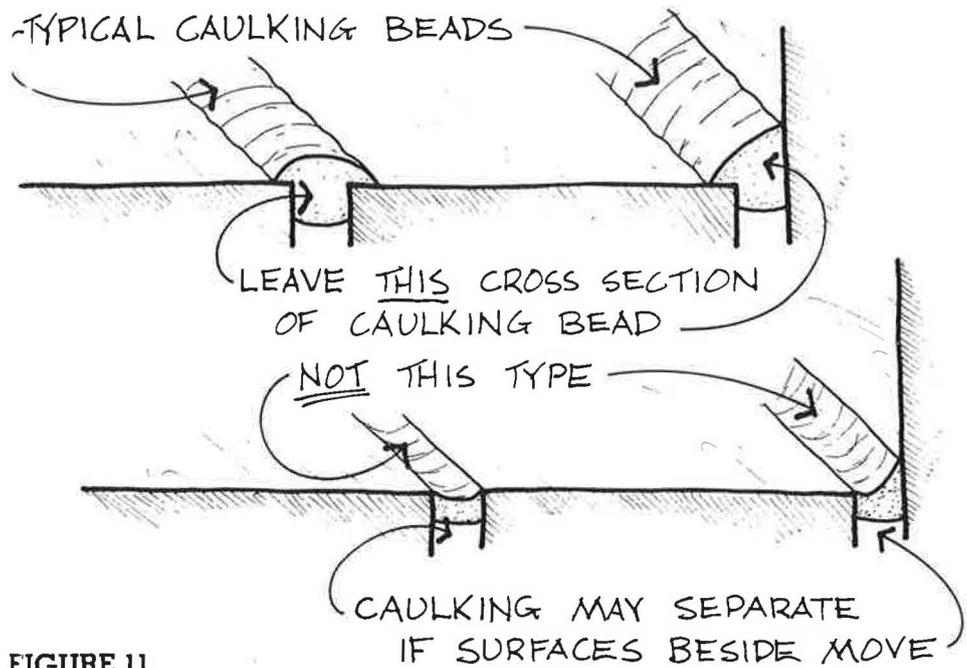


FIGURE 11

1. Sealing the Joist Space

The exposed section of foundation walls and the joist space have a number of cracks and openings, which can result in a high rate of air movement. It is most convenient to seal the joist space against air leakage from the inside. Figure 12 shows how the sill plate and joists can be caulked (depending on the construction of your home). Also, be sure to seal inside and outside any service pipes, ducts or conduits that go through the walls or end joists. Large gaps should be tightly stuffed with oakum, sponge rubber, insulation or rope caulking material or filled with an expanding foam to act as a backing for caulking (See Figure 13). Use a good-quality, durable caulking material because it may be covered if you insulate the joist space. Long-lasting silicone or elastomeric caulks suitable for concrete application will give the best service.

