# Passive Solar Design - Thermal Mass

So far everything described as a passive home is basic, smart construction. What truly sets a passive design home apart from a standard tract home is thermal mass.

If solar heat is to be used when the sun is not shining, excess heat must be stored. Everyone has leaned against a sun-warmed brick or stone. It's warm and comfortable and takes a while to cool off. That's thermal mass. Thermal mass is simply a solid or liquid material that will absorb and store warmth and coolness until it is needed.

Thermal mass in the form of concrete, masonry or water has a much better storage capacity for heating and cooling than does the surrounding air. That's why thermal mass acts to prevent large changes of indoor temperature as the outdoor temperatures rise or fall. In fact, a well designed solar home can hold an interior temperature between 68 and 70 degrees, balancing the square footage of glass (solar collectors) and the right amount of effective thermal storage mass.

In winter, thermal mass absorbs heat by direct sunlight. At night the process is reversed as thermal mass gives up heat, warming the room by radiation, convection and conduction. In the summer, thermal mass should be shaded so it draws the warmth from the surrounding air and cools the room. The greater the area of thermal mass, the greater its ability to store heat and maintain a uniform temperature. There are two ways thermal mass works in a passive design home: direct solar gain and indirect solar gain.

How thermal mass is used in a passively designed home is the owner's choice. Thermal mass can take numerous forms such as brick, tile or thick concrete floors (called a **Solar Slab**). It can also be a large brick or stone internal fireplace or an interior wall made of adobe or brick.

A masonry or concrete wall (called a **Trombe Wall**) or water filled containers (called a **Tube Wall**) can also be used to absorb heat and cool. This type of system must have southern exposure and receive direct sunlight.

Regardless of which type of passive system is installed in your home, it must be thoughtfully designed, balancing glazing with thermal storage mass.