Single Family Dwelling

Energy Code Compliance Verification Packet

Choose an Option from below:

Option A)

Submit a completed New Construction Energy compliance Certificate. This form will also need to be posted by the electric panel with the date posted and include the results of the Building envelope air tightness test (Blower door) and Duct system air tightness test (Duct blaster) results filled in at the time of building final.

Thermal envelope and fenestrations must meet minimum requirements of Pg. 3

A completed copy of Table 501.4.1 (2015 MN IMC) (Pg. 4)

See Table 501.4.2 (2015 MN IMC) for makeup air (If required) (Pg. 5)

Ventilation requirements per Table 403.5.2 (2015 MN Energy Code Chapter 1322) (Pg.6)

Combustion air MN 1346.6012 and 1346.6014 IFGC Appendix E, Worksheet E-1 (Pages 7-9) and (10-12) or use Table 304.1 (2015 MN IFGC Exception 4) (Pg. 13)

Calculated heat loss/gain and calculated cooling load verifying HVAC sizing in compliance with the Minnesota Energy Code.

Option B)

Simulated performance alternative using the prescriptive criteria from 2015 MN Residential Energy Code Section R-405

New Construction Energy Code Compliance Certificate

Per R401.3 Certificate. A building certificate shall be posted on or in the electrical distribution panel.

Date Certificate Posted	

Mailing Address of the Dwelling or Dwelling Unit	City
Name of Residential Contractor	MN License Number

THERMAL ENVELOPE

Insulation Location	Total R-Value of all Types of Insulation	Type: Check All That Apply								
		Non or Not Applicable	Fiberglass, Blown	Fiberglass, Batts	Foam, Closed Cell	Foam Open Cell	Mineral Fiberboard	Rigid, Extruded Polystyrene	Rigid, Isocynurate	Other Please Describe Here
Below Entire Slab										
Foundation Wall										
Perimeter of Slab on Grade										
Rim Joist (1st Floor)										
Rim Joist (2nd Floor+)										
Wall										
Ceiling, flat										
Ceiling, vaulted										
Bay Windows or cantilevered areas										
Floors over unconditioned area										
Describe other insulated areas										

RADON CONTROL SYSTEM

	Passive (*No Fan*)
	Active (*With fan and monometer or other system monitoring device*)
Location (or future location) of Fan:	

Building envelope air tightness:		**Duct system air tightness:**	

Windows & Doors		**Heating or Cooling Ducts Outside Conditioned Spaces**	
Average U-Factor (*excludes skylights and one door*) U:			Not applicable, all ducts located in conditioned space
Solar Heat Gain Coefficient (SHGC):			R-value

MECHANICAL SYSTEMS

Appliances	Heating System		Domestic Water Heater		Cooling System	
Fuel Type						
Manufacturer						
Model						
Rating or Size	Input in BTUS:		Capacity in Gallons:		Output in Tons:	
Efficiency	AFUE or HSPF%				SEER /EER	

Residential Load Calculatio	**Heating Loss**	**Heating Gain**	**Cooling Load**

Make-up Air *Select a Type*

	Not required per mech. code
	Passive
	Powered
	Interlocked with exhaust device. Describe:
	Other, describe:
Location of duct or system:	
	Cfm's
	" round duct OR
	" metal duct

MECHANICAL VENTILATION SYSTEM

Describe any additional or combined heating or cooling systems if installed: (e.g. two furnaces or air source heat pump with gas back-up furnace):

Select Type

	Heat Recover Ventilator (HRV) Capacity in cfms:	Low:		High:	
	Energy Recover Ventilator (ERV) Capacity in cfms:	Low:		High:	
	Balanced Ventilation capacity in cfms:				
	Location of fan(s), describe:				
	Capacity continuous ventilation rate in cfms:				
	Total ventilation (intermittent + continuous) rate in cfms:				

Combustion Air *Select a Type*

	Not required per mech. code
	Passive
	Other, describe:
Location of duct or system:	
	Cfm's
	" round duct OR
	" metal duct