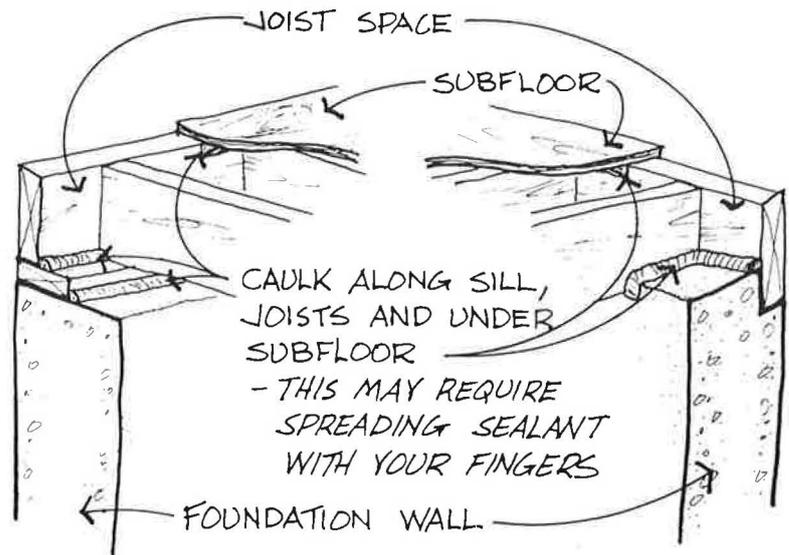


FIGURE 12

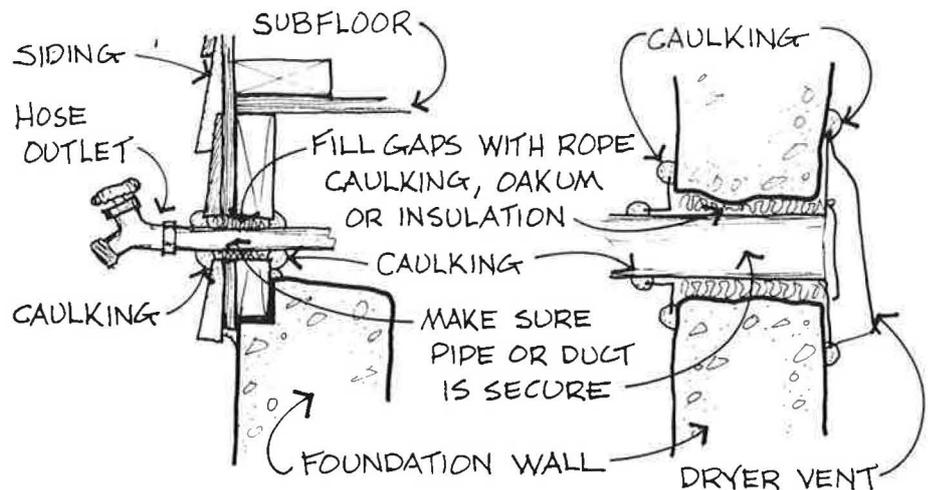


FIGURE 13

2. Sealing the Attic Space

Weatherstripping the attic hatch has been discussed on page 14. If your attic has a vapour barrier, any cracks around pipes, vents and chimneys or along partitions between the warm living space and the cool attic must be plugged to stop air leakage. Plywood "collars," neoprene roof flashing or polyethylene, as shown in Figure 14, can fit snugly around plumbing and vents. The material must then be secured and caulked to the pipe and existing vapour barrier.

