

Heat Loss Terminology + Calculation

Terminology:

- Advanced Framing, Intermediate Framing
- ACH (*infiltration; a percentage, expressed as a decimal*)
- Annual heat loss (*Annual Btus*)
- Btu (*British Thermal Unit*)
- DD (*Degree Days/4,700 PDX*)
- Design temperature (*68/65*)
- Framing Factor (*thermal bridging of framing*)
- Heat loss, hourly (*Btus/hour*)
- Outdoor design temperature (*22 PDX*)
- R-Value (*higher=better; typically refers to insulation*)
- SIPS Panels, (*Structural Insulated Panel System*)
- Target Heat loss: *Btus/hour/SF; Annual Btus/SF/Degree Day*
- Therm (*Unit of natural gas; 1 Therm = 100,000 Btus*)
- U-Value (*lower=better; typically refers to windows*)

Steps to calculate heat loss:

1. Referring to "Energy Information" chart, fill in data on "Worksheet".
2. Go to online website (www.builditsolar.com), use link "Home Heat Loss Calculator"; enter data from step 1.
3. Fill in heat loss results (from website) into "Worksheet".
4. Calculate Btu/hour/SF by dividing Btu/hour by total SF of heated area of house (1,824).
5. Briefly review targets: how close are you?

Energy Information by House Type

House	Description	R value-Roof	R value-Wall	R value-Floor	R value- Windows	Infiltration Rate	Notes/Furnace
#1	Lovely character Craftsman	R-2	R-2	R-2	R-1.1	3.0 (2-20?)	No energy upgrades (.6)
#2	Lovely character Craftsman + some updates	R-19	R-2	R-2	R-1.5	2.0 (1.0+)	Add attic insulation, storm windows, weathers. (.7)
#3	Lovely character Craftsman + full updates	R-49	R-11 (1)	R-9 (1)	R-2.5 (U-.40)	.80 (.6+)	Add attic, floor, wall insul., air sealing, new windows, weather., air sealing (.8)
#4	Lovely Craftsman New, 2009 Code	R-38	R-15 (1)	R-24 (1)	R-2.8 (U-.35)	.50 (approx)	Assume good air sealing (no test. req. for infiltration) (.9)
#5	Lovely Craftsman Energy Star II	R-49	R-24	R-27 (1)	R-3.1 (U-.32)	.40 (.7 max.)	Walls=intermediate frame w/insulated sheathing (.9)
#6	Lovely Craftsman New OR High Performance	R-49	R-24	R-34 (1)	R-3.1 (U-.32)	.35 (.5 max.)	Walls=intermediate frame w/insulated sheathing (.92) (delete bay window)
#7	Lovely Craftsman "Energy Hybrid"	R-60	R-27 (2)	R-38	R-5.5 (U-.18)	.15 (est.)	"Hybrid" of thick wall, good windows, air sealing (.97)*
#8	Lovely Craftsman "near" PassivHaus	R-60	R-29 (6.5" panel)	R-38	R-10 (U-.10)	.10 (est.)	SIPS panels + best windows (or ICF panels) (.97)*

(1) includes "framing factor"