Minimum Fenestration and Thermal Envelope

(Tables R402.1.1 and R402.1.3 combined)

Componet	(Code min.)	Design
Fenestration U- Factor	U-0.32	
Skylight U-Factor	U-0.55	
Ceiling R-factor [i]	U-0.026	
	R-49	
Wood Frame Wall	U-0.048	
	R-20 or (R-13+R-5)[ii]	
Mass Wall	U-0.060	
	R-15, R-20[iii]	
Floors over unconditioned space	R-30[iv]	
	U-0.033	
Foundation	R-15[v]	
	U-0.050	
Rim Joist	R-20	
	U-0.048	
Slab R-Value and depth	R-10 to a depth of 3.5' or top of footing	
(Add R-5 to "edges of" heated slabs)		
Crawl space walls (unvented)	R-15	

[i] Minimum 6" energy on roof trusses.

[ii] First value is cavity insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used to maintain a consistent total sheathing thickness.

[iii] The second R-Value applies when more than half of the insulation is on the interior of the mass wall. When using log type construction for thermal mass walls a minimum of a 7-inch diameter log shall be used and the U-Value of the fenestration shall be U-0.29 overall on average or better.

[iv] Or insulation sufficient to fill the framing cavity, R-19 minimum. (Insulation must be in permanent contact with the subfloor.)

[v] Minimum of R-10 exterior. See 2015 MN Energy Code R-402.2.8 for more information and exceptions.

TABLE 501.4.1
PROCEDURE TO DETERMINE MAKEUP AIR QUANTITY FOR EXHAUST APPLIANCES IN DWELLING UNITS

	ONE OR MULTIPLE POWER VENT OR DIRECT VENT APPLIANCES OR NO COMBUSTION APPLIANCES[A]	ONE OR MULTIPLE FAN-ASSISTED APPLIANCES AND POWER VENT OR DIRECT VENT APPLIANCES[B]	ONE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCE OR ONE SOLID FUEL APPLIANCE[C]	MULTIPLE APPLIANCES THAT ARE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCES OR SOLID FUEL APPLIANCES[D]
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf)	0.15	0.09	0.06	0.03
b) conditioned floor area (sf)	—	—	—	—
(including unfinished basements)				
Estimated House Infiltration (cfm): [1a × 1b]	—	—	—	—
2. Exhaust Capacity				
a) clothes dryer	135	135	135	135
b) 80% of largest exhaust rating (cfm):	—	—	—	—
(not applicable if recirculating system or if powered *makeup air* is electrically interlocked and matched to exhaust)				
c) 80% of next largest exhaust rating (cfm):	not applicable	—	—	—
(not applicable if recirculating system or if powered *makeup air* is electrically interlocked and matched to exhaust)				
Total Exhaust Capacity (cfm): [2a+2b+2c]	—	—	—	—
3. *Makeup Air* Requirement				
a) Total Exhaust Capacity (from above)	—	—	—	—
b) Estimated House Infiltration (from above)	—	—	—	—
Makeup Air Quality (cfm): [3a - 3b]	—	—	—	—
(if value is negative, no makeup air is needed				
4. For *Makeup Air* Opening Sizing, refer to Table 501.4.2.				

A. Use this column if there are other than fan-assisted or atmospherically vented gas or oil *appliances* or if there are no *combustion appliances*.

B. Use this column if there is one fan-assisted *appliance* per venting system. Other than atmospherically vented *appliances* may also be included.

C. Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil *appliance* per venting system or one solid fuel *appliance*.

D. Use this column if there are multiple atmospherically vented gas or oil *appliances* using a common vent or if there are atmospherically vented gas or oil *appliances* and solid fuel *appliances*.