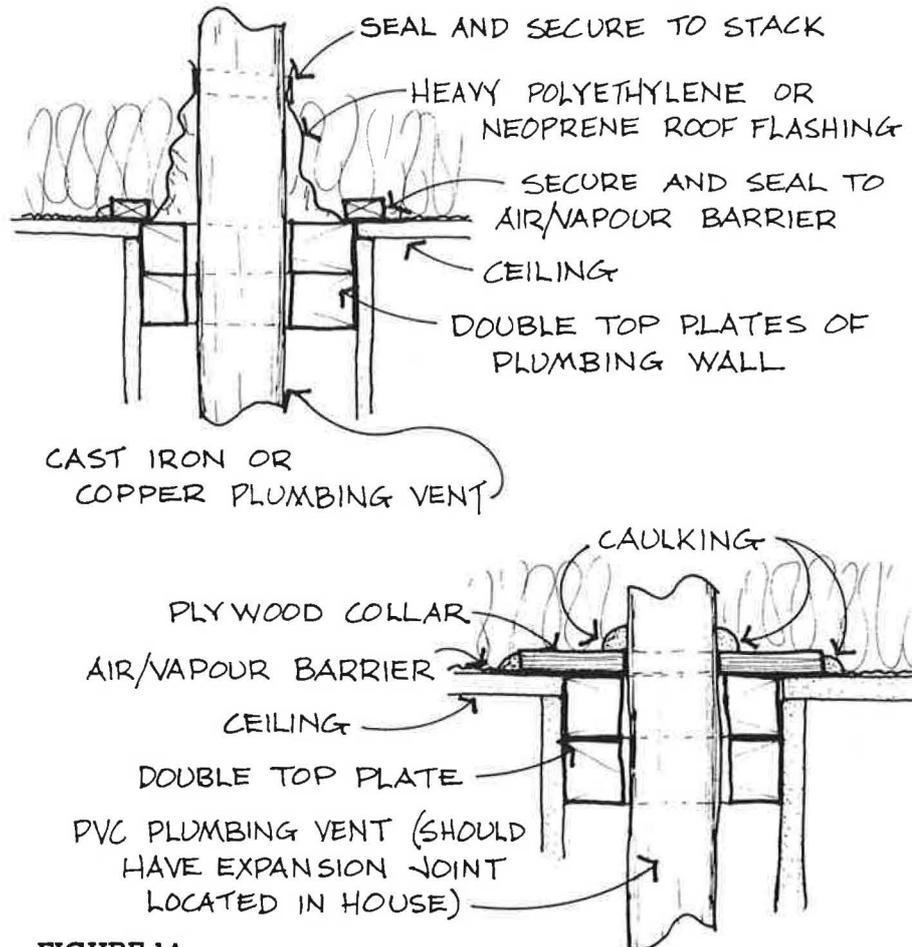


FIGURE 14

Metal firestops must be used around chimneys. Again, the metal must be sealed to the vapour barrier. A material such as heat-resistant "muffler cement" can be used to seal the firestops to the chimney metal — do not use a normal caulking material.

Improving the vapour barrier over ceiling electrical boxes is also possible. Figure 15 shows how an additional piece of polyethylene can be added over the boxes. Be careful around wiring and be sure to disconnect the circuits of the areas being worked on. Try to caulk where electrical wires penetrate the top plates of walls.

Before leaving the attic, make sure all areas disturbed have had the insulation replaced. Do not place insulation within 50 mm (2 in.) of chimneys.

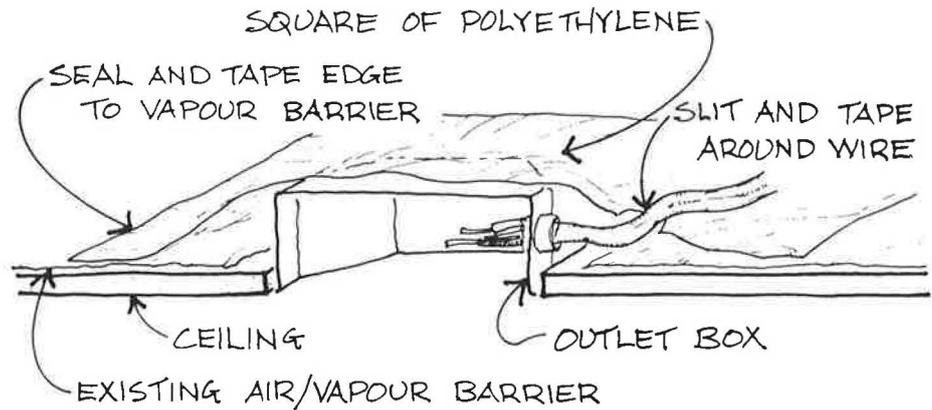


FIGURE 15

3. Sealing Around Window and Door Openings

The installation space (or rough opening) around windows and doors is another area subject to air leakage. Insulation has usually been stuffed into the crack — this serves to insulate but not **stop** the air flow. This leakage can be stopped by:

- Caulking around the trim with clear silicone sealant.
- Removing the trim and sealing the space with a caulking or an expanding foam. Or,
- Removing the trim and sealing the space with a strip of polyethylene, sealed with an acoustical caulk (as shown in Figure 16).

