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Save Home Energy

Insulating Windows and Other Glass Areas

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Windows can increase or decrease utility consumption. During the winter, a window can transmit sunlight into a room and then trap the heat. This heat gain can exceed the window's total conductive heat loss for the day only if the sun is shining when it is needed. If the sun does not shine when needed, the cost of the heat loss can exceed any heat gain advantages. During the summer, windows can be used to provide natural air conditioning by taking advantage of mild temperatures and breezes. Daylight serves as a free source of illumination during all seasons. Poorly planned openings allow heat to escape in the winter and enter in the summer, increasing the load on the heating and cooling system.

Insulated glass, storm windows and sashes provide a buffer of air space between the inside and outside temperature. This buffer helps reduce water condensation on inside surfaces by allowing the temperature of the air next to the inside glass to remain higher and not condense the moisture in the air.

Primarily, this buffer of air space helps reduce heat loss and gain. A single pane of glass has an R value of 0.88. "R" indicates resistance to the flow of heat. The higher the R value, the better the insulation qualities. By adding storm windows or sashes, the R value is increased to 1.75 to 1.89, thus cutting in half the heat loss and gain through the window area. Insulated glass made of two or three panes of glass has an R value of 1.60 to 1.75. Insulated glass, storm windows and sashes should be used throughout the year to reduce both heating and cooling costs.

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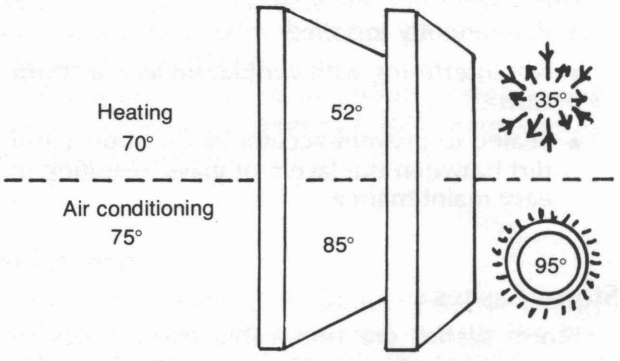

Effects of storm window on temperature.

Insulated Glass

Insulated glass is permanently installed in either fixed or movable frames. Double- and triple-glazed windows consist of individual layers of glass separated by an air space. The air space acts as insulation and retards the movement of heat to cold. The optimum space is 5/8 to 3/4 of an inch. Insulated glass can be placed in movable frames to allow for ventilation or in a fixed-frame window.

Insulated glass is made by sealing the edges of multiple panes of glass together at a factory. If the panes of glass are not dried and sealed, moisture and dirt problems can occur. If the layers of glass are sealed, moisture and dirt cannot get between them. During the sealing process, the air space between the glass is dried to prevent moisture condensation problems.

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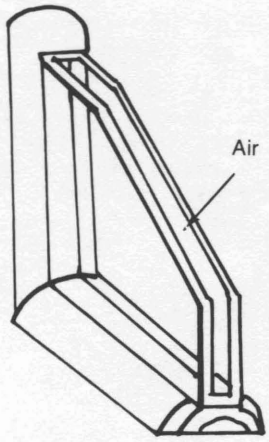


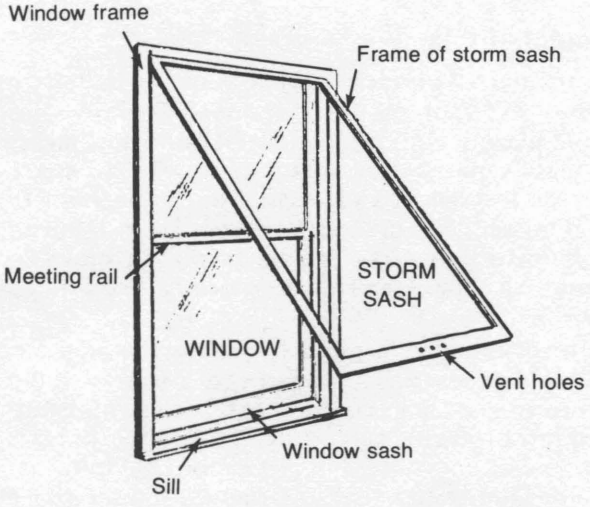
Insulated glass.

