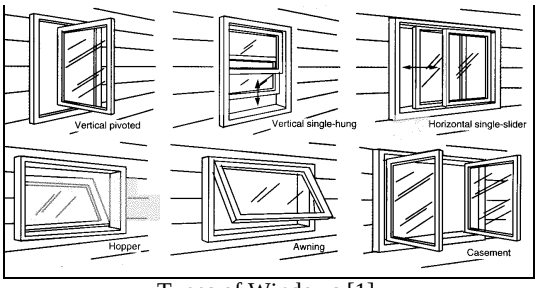
Windows and Doors

Windows

Windows are typically the weakest link in the thermal barrier.

Efficient superwindows are more expensive than standard windows, however they can reduce heat gain in hot climates, net a higher heat gain in colder climates, and reduce lifetime energy costs. This makes it possible to downsize or even eliminate the heating and/or cooling systems in a building. Superwindows cut noise, improve radiant comfort, and even eliminate perimeter zone heating in buildings, saving floor space

- Use caulk around window frames to help prevent drafts
- Heat-shrink plastic wrap, available at hardware stores, also helps to prevent drafts
- Installing new high-performance windows can help decrease the cost of heating and cooling loads
- Low-e (low-emissivity) coating prevents infrared radiation from passing through, but allows visible light to pass
- Sealed argon or krypton, instead of air, can improve the insulating value of the window by 15 to 20%
- Krypton is more expensive than argon, but performs better, allowing for a thinner gas barrier between window panes
- Look for an air tightness rating no higher than 0.2 cfm/ft (cubic feet of air leakage per foot of window ledge)
- The best windows are less than 0.1 cfm/ft
- "Super windows" use low-e coatings, gas fill, good edge seals, insulated frames, and airtight construction
- refer to : http://www.efficientwindows.org/energycosts.html
- high performance windows create a warmer interior glass surface, helping to reduce condensation and frost on the window
- superwindows can achieve a midpane R-17
- conventional windows can account for 35% of total heat loss
- low-e coating is a thin metallic oxide that bounces the heat energy back into the house
- low-e coating can reduce heat loss through a window by 35%
- a softcoat (vacuum deposited) low-e coating is more thermally effective than a hardcoat (sprayed on as glass cools)
- low-e reflects long wave radiation
- short wave radiation is best minimized by using overhangs
- Fiberglass provides low thermal conductivity, dimensional stability, and resistance to moisture and corrosion
- The type of window can play a vital role in the thermal properties of the window. Windows which can be pulled or cranked shut prevent air leakage better than windows which slide open and shut. Fixed windows show the best results at stopping air leakage.



Types of Windows [1]

Doors

- ensure that the doors are not filled with CFC-blown foam core
- air leakage is the greatest concern for doors
- air leakage may be caused by missing or ineffective weather stripping, improperly located strike plates, frames which no longer fit the door, and doors which have warped and no longer contact the steps
- consider the use of 3' wide doors instead of the standard 2½' wide doors to increase the accessibility of the door for those in wheelchairs or otherwise infirmed
- wider doors will also make it easier to move furniture in and out of the building
- doors should open using levers instead of knobs to make them easier to open
- heat may escape through the door and frame, between the door, frame and sill, through glass in patio doors and doors with windows, and between the door frame and the rough frame
- Incorporating double door entries into a structure, helps reduce air leakage
- Primary exterior doors should be located on the protected side of a building in cold, windy climates

- Exterior doors lose/gain heat by conduction through wood or metal frame doors. Wood doors conduct heat at a slower rate than metal doors, however both should be constructed with well insulated cores
- look for wood, vinyl, or thermally broken metal frames
- Proper installation of exterior doors is essential, as doors are a weak link in the thermal barrier of any structure. Swinging doors must be mounted accurately and hinges should be fastened securely to ensure a snug fit
- To reduce air leakage around the various components of a door, proper installation techniques must be followed:
    - Fill the shim space between the jambs and the framing with a low-emission, recycled (if possible), insulation
    - Extend the vapor barrier over the jambs
    - Caulk behind the outside casings and beneath the sill with water-based, acrylic latex, or neutral-cure silicon caulking (as discussed in the Indoor Air Quality file)

References

1. Canadian Home Builders' Association Builder's Manual. 1994. Pg. 187.