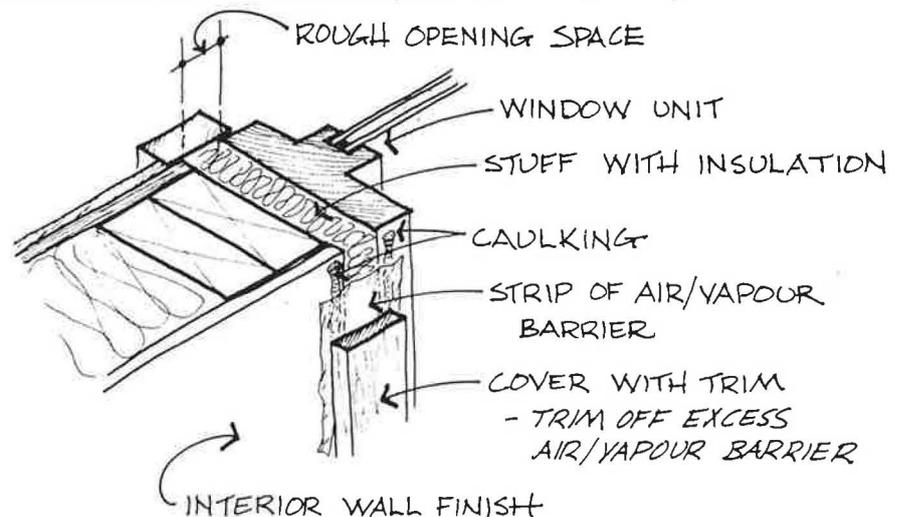


FIGURE 16

It is often convenient to improve the seal around doors and windows of older homes when the trims are removed for repainting or are being replaced.

4. Sealing Loose Panes of Glass

If any glass panes are loose in their wood frames, new caulking is required to stop air leakage. Putty compounds are most often used and are the least expensive solution. Clean the old material off before reglazing the panes.

Air leakage around sealed units and their frames can be stopped using one of the gun-type of caulking materials (see Figure 17).

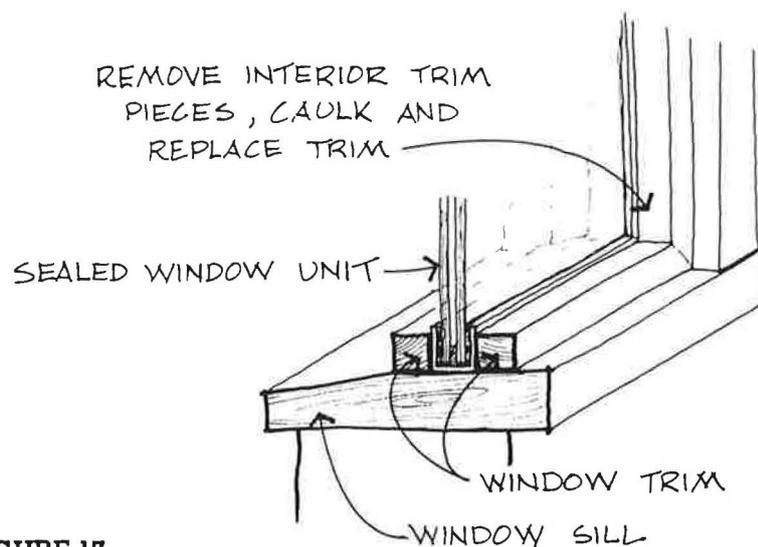


FIGURE 17

Glass panes in metal and vinyl frames are sealed with vinyl strips. The strips are durable and should not require replacement during the life of the window.

5. Sealing Wall Outlets and Switches

Outlets and switches on **exterior walls** are yet another source of heat loss. Some tests have indicated that up to 20% of the total air leakage heat losses in existing houses can occur through the outlets. Losses can be cut in two ways:

- By using clear silicone sealant and drawing a bead around the plate and wall and around the switch or outlets and the plate (as in Figure 18), or
- By using commercially available, inexpensive, Canadian Standards Association (CSA)-approved gaskets between the plate and wall.

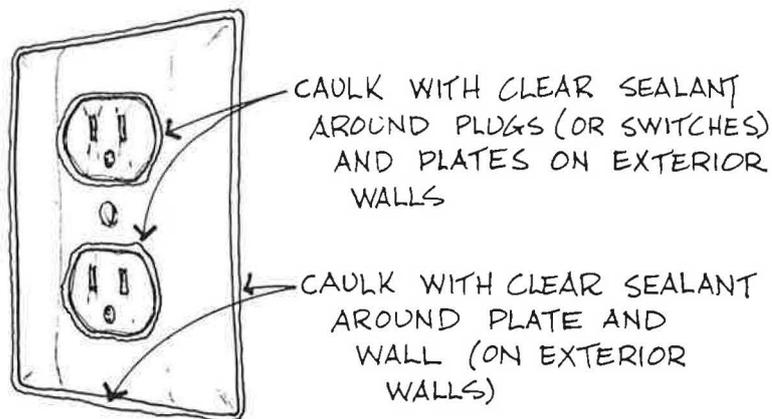


FIGURE 18

Disconnect the power to any outlets you are working on. Electrical codes forbid placing any object inside the boxes so all sealing has to be "external." Child "safety plugs" can be placed into unused outlets to stop air flow through the outlet holes (as shown in Figure 19).