MAKEUP AIR OPENING SIZING TABLE FOR NEW AND EXISTING DWELLING UNITS

TYPE OF OPENING OR SYSTEM	ONE OR MULTIPLE POWER VENT OR DIRECT VENT APPLIANCES OR NO COMBUSTION APPLIANCES[A] (cfm)	ONE OR MULTIPLE FAN-ASSISTED APPLIANCES AND POWER VENT OR DIRECT VENT APPLIANCES[B] (cfm)	ONE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCE OR ONE SOLID FUEL APPLIANCE[C] (cfm)	MULTIPLE APPLIANCES THAT ARE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCES OR SOLID FUEL APPLIANCES[D] (cfm)	PASSIVE MAKEUP AIR OPENING DUCT DIAMETER[E, F, G] (inches)
Passive opening	1-36	1-22	1-15	1-9	3
Passive opening	37-66	23-41	16-28	10-17	4
Passive opening	67-109	42-66	29-46	18-28	5
Passive opening	110-163	67-100	47-69	29-42	6
Passive opening	164-232	101-143	70-99	43-61	7
Passive opening	233-317	144-195	100-135	62-83	8
Passive opening with motorized damper	318-419	196-258	136-179	84-110	9
Passive opening with motorized damper	420-539	259-332	180-230	111-142	10
Passive opening with motorized damper	540-679	333-419	231-290	143-179	11
Powered makeup air[H]	> 679	> 419	> 290	> 179	Not applicable

A. Use this column if there are other than fan-assisted or atmospherically vented gas or oil *appliances* or if there are no *combustion appliances*.

B. Use this column if there is one fan-assisted *appliance* per venting system. Other than atmospherically vented *appliances* may also be included.

C. Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil *appliance* per venting system or one solid fuel *appliance*.

D. Use this column if there are multiple atmospherically vented gas or oil *appliances* using a common vent or if there are atmospherically vented gas or oil *appliances* and solid fuel *appliances*.

E. An equivalent length of 100 feet of round smooth metal duct is assumed. Subtract 40 feet for the exterior hood and ten feet for each 90-degree elbow to determine the remaining length of straight duct allowable.

F. If flexible duct is used, increase the duct diameter by one inch. Flexible duct shall be stretched with minimal sags.

G. Barometric dampers are prohibited in passive *makeup air* openings when any atmospherically vented *appliance* is installed.

H. Powered *makeup air* shall be electrically interlocked with the largest exhaust system.

MECHANICAL VENTILATION SYSTEM FAN EFFICACY

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
Range hoods	Any	2.8 cfm/watt	Any
In-line fan	Any	2.8 cfm/watt	Any
Bathroom, utility room	10	1.4 cfm/watt	< 90
Bathroom, utility room	90	2.8 cfm/watt	Any

For SI: 1 cfm = 28.3 L/min.

TABLE R403.5.2
NUMBER OF BEDROOMS

	1	2	3	4	5	6[2]
Conditioned space[1] (in sq. ft.)	Total/ Continuous	Total/ Continuous	Total/ Continuous	Total/ Continuous	Total/ Continuous	Total/ Continuous
1000-1500	60/40	75/40	90/45	105/53	120/60	135/68
1501-2000	70/40	85/43	100/50	115/58	130/65	145/73
2001-2500	80/40	95/48	110/55	125/63	140/70	155/78
2501-3000	90/45	105/53	120/60	135/68	150/75	165/83
3001-3500	100/50	115/58	130/65	145/73	160/80	175/88
3501-4000	110/55	125/63	140/70	155/78	170/85	185/93
4001-4500	120/60	135/68	150/75	165/83	180/90	195/98
4501-5000	130/65	145/73	160/80	175/88	190/95	205/103
5001-5500	140/70	155/78	170/85	185/93	200/100	215/108
5501-6000[2]	150/75	165/83	180/90	195/98	210/105	225/113

1. Conditioned space includes the basement and conditioned crawl spaces.
2. If conditioned space exceeds 6000 sq. ft. or there are more than 6 bedrooms, use Equation R403.5.2.

