



Basic Formulas for Solar Design

Solar Structure Design Principles

- * Quality building envelope
- * Superior insulation
- * Healthy materials
- * Controlled ventilation
- * Efficient household appliances
- * Passive solar construction
- * Energy self-reliance

Orientation for Solar Collecting Surfaces

Best: Up to 30 degrees either direction from True South

Acceptable: Up to 45 degrees either direction from True South

Measure True South with a sun dial
(In Boulder, 11-13 degrees east of compass reading)

Insulation

Minimum Recommendations

Walls: R-30 or more

Roof: R-42 or more

Outside Foundation: R-20

Shadow Length (for 40 degrees latitude at high noon)

On the Winter Solstice: 1.7 times the height of the object

On the Summer Solstice: .6 times the height of the object

Rules of Thumb for the Proportions of Various Components

(note: other factors may alter these ratios)

Amount of glazing for floor space to be heated:

1 square foot of glazing for every 7 square feet of floor space

Amount of glazing for volume of masonry thermal mass:

1 square foot of glazing for every 1-2 cubic feet of masonry

Amount of glazing for volume of water thermal mass:

1 square foot of glazing for 1 cubic foot (7.5 gallons) or more of water

Amount of masonry wall area for floor space to be heated:

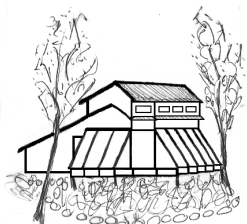
1 square foot of wall for every 1 square foot of floor space

Amount of water wall area for floor space to be heated:

1 square foot of water wall for every 2 square feet of floor space

Amount of vent area for thermal wall surface area:

1 square foot of vent area for every 100 square feet of thermal wall





Recommended Books for Solar Greenhouse Design and Management

Greenhouse Gardener's Companion, by Shane Smith
Fulcrum Publishing, Golden CO, 2000

Solarizing Your Present Home, edited by Joe Carter
Rodale Press, Inc., Emmaus PA, 1981

The Passive Solar Energy Book, by Edward Mazria
Rodale Press, Inc., Emmaus PA, 1979

Passive Solar Energy, by Bruce Anderson and Malcolm Wells
Brick House Publishing Co., Inc., Amherst NH, 1994

Biodynamic Greenhouse Management, by Hans Grotzke
Biodynamic Farming and Gardening Association, Inc., Kimberton, PA, 1990

Secrets of Plant Propagation, by Lewis Hill
Storey Communications, Inc., Pownal VT, 1985
(great guide to seeds, division, layering, cuttings, grafting, etc.)

Introduction to Permaculture, by Bill Mollison and Reny Mia Slay
Tagari Publications, Tyalgum NSW Australia, 1994

Permaculture: A Designers' Manual, by Bill Mollison
Tagari Publications, Tyalgum NSW Australia, 1990

Worms Eat My Garbage, by Mary Appelhof
Flower Press, Kalamazoo MI, 1997

Small Scale Aquaculture, by Steven Van Gorder, 2000

Build Your Own Earth Oven, by Kiko Denzer, 2000

Creating an Oasis with Grey Water, 1994
Builder's Greywater Guide, 1995
Branched Drain Greywater Systems, 2000
All three by Art Ludwig, Oasis Design, Santa Barbara CA

Movable Insulation, by William K. Langdon
Rodale Press, Emmaus PA, 1980
(good chapter on greenhouse window coverings)

