



## Single Family Dwelling

# Energy Code Compliance Verification Packet

Choose an Option from below:

### Option A)

Submit a completed New Construction Energy compliance Certificate (Pg. 2) 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)

### 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 Pos

Place your logo here

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

THERMAL ENVELOPE								RADON CONTROL SYSTEM	
Insulation Location	Total R-Value of all Types of Insulation	Type: Check All That Apply						Passive (No Fan)	
		Non or Not Applicable	Fiberglass, Blown	Fiberglass, Batts	Foam, Closed Cell	Foam Open Cell	Mineral Fiberboard	Rigid, Extruded Polystyrene	Rigid, Isocynurate
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									Other Please Describe Here

<b>Building envelope air tightness:</b>	<b>Duct system air tightness:</b>
<b>Windows &amp; Doors</b>	<b>Heating or Cooling Ducts Outside Conditioned Spaces</b>
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				Make-up Air <i>Select a Type</i>	
Appliances	Heating System	Domestic Water Heater	Cooling System	Not required per mech. code	
Fuel Type				Passive	
Manufacturer				Powered	
Model				Interlocked with exhaust device. Describe:	
Rating or Size	Input in BTUS:	Capacity in Gallons:	Output in Tons:	Other, describe:	
Efficiency	AFUE or HSPF%		SEER /EER	Location of duct or system:	
<b>Residential Load Calculati</b>	Heating Loss	Heating Gain	Cooling Load		
				Cfm's	
				" round duct OR	
				" metal duct	

MECHANICAL VENTILATION SYSTEM						Combustion Air <i>Select a Type</i>	
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):						Not required per mech. code	
<b>Select Type</b>						Passive	
Heat Recover Ventilator (HRV) Capacity in cfm's:	Low:		High:		Other, describe:		
Energy Recover Ventilator (ERV) Capacity in cfm's:	Low:		High:		Location of duct or system:		
Balanced Ventilation capacity in cfm's:							
Location of fan(s), describe:						Cfm's	
Capacity continuous ventilation rate in cfm's:						" round duct OR	
Total ventilation (intermittent + continuous) rate in cfm's:						" metal duct	

## Minimum Fenestration and Thermal Envelope

(Tables R402.1.1 and R402.1.3 combined)

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

<sup>i</sup> Minimum 6" energy on roof trusses.

<sup>ii</sup> 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.

<sup>iii</sup> 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.

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

<sup>v</sup> 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 <sup>A</sup>	ONE OR MULTIPLE FAN-ASSISTED APPLIANCES AND POWER VENT OR DIRECT VENT APPLIANCES <sup>B</sup>	ONE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCE OR ONE SOLID FUEL APPLIANCE <sup>C</sup>	MULTIPLE APPLIANCES THAT ARE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCES OR SOLID FUEL APPLIANCES <sup>D</sup>
<b>1. Use the Appropriate Column to Estimate House Infiltration</b>				
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]	—	—	—	—
<b>2. Exhaust Capacity</b>				
a) clothes dryer	135	135	135	135
b) 80% of largest exhaust rating (cfm):	—	—	—	—
(not applicable if recirculating system or if powered <i>makeup air</i> 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 <i>makeup air</i> is electrically interlocked and matched to exhaust)				
Total Exhaust Capacity (cfm): [2a+2b+2c]	—	—	—	—
<b>3. Makeup Air Requirement</b>				
a) Total Exhaust Capacity (from above)	—	—	—	—
b) Estimated House Infiltration (from above)	—	—	—	—
Makeup Air Quantity (cfm): [3a - 3b]	—	—	—	—
(if value is negative, no makeup air is needed)				
<b>4. For Makeup Air Opening Sizing, refer to Table 501.4.2.</b>				

- 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*.



**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**

Conditioned space <sup>1</sup> (in sq. ft.)	1	2	3	4	5	6 <sup>2</sup>
	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 <sup>2</sup>	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<sup>3</sup>

**Step 3:** Determine Air Changes per Hour (ACH)<sup>1</sup>

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<sup>3</sup>

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<sup>3</sup>

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<sup>3</sup>

Total Required Volume (TRV) = RVFA + RVNFA

$$RV = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ ft}^3$$

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)

$$\text{Ratio} = \underline{\hspace{2cm}} / \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

**Step 6:** Calculate Reduction Factor (RF).

RF = 1 *minus* Ratio

$$RF = 1 - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

**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<sup>2</sup>

$$CAOA = \underline{\hspace{2cm}} / 3000 \text{ Btu/hr per in}^2 = \underline{\hspace{2cm}} \text{ in}^2$$

**Step 8:** Calculate Minimum CAOAA.

Minimum CAOAA = CAOAA *multiplied by* RF

$$\text{Minimum CAOAA} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ in}^2$$

**Step 9:** Calculate Combustion Air Opening Diameter (CAOD)



CAOD = 1.13 *multiplied by the square root of* Minimum CAO A

CAOD = 1.13 Minimum CAO A = \_\_\_\_\_ in

<sup>1</sup>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)

Input Rating (Btu/hr)	Standard Method (ft <sup>3</sup> )	Known Air Infiltration Rate (KAIR) Method (ft <sup>3</sup> )			
		Fan Assisted		Non-Fan-Assisted	
		1994 <sup>1</sup> to Present	Pre 1994 <sup>2</sup>	1994 <sup>1</sup> to Present	Pre 1994 <sup>2</sup>
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

<sup>1</sup>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.

<sup>2</sup>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 <sup>1</sup> , THOUSANDS OF Btu/hr (kW)	REQUIRED FREE AREA OF AIR-SUPPLY OPENING OR DUCT, SQUARE INCHES (sq mm)	ACCEPTABLE APPROXIMATE ROUND DUCT EQUIVALENT DIAMETER <sup>2</sup> , 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.