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# Energy-conserving window treatments—draperies

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## Quick Facts

- An energy conserving window treatment must trap air between itself and the window.
- The effectiveness of a drapery is determined by the amount of incoming solar energy reflected back at the glass, the amount of solar energy absorbed by the fabric, and the amount of solar energy transmitted through the fabric.
- To be energy efficient, draperies must be sealed at the top and at the sides.
- The effectiveness of a closed drapery as an insulator is greatly impaired if conditioned air is free to circulate between the drapery and the window.
- Some historical drapery treatments were very energy efficient.
- The use of double draperies—two layers of draperies separated by air space—further improves the thermal performance of window treatments.
- Drapery linings also are important as energy savers; they provide an additional barrier to the sun's rays in summer and help reduce heat loss in winter.

The unprecedented rise in fuel costs is forcing many consumers to be on the continual search for energy efficient methods of heating and cooling their homes. Though somewhat limited in scope and seldom thought of as energy conserving, window treatments are one method of maximizing a home's heat gain and minimizing loss.

While window treatments can be as diverse and distinctive as desired, some treatments are more energy efficient than others. Why? Because an energy conserving window treatment must trap and hold air between itself and the window.

## Draperies

The effectiveness of a drapery is determined mainly by three factors: the amount of incoming solar energy reflected back at the glass, the amount of solar energy absorbed by the fabric, and the amount of solar energy transmitted through the fabric and through the openings of the weave.

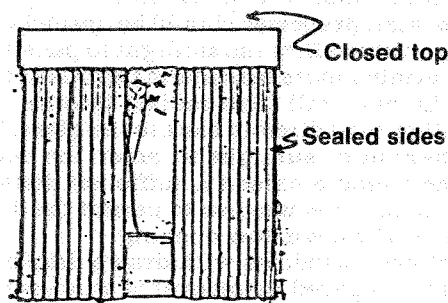
The most common window treatment today is the pinch- or French-pleated drapery. However, since the drapery stands away from the wall and is not sealed at the top nor the sides, air leaks are created. The use of a valance, a common addition to the popular pinch- or

French-pleated drapery, does not stop air leakage because the top is open.

Draperies should be sealed at the edges by tacking the fabric against the wall or window frame. They also should be extended down in contact with the floor or window sill. These methods will insulate the window against heat loss in the winter and heat gain in the summer.

Heat loss through windows with tight-fitting, closed draperies is substantially reduced compared to the heat loss of an uncovered window. The effectiveness of a closed drapery as an insulator is greatly impaired if conditioned air is free to circulate between the drapery and the window.

Draperies should be installed so that conditioned air blows on the room side of the drapery and not between the drapery and the window. Where the register is directly below or above the window, retrofit deflectors are readily available which divert the air into the room rather than up or down the window surface.

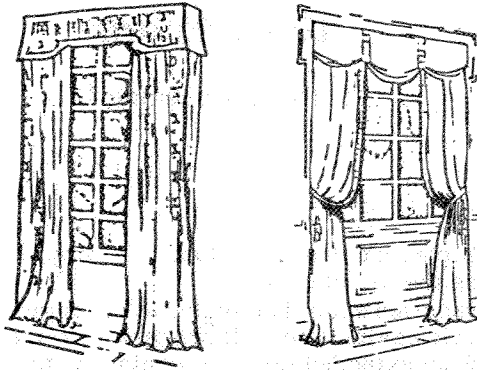


Closed top and sealed sides help prevent air leakage.

When room air comes in contact with the cold glass, it is cooled and cascades back into the room at the bottom of the drapery. In order to avoid the "cascading" effect, draperies need to extend from the ceiling to the floor. However, if this is not suitable, a cornice board also will stop air circulation if the cornice is constructed with a closed top. Cornice boards may be shaped to follow the rectilinear or curvilinear lines of a room.

Some historical drapery treatments were very energy efficient. As well as having cornice boards, the draperies were allowed to flow out onto the floor, preventing air circulation between the room and the window glass.

1/ Craig Birdsong, CSU assistant professor, family housing (4/1/78)



Treatments such as these are excellent for sealing out air; they are appropriate for Queen Anne, Chippendale or Federal styles.

The use of a wooden frame surrounding the window is the same principle as the cornice board and sealed edges. It may be a simple plywood frame, painted, papered or covered with fabric and suitable for contemporary interiors. Shaped, painted, papered or covered with fabric and trimmed, historical window frames are called *lambrequins* and are appropriate with many period-style interiors.

The use of double draperies—two layers of draperies separated by an air space—further improves the thermal performance of window treatments. Again, these need to be closed off at the top, sealed at the sides and reach to the floor or window sill.

In the winter, draperies should be opened when the window is sunlit to allow the sunlight to penetrate into the room, warming more massive materials and remote surfaces. The heat will then radiate to other interior surfaces rather than directly back to the glass. In order to allow maximum sunlight to enter the room, the drapery track should extend a sufficient distance beyond either side of the window to permit the draperies to stack clear of the window opening.

Comfort near windows with drawn draperies will be improved compared to uncovered windows. This is due to the draperies being much closer to room temperature than the glass with a corresponding reduction in body heat loss by radiation. Tightly woven fabrics are more effective for improving this comfort.

Drapery linings also are important as energy savers. As well as inhibiting deterioration caused by sunlight, linings provide an additional barrier to the sun's rays in the summer and help to reduce heat loss in the winter.

Some drapery fabrics have a "self-lining" that consists of a satin face woven on the back of the fabric. Important in the self-lining category is a new acrylic-foam-backed drapery. The backing is a very thin, aerated acrylic coating that forms a barrier against light and, to some extent, against outside noises and air around the window.

Insulative linings are available in several types: 1) plastic or vinyl which may be either clear or opaque and serve mainly as a barrier to air and moisture; 2) fabric coated with vinyl; 3) silver-backed fabric which is particularly valuable in reflecting the sun's rays as well as serving as a barrier to air and moisture; and 4) a foam-backed fabric that has the added benefit of increased thermal performance and acoustical insulation.

In a series of tests conducted by the Illinois Institute of Technology, a medium-colored drapery with a white plastic backing reduced conducted heat loss in the winter by 6 to 7 percent and conductive and radiant heat gains in the summer by 33 percent.

While all window treatments have advantages and disadvantages, the advantages of draperies include:

- Decreased winter heat loss and summer heat gain.
- Improved comfort near windows when draperies are closed.
- Glare control.
- Privacy.
- Noise absorption; noise within a room is absorbed rather than reflected as from uncovered glass. Also, outside noise transmitted through the glass is partially absorbed. The denser the weave and heavier the drapery, the more effective it is in reducing noise transmission.

The disadvantages of draperies are:

- Periodic cleaning required.
- Obstruction of view when closed.
- Possible breakage of glass when used in conjunction with heat-absorbing glass. The glass and the way it is set should be designed to withstand the additional heat buildup from sunlight being reflected back at the glass from the closed drapery.

Prices of draperies range largely with the cost of the fabric. A ready-made drapery can range in price from 85 cents to \$1.50 per square foot (.09 square meter). Custom-made draperies may be much higher in price.

For information on other types of energy-conserving window treatments, such as insulating shutters, opaque roll shades and venetian blinds, see Service in Action sheet 9.512.

For information on characteristics of various fabric fibers, see Service in Action sheets 9.509 and 9.510, Selecting draperies and curtains, Parts I and II.

## References

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