If you are removing wall finishes, renovating, or installing new wiring, it would be wise to install a vapour barrier behind new electrical boxes. There are commercially available polyethylene box covers available. Seal the box covers to the wall vapour barrier with an acoustical sealant before covering the walls.

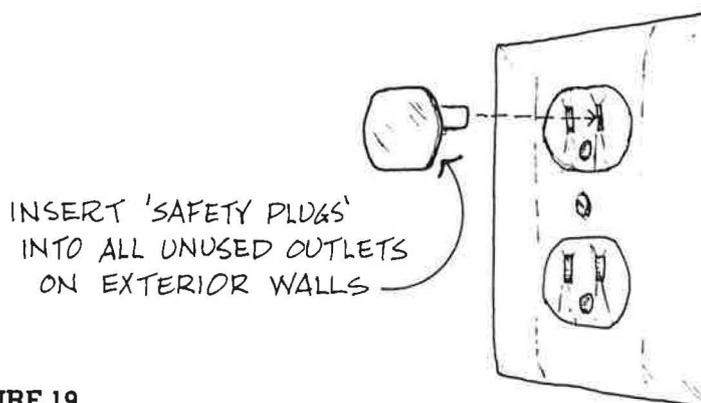


FIGURE 19

C. CAN YOU OVERSEAL YOUR HOME?

It is very difficult to seal an existing house to the point that the air supply to combustion equipment is restricted or humidity and condensation problems occur. In recently built homes, there will be separate combustion and fresh air supplies to the furnace area of your home so that sealing the home should not affect performance.

If excessive condensation does begin to appear on the inside of windows in cold weather (even though the humidifier is turned off), or if your fireplace doesn't draw properly, the fresh air supply should be increased. This can be accomplished by opening the fresh air supply damper either to the return air of your furnace or to the fireplace (if it has a fresh air supply), or by slightly opening a window. If your home is older and does not have a fresh air supply to the furnace area, consider installing one. If you isolate the furnace in a room with its own outside air supply, no large, uncontrolled fresh air supply has to enter the rest of the house (see Figure 20).