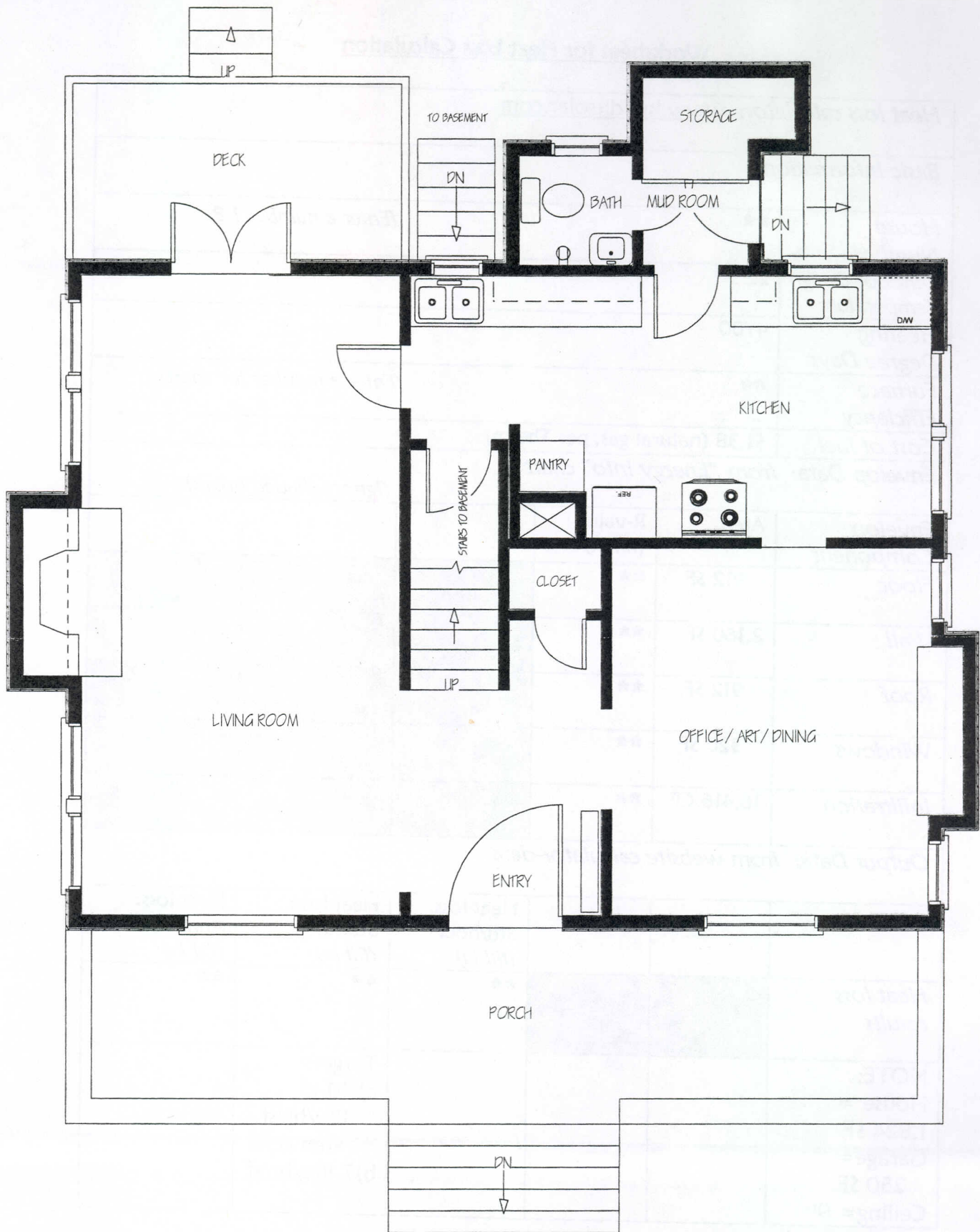
(2) 2 x 8 sill w/staggered studs

NOTE: Use 4 people for online calculator

*typical heating w/very low infiltration = non-ducted

Worksheet for Heat Loss Calculation

Heat loss calculator: www.builditsolar.com					
Basic Information:					
House Number	** (Enter a number 1-8)				
Outdoor Design Temperature	22				
Heating Degree Days	4700				
Furnace Efficiency	** (Enter a number for chart)				
Cost of fuel	\$1.38 (natural gas, per Therm)				
Envelop Data: from "Energy Info" chart					
(Ignore shaded boxes)					
Envelop Component	Area	R-value (fill in)			
Floor	912 SF	**			
Wall	2,160 SF	**			
Roof	912 SF	**			
Windows	320 SF	**			
Infiltration	16,416 CF	**			
Output Data: from website calculator data					
			Heat loss: Btu/hour (fill in)	Heat loss: Btu/hr/s.f. (fill in)	Heat loss: Annual (fill in)
Heat loss results			**	**	**
NOTE: House = 1,824 SF Garage = 250 SF Ceiling = 9'				Targets: a) 10-15 Btu/hr/sf +remodel b) 7 Btu/hr/sf	



FIRST FLOOR PLAN

Scale: 1/4" = 1'-0"

Note: Garage = 250 sq. ft.