

ACH50=(CFM50 x 60) / Volume
 ACHnat=(CFMnat x 60)/Volume

HVAC Delivery adjustment for duct leakage
 0-50cfm=no drop 50-150cfm=5% 150-300=10%

.8 NACH= Drafty .35 NACH=ASHRAE Minimum
 0=airtight

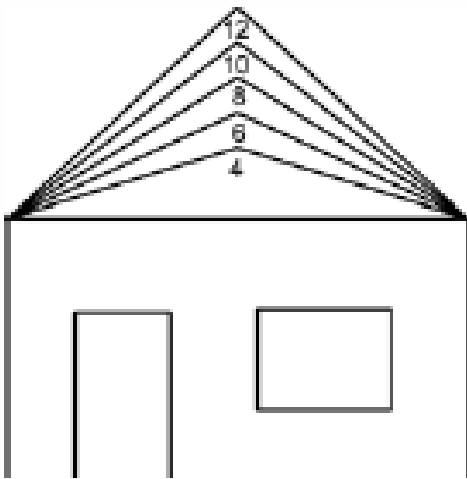
Return Leaks in attic PRESSURIZE the house
 Supply Leaks in attic DEPRESSURIZE the house

Leakage Area: EqLA=.2939 x CFM10

Building Tightness Limits
 BTL=15cfm x Occupants x N
 also 1 cfm/square foot

1"=.083 2"=.167 3"=.25 4"=.333 5"=.417 6"=.5
 7"=.583 8"=.667 9"=.75 10"=.833 11"=.917
 12"=1.00

NACH=ACH/N where
 N=18xHeight(1,.9,.8)xShielding(1.2,1.0,.9)



Slope	Pitch	Area Multiplier	Slope	Pitch	Area Multiplier
3:12	14°	1.03	7:12	30.2°	1.16
4:12	18.4°	1.05	8:12	33.7°	1.2
5:12	22.6°	1.08	9:12	36.8°	1.25
6:12	26.5°	1.12	10:12	39.8°	1.30

Table of Slopes and Pitch, in Degrees
 12/12 = 45 degrees = 1.41

$$\text{HERS Score} = 100 - 20 \times \frac{(\text{Rated Home Heating} + \text{Cooling} + \text{Water Heating MMBtu's})}{(\text{Reference Home Heating} + \text{Cooling} + \text{Water Heating MMBtu's})}$$

$$\text{HERS Index} = \left[\frac{\text{Total Energy Use} - \text{On Site Power Production}}{\text{Total Energy Use}} \right] \times \frac{(\text{Rated Heating} + \text{Cooling} + \text{Water Heating} + \text{Lights \& Appliances MMBtu's})}{(\text{Ref Heating} + \text{Cooling} + \text{Water Heating} + \text{Lights \& Appliances MMBtu's})} \times 100$$

EEM allows 2% increase in debt:income ratio by adding savings to income. include cost of improvements in the mortgage up to 15%

EIM allows cost of improvements to be added to the mortgage.

BTU per Hour= (T1-T2 x Area) / R-value
 Sensible Heat Recovery=CFM x Temp Diff x 1.08

Min Draft Pressures Out Temp/Pa: 80+/-1Pa,
 60-80/2Pa, 40-60/3Pa, 20-40/4Pa, 20-/5Pa

250 Pa= 1" W.C. 1 Kwh=3413 BTU
 1 CCF = 100,000 BTU = 1 THERM

Gas cost per BTU= Rate per Therm/100,000/efficiency
 Elec cost per BTU= Rate per Kwh/3412

ASHRAE 62.2 Ventilation Requirement
 (#BR + 1 x 7.5) + (.01 x Area) = CFM

COP vs Natural Gas Calculators:
http://electricheatstore.com/annual_cost.aspx
<http://ces.ca.uky.edu/energy/>

HERS REFERENCE HOME -->

Door Area: 40ft2, North, .35
 Window Area: 18% of Floor, equal orientations, U .55
 Heating Systems: Same as rated home

HERS Appliances Includes: Refrigerator and Dishwasher

HERS Appliances DO NOT include: Washer, Dryer, Microwave,

Percentage Improvement (Before-After) /Before x100

*Created by Matt Rosendaal of Great Lakes Home Performance.
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