The initial cost of insulated glass is higher than single-glazed windows but offers several advantages over single-pane glass and a storm sash. Insulated glass is:

- Permanently installed
- Noninterfering with ventilation as is a storm sash
- Sealed to prevent accumulation of dust and dirt between the layers of glass, resulting in easy maintenance

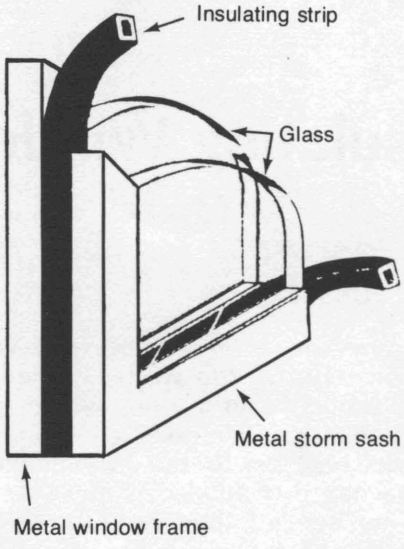
Storm Sashes

Storm sashes are removable extra panes of glass or rigid plastic that are fastened to the frame of the window. They are in fixed frames and must be removed to allow for ventilation through the window.



Parts of a window and a storm sash.

Storm sashes reduce infiltration of cold air and dirt. To reduce winter moisture condensation problems between the glass, the inside window or storm sash must fit tighter than the outside one. This can be accomplished by using weatherstripping, tape or other sealants at all joints and cracks. Metal frame windows and sashes should be separated by a sealant or weatherstripping material to prevent transfer of heat through the frame area.



Metal frame window and sash separated by weatherstripping.

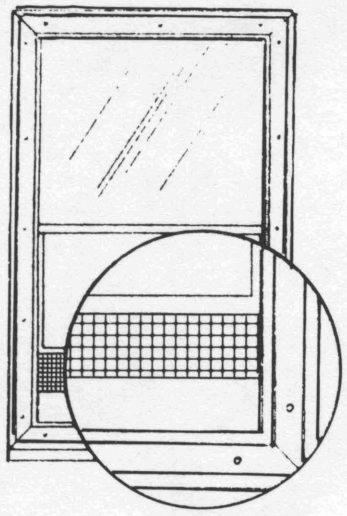
Inexpensive storm sashes can be made of plastic sheeting. Four-mil plastic can be purchased in kits with strips and tacks. Plastic can be bought in large rolls from which each window sash is cut. The plastic also can be attached to a frame which is then attached to the window opening.

Storm Windows

The type of storm window most commonly used is the permanent type, double-track or triple-track window-and-screen combination. Ease of operation, care, maintenance and serviceability are important selection factors.

Storm windows that are referred to as double track have a fixed upper window and lower screen in the outside track and a movable window in the inside track. In most cases, all three frames can be removed for repair or cleaning.

Storm windows that are referred to as triple track have a separate track for each sash and screen. This gives the home occupant the choice of placing the screen at the top or bottom location and allows for ventilation from the top or bottom of the window during the warmer seasons.



Combination storm window and screen.

Ease of operation is important. The window sash should move properly within the storm window frame. An ideal situation would be to have the storm window slide against a vinyl track rather than metal to metal. Spring-loaded vinyl jambs that provide a friction fit allow for a tighter storm window and for smoother operation. Normally the storm window will allow for some air infiltration to take care of any moisture problem between the windows.

The thickness of metal frames affects the quality of storm windows. Some metal frames of lesser quality have a thickness of less than a dime. Others of higher quality are approximately as thick as a 50-cent-piece. Thicker frames usually give less trouble because they have less tendency to bend out of shape. This is important because a poor fit can cause too much air infiltration and nullify the storm window effect. The thicker metal frames normally provide for better sash movement. Aluminum frames should have thermal barriers to break direct thermal conductance.

The finish of metal storm windows is usually reflected in the price. Most metal storm windows are made of aluminum and come in three finishes: baked-on enamel, anodized aluminum and natural aluminum finish. Baked-on enamel finishes are considered the best and most expensive. The natural or mill finish is less expensive and can be buffed with fine steel wool to give it a bright, clean look.

Wood frames provide better insulation in the frame area but are higher in cost than metal. Wood frames reduce heat loss about 3 percent more than aluminum frames. They provide easy maintenance when covered with vinyl.

Storm window installation is very important. Sill drainage must be provided to prevent interior sill overflow. A good grade of caulking material such as silicone, latex or butyl rubber or weatherstripping should be used. Applied to the area between the storm window frame and the window frame, the caulking or weatherstripping prevents excess air infiltration and serves as a thermal barrier. As the space between the primary glass and the storm window exceeds 2 inches, insulative ability is reduced.

For more information about energy saving window treatments, refer to L-1674 *Energy-Saving Window Treatments*.

References

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