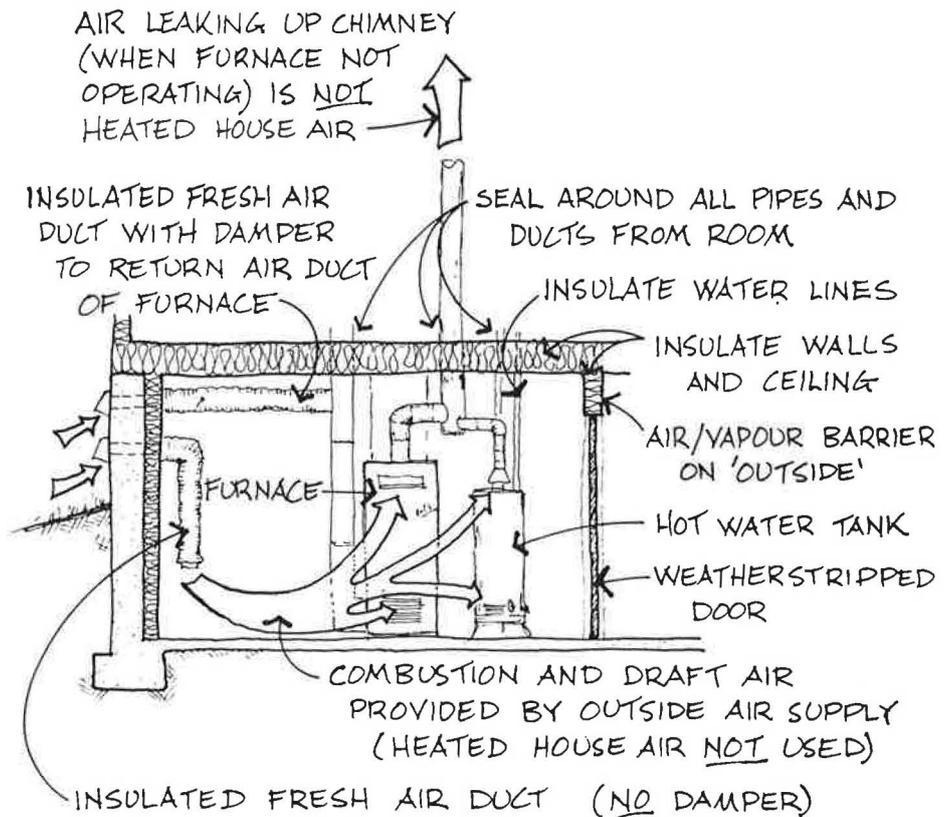


FIGURE 20

If excessive condensation becomes a problem, you have done an excellent job of sealing the home — to the point that it **may** be economical to install an air-to-air heat exchanger (see Figure 21). Warm, humid and stale air (from bathrooms, the kitchen, etc.) is exhausted past incoming cold, fresh air. The incoming fresh air picks up most of the heat from the stale air, thereby reducing heat loss. This increases the fresh air supply and lowers the humidity level inside. **Air-to-air heat exchangers are only useful in "tight" houses.** They are not economical to install in older homes unless excessive humidity warrants a large fresh air supply.

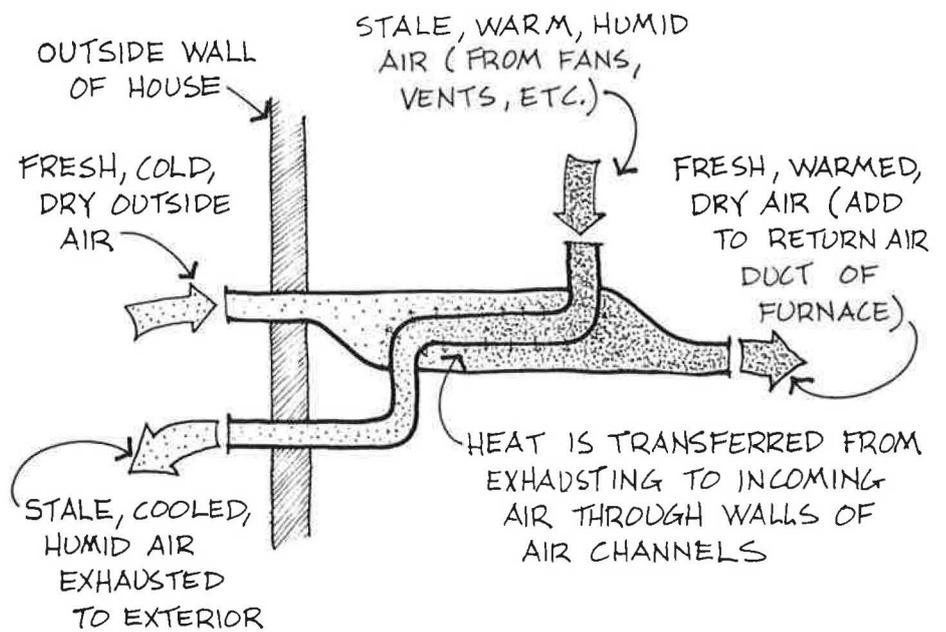


FIGURE 21

D. SUMMARY

- Check potential areas of air leakage and identify the worst sources.
- Check on grants available, application procedures, materials accepted, etc.
- Weatherstrip windows, doors and hatches.
- Check vents and dampers on fans and fireplaces.
- Caulk cracks, outlets, vents and pipes penetrating the house exterior. (Remember the ceiling as well as exterior walls.)
- Seal around door and window trim.
- Test again for effectiveness of sealing.
- Observe windows for condensation in cold weather.
- Increase the fresh air supply to control condensation — it may require adding a fresh air supply to older homes.

The costs associated with weatherstripping and caulking are small. Installation takes time but is not difficult, and fuel savings are considerable. Improving air tightness should be considered a **must** for making your home energy-efficient.

NOTES:

