BUILDING SYSTEMS AND APPLICATIONS

Reflectance and Absorptance of Clay Brick and Tile (%)		
Material and Color	Reflectance	Absorptance
Unglazed brick and tile		
cream manganese spot	52	48
cream	50	50
light buff	43	57
light gray	40	60
gray manganese spot	40	60
golden buff	35	65
red	30	70
dark red	23	77
Glazed brick and tile		
white	83	17
ivory	67	33
sunlight yellow	65	35
white mottle	64	36
coral	58	42
cream glazed	51	49
light gray	49	51
green mottle	49	51
cream mottle	49	51
light green	46	54
cream tone, salt glaze	44	56
gray mottle	41	59
ocular green	37	63
tan	37	63
blue	35	65
buff tone, salt glaze	27	73
black	5	95

Figure 8-40 Light reflectance and absorptance of glazed and unglazed clay masonry. (*From BIA* Technical Notes, Vol. 11, No. 11)

walls, floors, and even ceilings, performance and efficiency are increased because the ratio of surface area to volume of mass is maximized.

Masonry walls in direct-gain systems can be any color, but light to medium colors are best for diffusing light over the wall. Heat distribution is generally not critical in direct-gain systems because the heat is stored in the same space in which it is used. The amount of solar heat collected and stored can be controlled by shading devices, and heat loss at night can be minimized by movable insulation. Direct gain is used primarily in mild and moderate climates.

8.7.3 Thermal Storage Walls

In regions with mild to severe winters, a thermal storage wall system provides better performance than direct gain. A loadbearing or non-loadbearing masonry or concrete wall is constructed and, leaving a 2-in. to 4-in. air space, is covered with double insulating glass to act as a collector. The masonry is heated by direct radiation, stores the heat, and then reradiates it to the interior spaces. The glass traps solar energy through a greenhouse effect. Sunlight strikes the mass wall, is converted to thermal energy, and is stored. The storage mass becomes a radiant heat source, and creates natural convection currents which help to distribute the heat. Buildings are most efficient when the glass area and thermal mass are properly sized and oriented for

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BUILDING SYSTEMS AND APPLICATIONS

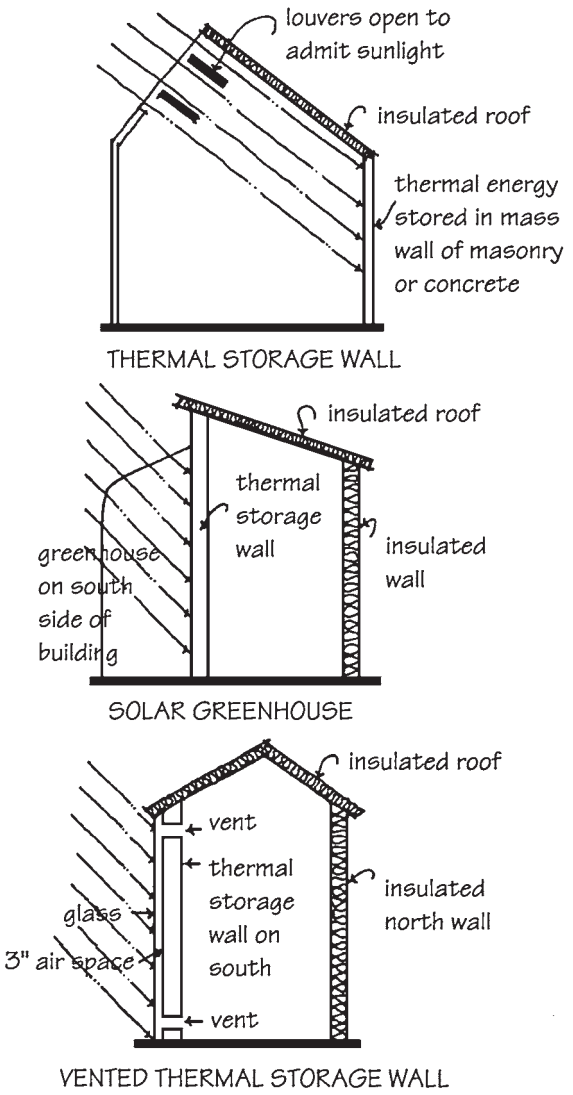

Figure 8-41 Passive solar design strategies using thermal storage walls of masonry or concrete. (*From National Concrete Masonry Association,* TEK Bulletin 97, *NCMA, Herndon, VA.*)

optimum exposure, and are protected from heat loss by movable insulating panels or louvers. Efficiently designed walls may store enough heat to maintain comfortable indoor temperatures for as long as 3 overcast days. Thermal storage wall systems have much less temperature fluctuation than direct-gain systems, but do not usually achieve the same high initial interior temperatures.

8.7.4 Vented Thermal Storage Walls

The most widely used type of thermal storage wall is connected to the interior space by vents at the top and bottom of the wall (*see Fig. 8-42*). The heated air circulates into the room by thermal buoyancy currents. For summer operation,

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