1346.6012 IFGC APPENDIX E, WORKSHEET E-1.

IFGC Appendix E, Worksheet E-1

Residential Combustion Air Calculation Method

(for Furnace, Boiler, and/or Water Heater in the Same Space)

Step 1: Complete vented combustion appliance information.

Furnace/Boiler:

____ Draft Hood	____ Fan Assisted	____ Direct Vent	Input:
(Not fan assisted)	& Power Vent		_____ Btu/hr

Water Heater:

____ Draft Hood	____ Fan Assisted	____ Direct Vent	Input:
(Not fan assisted)	& Power Vent		_____ Btu/hr

Step 2: Calculate the volume of the Combustion Appliance Space (CAS) containing combustion appliances.

The CAS includes all spaces connected to one another by code compliant openings. CAS volume:_____ft^3

Step 3: Determine Air Changes per Hour (ACH)[1]

Default ACH values have been incorporated into Table E-1 for use with Method 4b (KAIR Method). If the year of construction or ACH is not known, use method 4a (Standard Method).

Step 4: Determine Required Volume for Combustion Air.

4a. Standard Method

Total Btu/hr input of all combustion appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr

Use Standard Method column in Table E-1 to find Total Required Volume (TRV) TRV:_____ft^3

If CAS Volume (from Step 2) ***is greater than*** TRV then no outdoor openings are needed.

If CAS Volume (from Step 2) ***is less than*** TRV then go to **STEP 5.**

4b. Known Air Infiltration Rate (KAIR) Method

Total Btu/hr input of all fan-assisted and power vent appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr

Use Fan-Assisted Appliances column in Table E-1 to find Required Volume Fan Assisted (RVFA) RVFA: _____ ft^3

Total Btu/hr input of all non-fan-assisted appliances Input: _____ Btu/hr

Use Non-Fan-Assisted Appliances column in Table E-1 to find Required Volume Non-Fan-Assisted (RVNFA) RVNFA: _____ ft^3

Total Required Volume (TRV) = RVFA + RVNFA

RV = _____ + _____ = _____ ft^3

If CAS Volume (from Step 2) ***is greater than*** TRV then no outdoor openings are needed.

If CAS Volume (from Step 2) ***is less than*** TRV then go to **STEP 5.**

Step 5: Calculate the ratio of available interior volume to the total required volume.

Ratio = CAS Volume (from Step 2) ***divided by*** TRV (from Step 4a or Step 4b) Ratio = _____ / _____ = _____

Step 6: Calculate Reduction Factor (RF).

RF = 1 ***minus*** Ratio RF = 1 - _____ = _____

Step 7: Calculate single outdoor opening as if all combustion air is from outside.

Total Btu/hr input of all Combustion Appliances in the same CAS (EXCEPT DIRECT VENT) Input: _____ Btu/hr

Combustion Air Opening Area (CAOA):

Total Btu/hr ***divided by*** 3000 Btu/hr per in^2

CAOA = _____ /3000 Btu/hr per in^2 = _____ in^2

Step 8: Calculate Minimum CAOA.

Minimum CAOA = CAOA ***multiplied by*** RF

Minimum CAOA = _____ x _____ = _____ in^2

Step 9: Calculate Combustion Air Opening Diameter (CAOD)

CAOD = 1.13 ***multiplied by the square root of*** Minimum CAOA

CAOD = 1.13 Minimum CAOA = _____ in

[1]If desired, ACH can be determined using ASHRAE calculation or blower door test. Follow procedures in Section G304.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

1346.6014 IFGC APPENDIX E, TABLE E-1.

IFGC Appendix E, Table E-1

Residential Combustion Air Required Volume

(Required Interior Volume Based on Input Rating of Appliances)

