

## Modular/Pre-Fab Homes

Modular homes, also called prefabricated homes, consist of multiple sections called modules. The modules are built in indoor facilities and then delivered to their intended site, where they are set onto the foundation and joined together to make a single building. The modules can be placed side-by-side, end-to-end, or stacked, allowing a wide variety of configurations and styles in the building layout. Modular homes are NOT the same as mobile homes; modular homes must conform to all local building codes for their proposed use, while mobile homes made in the United States are required to conform to federal codes governed by HUD (U.S. Department of Housing and Urban Development).



- This handout is intended only as a guide. It shall not be considered a complete set of requirements.
- Materials and installation must comply with the current Minnesota State Building Code and the manufacturers' installation specifications for each product.
- A building permit is required PRIOR to the installation of a modular home. Permits are required for the basement, foundation, or footing system under any modular structure, along with any electrical, mechanical, and/or plumbing work being performed.
- Compliance with the **Minnesota** State Building Code is evidenced by a permanent seal and data plate.

**Permit Submittal Checklist:** (Incomplete applications **will not** be forwarded to the Building Inspections Department for plan review.)

- Building Permit Application, Plumbing Permit Application and Mechanical Permit Application** completed in their entirety, including signature, valuation, all License/Bond Numbers, contact phone numbers and email addresses).
- A copy of pages 1 and 2 of this handout**, completed and signed.
- One set of plans** (drawn to scale) showing the proposed design, and including:
  - One set of structural building plans (floor plans and elevations)
  - One set of plans indicating braced wall line locations, panel locations, panel widths, and panel methods for each floor (if new foundation includes walkout or lookout wall)
  - Roof/floor truss plan/layout
  - New Construction Energy Code Compliance Certificate (attached)
  - Worksheet E-1 ("Residential Combustion Air Calculation Method") (attached)
  - Table 501.4.1 form ("Procedure to Determine Makeup Air Quantity for Exhaust Appliances") (attached)
  - Certificate of Grading (if applicable)
- A site plan** (or **Certificate of Survey** if required by municipality) drawn to scale and dimensioned, identifying proposed building dimensions with measurements from the adjacent lot lines; as well as all lot lines, setbacks, easements, adjacent street names, and any existing structures on the property. **Check with your municipality to determine setback requirements for the property.**
- One digital/electronic set** of all above listed items (plans and paperwork).
- Additional information may be required by the plan reviewer.

➤ Check all items below that will be included in the construction of the home. NOTE: All items checked below may need to be completed before a Certificate of Occupancy can be issued. If any of the unchecked items are added to the plan after the permit has been issued, an additional permit will be required.

Finished Basement

Deck

3-Season Porch

Gas Fireplace - Quantity: \_\_\_\_\_

Masonry/Wood Fireplace - Quantity: \_\_\_\_\_

In-Floor Heat – Wirsbo

Geothermal System

Other: \_\_\_\_\_

Retaining Wall - maximum height = \_\_\_\_\_ (retaining walls are measured from the bottom of the footing to the top of the wall)

**Septic System (Township permits only) – Please check that you have contacted the Township Septic Inspector – Building permit CANNOT be issued until septic approval is received.**

\_\_\_\_\_  
Applicant's Signature

\_\_\_\_\_  
Date

**PERMIT CARD AND APPROVED PLANS (throughout the project) shall be: POSTED** prior to start of work - **VISIBLE** from street or driveway - **ACCESSIBLE** to the inspector

**INSPECTION REQUIREMENTS:**

Inspections **MUST** be scheduled during office hours **AT LEAST** one business day prior to inspection. If a specific date and time is required, additional notice may be needed. Failure to cancel a scheduled inspection may result in a reinspection fee.

- **Office Hours:** Monday - Friday • 8:00 a.m. - 4:30 p.m.
- **Phone:** (952) 442-7520 or (888) 446-1801

**Inspections:** (Refer to your permit card regarding project-specific inspections)

- **Permit card and approved plans MUST be on site for each inspection and should be protected from the weather.**
- Post site address on the construction site in a manner visible from the street.
- **Site inspection (prior to excavation):** Refer to Site Inspection Checklist that will come back with your approved plans – all items on the checklist must be complete prior to the inspection. The Site Inspection Checklist **MUST** be on site for the inspection.
- **Footings:** After forms and reinforcing are in place, but **PRIOR TO POURING CONCRETE.**
- **Poured Wall/Core Fill:** After forms and reinforcing are in place, but **PRIOR TO POURING CONCRETE.** For block walls (core-fill), rebar must be in place.
- **Foundation/Drainage (often referred to as the backfill inspection):** Prior to backfilling. Exterior drainage system, waterproofing, exterior insulation and wall bracing must be in place. IF a foundation as-built survey is required by the municipality, the survey **MUST** be submitted **AND** approved before the foundation inspection will be performed.
- **Radon Rough-In:** Prior to pouring slab. Under slab radon piping installed, and installation of 4" rock or sand base complete. Note: If a sand base is used, geotextile drainage matting must be installed.
- **Under Slab Vapor Retarder:** (Can take place at the same time as the radon rough-in.) Min 6' mil poly installed (with minimum 12" lap).
- **Framing: All plumbing, mechanical, fireplace, fire sprinkler and electrical rough-ins (if applicable) must be approved prior to this inspection.** (See handouts for those items for details about their rough-in and final inspections.) In addition to the approved plans, truss specs and any required engineering must be available at this inspection. Fire-blocking and wall bracing must be in place.
- **Energy Efficiency (insulation and vapor barrier):** All insulation, chutes, and poly must be installed, and poly taped and sealed, for this inspection. The wall and roof sheathing must be protected on the exterior, and the roof must be shingled.
- **Lath (if applicable):** After weep screed, paper, and kick-out flashing are applied, but **BEFORE BROWN COAT.**
- **Final: All plumbing, mechanical, fireplace, fire sprinkler, and electrical finals (if applicable) must be approved prior to this inspection.** The attic insulation and building certificates must be provided/posted. See the New Home Final Checklist (attached) for a list of items that must be complete.

