

Energy-Efficient Doors

It is difficult to justify the expense of a new door based on energy savings alone, but often times the additional benefits of appearance, comfort, and security are persuasive. Heat lost through ceilings and windows, for example, is much more significant and initial attempts to weatherize should be concentrated there.

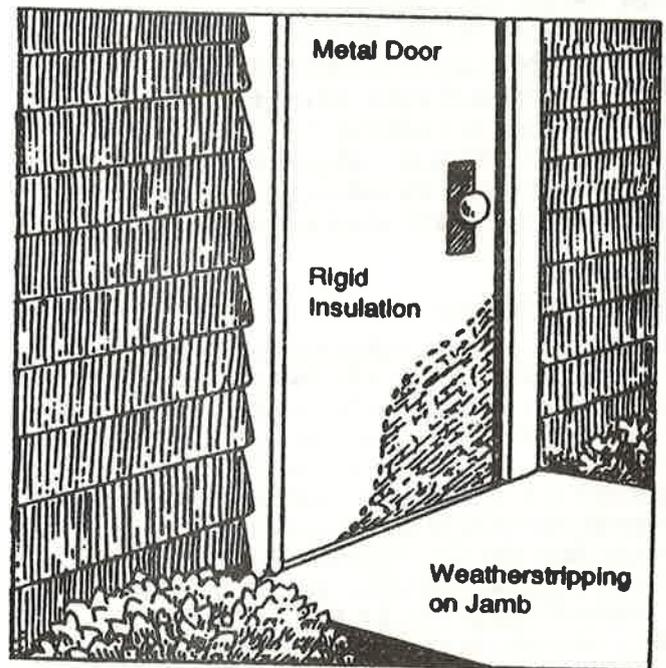
It is fairly obvious, however, if an exterior door is wasting energy. If a door doesn't shut snugly, it means that air is leaking around its edges. In fact, more heat is typically lost in this way than by conduction through the door itself. Sliding patio doors often have this problem if the weatherstripping is of poor quality or is worn out. Glass doors also have high conductive losses since glass is a very poor insulator.

This pamphlet will cover techniques for improving the energy efficiency of doors. They fall into the following categories: *Proper Fit and Weatherstripping*; *Storm Doors*; *Door Replacement*; and *Doors Containing Glass*. Each strategy is further discussed below.

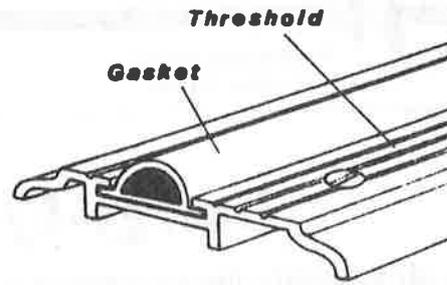
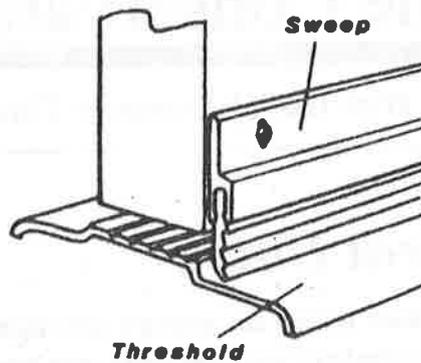
Proper Fit and Weatherstripping

A door must be properly fitted and weatherstripped to ensure it is leak free when closed. Weatherstripping materials range from inexpensive adhesive backed plastic strips and foams to metal strips that are nailed or screwed in place. The difference is in durability. In general, choose a product that fits your budget; all will do a good job of sealing out drafts if carefully installed. For doors that receive frequent use, however, quality products such as spring steel or metal-backed vinyl will last much longer. If necessary, a "door sweep" can be added at the bottom to seal the space above the threshold. Some newer thresholds and door bottoms come equipped with replaceable gasket material (typically vinyl or neoprene) to maintain a snug fit.