		Known Air Infiltration Rate (KAIR) Method (ft^3)			
		Fan Assisted		Non-Fan-Assisted	
Input Rating (Btu/hr)	Standard Method (ft^3)	1994[1] to Present	Pre 1994[2]	1994[1] to Present	Pre 1994[2]
5,000	250	375	188	525	263
10,000	500	750	375	1,050	525
15,000	750	1,125	563	1,575	788
20,000	1,000	1,500	750	2,100	1,050
25,000	1,250	1,875	938	2,625	1,313
30,000	1,500	2,250	1,125	3,150	1,575
35,000	1,750	2,625	1,313	3,675	1,838
40,000	2,000	3,000	1,500	4,200	2,100
45,000	2,250	3,375	1,688	4,725	2,363
50,000	2,500	3,750	1,875	5,250	2,625
55,000	2,750	4,125	2,063	5,775	2,888
60,000	3,000	4,500	2,250	6,300	3,150
65,000	3,250	4,875	2,438	6,825	3,413
70,000	3,500	5,250	2,625	7,350	3,675
75,000	3,750	5,625	2,813	7,875	3,938
80,000	4,000	6,000	3,000	8,400	4,200
85,000	4,250	6,375	3,188	8,925	4,463
90,000	4,500	6,750	3,375	9,450	4,725
95,000	4,750	7,125	3,563	9,975	4,988
100,000	5,000	7,500	3,750	10,500	5,250

105,000	5,250	7,875	3,938	11,025	5,513
110,000	5,500	8,250	4,125	11,550	5,775
115,000	5,750	8,625	4,313	12,075	6,038
120,000	6,000	9,000	4,500	12,600	6,300
125,000	6,250	9,375	4,688	13,125	6,563
130,000	6,500	9,750	4,875	13,650	6,825
135,000	6,750	10,125	5,063	14,175	7,088
140,000	7,000	10,500	5,250	14,700	7,350
145,000	7,250	10,875	5,438	15,225	7,613
150,000	7,500	11,250	5,625	15,750	7,875
155,000	7,750	11,625	5,813	16,275	8,138
160,000	8,000	12,000	6,000	16,800	8,400
165,000	8,250	12,375	6,188	17,325	8,663
170,000	8,500	12,750	6,375	17,850	8,925
175,000	8,750	13,125	6,563	18,375	9,188
180,000	9,000	13,500	6,750	18,900	9,450
185,000	9,250	13,875	6,938	19,425	9,713
190,000	9,500	14,250	7,125	19,950	9,975
195,000	9,750	14,625	7,313	20,475	10,238
200,000	10,000	15,000	7,500	21,000	10,500
205,000	10,250	15,375	7,688	21,525	10,763
210,000	10,500	15,750	7,875	22,050	11,025
215,000	10,750	16,125	8,063	22,575	11,288
220,000	11,000	16,500	8,250	23,100	11,550
225,000	11,250	16,875	8,438	23,625	11,813
230,000	11,500	17,250	8,625	24,150	12,075

[1]The 1994 date refers to dwellings constructed under the 1994 Minnesota Energy Code. The default KAIR used in this section of the table is 0.20 ACH.

[2]This section of the table is to be used for dwellings constructed prior to 1994. The default KAIR used in this section of the table is 0.40 ACH.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

TABLE 304.1
COMBUSTION AIR REQUIREMENTS FOR GAS-FIRED APPLIANCES WHEN THE COMBINED INPUT IS UP TO AND INCLUDING 400,000 Btu/hr

TOTAL INPUT OF APPLIANCES[1], THOUSANDS OF Btu/hr (kW)	REQUIRED FREE AREA OF AIR-SUPPLY OPENING OR DUCT, SQUARE INCHES (sq mm)	ACCEPTABLE APPROXIMATE ROUND DUCT EQUIVALENT DIAMETER[2], INCH (mm)
25 (8)	7 (4,500)	3 (75)
50 (15)	7 (4,500)	3 (75)
75 (23)	11 (7,000)	4 (100)
100 (30)	14 (9,000)	4 (100)
125 (37)	18 (12,000)	5 (125)
150 (45)	22 (14,000)	5 (125)
175 (53)	25 (16,000)	6 (150)
200 (60)	29 (19,000)	6 (150)
225 (68)	32 (21,000)	6 (150)
250 (75)	36 (23,000)	7 (175)
275 (83)	40 (26,000)	7 (175)
300 (90)	43 (28,000)	7 (175)
325 (98)	47 (30,000)	8 (200)
350 (105)	50 (32,000)	8 (200)
375 (113)	54 (35,000)	8 (200)
400 (120)	58 (37,000)	9 (225)