If weatherstripping is insufficient to seal the spaces, or the door does not squarely butt against the jambs, it may require minor modifications prior to weatherstripping. Often the door and trim is removed and the jambs are replumbed. A door is correctly fitted and weatherstripped when it requires a small effort to close or open. Light should not penetrate anywhere along its edges. A final check for drafts can be made on a cold day using a lit match, a wet finger, or the underside of a wrist. No air movement should be detected.



Typical Energy-Efficient Door



Ways to Seal Door Bottoms

Storm Doors

Storm doors are sometimes suggested as a solution to poorly insulated doors. To put heat loss in perspective, however, the amount of heat lost through doors is quite small compared to windows. This is because there are much fewer exterior doors, and with the exception of glass doors, doors are already better insulators than windows (R2 versus R1). Thus, whereas storm windows can be big energy savers, storm doors simply are not.

Storm doors should not be dismissed, however. They can offer views and screened ventilation during warm weather, and important weather protection for expensive entrance doors during the winter. If properly weatherstripped, they will further reduce infiltration and the possibility of drafts and condensation on metal or glass primary door surfaces. One caution, however. If the door faces south or west, possible overheating (leading to cracking and blistering) of wood doors can occur during hot weather if not screened for ventilation or kept ajar.

Door Replacement

Normally, doors are replaced only as part of larger remodeling projects and not to improve energy efficiency. It is much easier and less expensive to improve fit and weatherstripping. If a door is to be replaced, for reasons such as appearance or security, then definitely consider a well insulated and weather-stripped unit. Although costs may be higher than for an ordinary wooden door, they are comparable to any premium crafted product and will offer long lasting comfort.

Higher R values, from R8-R12, are now available with doors containing foam insulation (typically polyurethane) and clad with metal, wood, or fiberglass. Although wood is traditional, metal and fiberglass offer low maintenance and resistance to warping. Metal can be dented, but is strong and will not burn. To avoid possible condensation on metal doors, only consider those materials such as vinyl, neoprene, or wood which separates the inside and outside metal

surfaces preventing rapid heat loss through the metal. Many metal doors utilize wood framing members serving as thermal break material. Often doors are sold without finished surfaces and must be painted or stained. Be sure finish options and requirements are understood before buying. Regardless of door type, the importance of quality weatherstripping and installation cannot be overemphasized.

Doors Containing Glass

Many doors containing glass may be very cold and drafty or, worse, experience moisture problems. Methods for dealing with doors containing glass are basically the same as for windows. What must be done is to further insulate the glass so that inside surfaces are warmer and more comfortable. Options include inexpensive plastic film attached as a storm window or replacement double pane (insulated) glass. Storm doors also serve the same purpose. To achieve maximum comfort, the storm window or door should form a tight seal with framing materials preventing cold air from leaking into the enclosed space. Air spaces are only good insulators when the air is motionless, otherwise heat loss by convection will occur.

Sliding glass doors are a special concern since potential air leakage adds to the problem of cold glass. First try to repair or replace weatherstripping that is no longer effective. A temporary solution is to block leaks with any form of blanket material or installing heavy drapes to minimize drafts. If the doors are not normally used in cold weather, they can be sealed on a seasonal basis using tape, rope caulk, or by covering the entire door with plastic film. Permanent solutions include adding storm door units (sliding or removable) that mount over the existing door perimeter or replacement with well weatherstripped, double pane units. Compression type weatherstripping offers a far better air seal than the brush type. If feasible, hinged doors (French or Atrium style) offer tight seals and generally cost less. Insulated shades or shutters are another alternative offering high R values (R4-R7).

Recent advances in insulated glass technology have resulted in coatings that reflect radiant (infrared) heat from room interiors back into the heated space. This technology is known as "low-e" glass, for the low emissivity coatings they utilize. In effect, double pane low-e glass offers similar R values as standard triple pane glass without the additional weight. Costs are slightly higher than glass without the coating, but for homes with lots of glass, and especially sliding glass doors, the comfort of low-e may alone be worth it.

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Glass Doors Need Special Attention

WEES Publications

Storm Windows (WAOENG-89-11)

Insulated Window Covers (FS-1104)

Washington Energy Extension Service

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