1. For total inputs falling between listed capacities, use next largest listed input.
2. If flexible duct is used, increase the duct diameter by one inch.*
*Flexible duct shall be stretched with minimal sags.

Use this table if you are using 2015 MN IFGC Section 304 Exception 4.

Do Not count direct vent or sealed combustion gas appliances using outdoor air for combustion.

New Construction Energy Code Compliance Certificate

Per R401.3 Certificate. A building certificate shall be posted on or in the electrical distribution panel.

Date Certificate Pos

Place your logo here

Mailing Address of the Dwelling or Dwelling Unit	City
Name of Residential Contractor	**MN License Number**

THERMAL ENVELOPE

Insulation Location	Total R-Value of all Types of Insulation	Type: Check All That Apply								
		Non or Not Applicable	Fiberglass, Blown	Fiberglass, Batts	Foam, Closed Cell	Foam Open Cell	Mineral Fiberboard	Rigid, Extruded Polystyrene	Rigid, Isocynurate	Other Please Describe Here
Below Entire Slab										
Foundation Wall										
Perimeter of Slab on Grade										
Rim Joist (1st Floor)										
Rim Joist (2nd Floor+)										
Wall										
Ceiling, flat										
Ceiling, vaulted										
Bay Windows or cantilevered areas										
Floors over unconditioned area										
Describe other insulated areas										

RADON CONTROL SYSTEM

- ☐ Passive (*No Fan*)
- ☐ Active (*With fan and monometer or other system monitoring device*)

Location (or future location) of Fan:

Building envelope air tightness:		**Duct system air tightness:**	

Windows & Doors	
Average U-Factor (*excludes skylights and one door*) U:	
Solar Heat Gain Coefficient (SHGC):	

Heating or Cooling Ducts Outside Conditioned Spaces

- ☐ Not applicable, all ducts located in conditioned space
- ☐ R-value

MECHANICAL SYSTEMS

Appliances	Heating System	Domestic Water Heater	Cooling System
Fuel Type			
Manufacturer			
Model			
Rating or Size	Input in BTUS:	Capacity in Gallons:	Output in Tons:
Efficiency	AFUE or HSPF%		SEER /EER

Residential Load Calculati	**Heating Loss**	**Heating Gain**	**Cooling Load**

MECHANICAL VENTILATION SYSTEM

Describe any additional or combined heating or cooling systems if installed: (e.g. two furnaces or air source heat pump with gas back-up furnace):

Select Type

☐	Heat Recover Ventilator (HRV) Capacity in cfms:	Low:		High:	
☐	Energy Recover Ventilator (ERV) Capacity in cfms:	Low:		High:	
☐	Balanced Ventilation capacity in cfms:				
	Location of fan(s), describe:				
	Capacity continuous ventilation rate in cfms:				
	Total ventilation (intermittent + continuous) rate in cfms:				

Make-up Air *Select a Type*

- ☐ Not required per mech. code
- ☐ Passive
- ☐ Powered
- ☐ Interlocked with exhaust device. Describe:
- ☐ Other, describe:

Location of duct or system:

- ☐ Cfm's
- ☐ " round duct OR
- ☐ " metal duct

Combustion Air *Select a Type*

- ☐ Not required per mech. code
- ☐ Passive
- ☐ Other, describe:

Location of duct or system:

- ☐ Cfm's
- ☐ " round duct OR
- ☐ " metal duct

ACCU-SIZE HEATING & COOLING HOME ANALYSIS

Cooling load (heat gain) - 95 degree day

SQUARE FOOTAGE OF WINDOWS			HEAT GAIN
North (single)	X 26	=	
North (double)	X 21	=	
NE & NW (single)	X 45	=	
NE & NW (double)	X 35	=	
East & West (single)	X 60	=	
East & West (double)	X 49	=	
SE & SW (single)	X 50	=	
SE & SW (double)	X 40	=	
South (single)	X 36	=	
South (double)	X 25	=	

SQUARE FOOTAGE OF DOORS			HEAT GAIN
Wood (no storm door)	X 13	=	
Wood (w/storm door)	X 9	=	
Insulated metal door	X 6	=	

SQUARE FOOTAGE OF NET WALLS — **HEAT GAIN**

Wall perimeter ____ X — height ____ less ____ glass and door area = net wall ____

No insulation	X 8	=	
R-13 (3.5" insulation)	X 3	=	
R-19 (6" insulation)	X 2	=	

SQUARE FOOTAGE OF CEILING			HEAT GAIN
No insulation	X 22	=	
R-11 (3" insulation)	X 4.1	=	
R-19 (6" insulation)	X 2.6	=	
R-30 (10" insulation)	X 1.6	=	

SQUARE FOOTAGE OF FLOOR			HEAT GAIN
No insulation	X 3	=	
Carpet (no insulation)	X 2	=	
R-11 (3"+ insulation)	X 1	=	
Floor on slab	X 0	=	0

INFILTRATION / VENTILATION			HEAT GAIN
Home square feet	X 3.5	=	

INTERNAL GAINS			HEAT GAIN
Number of people	X 530	=	
Kitchen & bath allowance			1250

Subtotal BTU/h heat gain = ____

GAINS FROM DUCTWORK	HEAT GAIN
In crawl space - (subtotal BTU/h X .09)	
In attic - (subtotal BTU/h X .13)	

Total BTU/h heat gain = ____

Heating load (heat loss) - 0 degree day

SQUARE FOOTAGE OF WINDOWS			HEAT LOSS
Single glass	X 97	=	
Double glass	X 69	=	

SQUARE FOOTAGE OF DOORS			HEAT LOSS
Single glass patio	X 99	=	
Double glass patio	X 72	=	
Wood (no storm door)	X 75	=	
Wood (w/storm door)	X 46	=	
Insulated metal door	X 35	=	

SQUARE FOOTAGE OF NET WALLS			HEAT LOSS
Frame (no insulation)	X 20	=	
Frame (3.5" insulation)	X 7	=	
Frame (6" insulation)	X 5	=	
Masonry (no insulation)	X 37	=	
Masonry (1" insulation)	X 11	=	

SQUARE FOOTAGE OF CEILING			HEAT LOSS
No insulation	X 25	=	
R-11 (3" insulation)	X 7	=	
R-19 (6" insulation)	X 4	=	
R-30 (10" insulation)	X 3	=	

SQUARE FOOTAGE OF FLOOR OVER CRAWL AREA			HEAT LOSS
No insulation	X 19	=	
Carpet (no insulation)	X 9	=	
R-11 (3"+ insulation)	X 6	=	

SQUARE FOOTAGE OF FLOOR OVER BASEMENT			HEAT LOSS
No insulation	X 2	=	
Carpet or insulation	X 1	=	

PERIMETER OF SLAB FLOOR			HEAT LOSS
Slab (no insulation)	X 57	=	
Slab (edge insulation)	X 22	=	

INFILTRATION / VENTILATION			HEAT LOSS
Home square feet	X 4.9	=	

Subtotal BTU/h heat loss = ____

LOSSES FROM DUCTWORK	HEAT LOSS
In crawl space - (subtotal BTU/h X .10)	
In attic - (subtotal BTU/h X .08)	

Total BTU/h heat loss = ____

80% furnace efficiency loss	X .25	=	
90% furnace efficiency loss	X .12	=	

Total BTU/h input needed = ____