**NOTICE:** Construction or work for which a permit is required shall be subject to inspection by the Building Official, and such **construction or work shall remain accessible and exposed for inspection purposes until approved.** It is the responsibility of the permit applicant to be in attendance on site and provide access to the Building Official for all required inspections. If work is concealed and/or work is not complete at time of inspection, an additional inspection is required and a **reinspection fee may apply.**

**Note:** The State of Minnesota requires all residential building contractors, remodelers, roofers, plumbers, and electricians to obtain a state license, unless they qualify for a specific exemption. Any person claiming an exemption must provide a copy of a Certificate of Exemption from the Department of Labor & Industry to the Municipality before a permit will be issued.

**Note:** To determine contractor requirements, or to check the licensing status of a contractor, please call the Minnesota Department of Labor & Industry at 651-284-5065 or toll free 1-800-342-5354.

**Note:** For specific code requirements, contact the Building Inspection Department at 952-442-7520 or 888-446-1801 or e-mail: [infoMN@safebuilt.com](mailto:infoMN@safebuilt.com).

**PROJECT CHECKLIST:**

- Refer to Minnesota Rules Chapter 1360 Prefabricated Buildings, Minnesota State Building Code 1361 Industrialized Modular Buildings, and <https://www.dli.mn.gov/business/manufactured-structures/industrialized-and-modular-buildings>.

# NEW HOME FINAL -CHECKLIST

P F N/A

## **EXTERIOR:**

- Address posted, secured, visible from the street fronting the property (contrasting color, min. 4" numbers/letters) (R319.1)
- Exterior exhaust clearances
- Grading: vegetation established or Sediment/Erosion Control in place
- Earth-wood separation – 6" (R317.1(5))
- Stucco exterior – weep screed clearance 4" above earth or 2" above paved areas (R703.6.2.1)
- Protective covering over exposed exterior waterproofing and/or insulation, extends a minimum of 6" below grade (R402.1.1)
- Ventilation intake/exhaust outlets have permanent, weather-resistant ID labels (R403.5.15)
- Grade falls 6" over the first 10' (R401.3) or swales are present
- Impervious surfaces within 10' of foundation are sloped  $\geq 2\%$  away from building
- Exterior wall penetrations sealed from weather/rodents (703.1)
- Roofing: kick-out flashing (where required) (R903.2.2)
- Roofing: ventilation as required (R806.2)
- Ramps (if installed) (R311.8)
- Deck: handrails (R311.7.7) and guardrails (R312.1)
- Steps and landing to house (R311.3), and handrails (R311.7.7)
- Stairway illumination (R311.7.9)

## **GARAGE:**

- Garage fire separations: walls/ceiling (302.6)
  - Sealed: attic access (see "General" item below) (RE402.2.4)
- Door 1: Garage overhead door meets 90 mph rating (R301.2.1)
- Door 1: GDO Test: reverse, sensors, obstruction, resistance (R309.4)
- Door 2: Garage overhead door meets 90 mph rating (R301.2.1)
- Door 2: GDO Test: reverse, sensors, obstruction, resistance (R309.4)
- Garage door to home is solid wood, solid steel, or honeycomb core steel not less than 1-3/8" thick, or is labeled as 20-minute fire rated (R302.5.1)
- Steps to home

## **GENERAL:**

- Smoke detector on each floor (installed and working) – interconnected (R314)
- Smoke detector outside of each sleeping room (installed and working) – interconnected (R314.3 and R314.4)
- Carbon monoxide detector outside of each sleeping room (10') (R315.1.1)
- Safety glazing on windows/doors where required (R308)
- Blocked patio doors (where required) (R312.2)
- Attic insulation card, insulation installer's certification and builder's certificate signed/posted (R401.3)
- Blower door test results – 3 air changes per hour (RE402.4.1.2)
- Light (natural or artificial) in every habitable room (R303.1)
- Minimum 75% of lamps in permanently installed fixtures are high-efficiency (RE404.1)
- Hallway/corridor widths 3' (R311.6) *(This section continued on next page...)*

P F N/A

**GENERAL (continued)**

- Ceiling height 7' (R305.1)
- Skylights (if installed) (R308.6)
- Main entry door: 32" clear width, side hinged (R311.2)
- Air intake separation (R303.5.1)
- Attic access: 22x30 and sealed (R807.1)
- Exposed poly is fire rated (302.10.1)
- Gas line shut-off on all gas appliances, AGA-approved flex connector – grounded CCST tubing (if required)

**BEDROOM(S):**

1 2 3 4

- Cranks on windows, egress size and sill height (R310.1)
- Window fall protection (R312.2)
- Heat register covers installed
- Smoke detector

**BATHROOM(S):**

1 2 3 4

- Ventilation (natural or mechanical) (R303.3)
- Shower walls 6' above floor (R307.2)

P F N/A

**UTILITY ROOM:**

- Sump hooked up, discharge in yard or tile along street
- Sump cover screwed down and sealed
- Water meter sealed

**STAIRS:**

- Rise, run, ceiling height, width, illumination, landings (R311.7)
- Handrails: height, gap/handroom, continuous, structural strength (R311.7.8)
- Guardrails: openings, structural strength (R312.1)
- Concealed space under stairs (R302.7)

**BASEMENT/CRAWL SPACE:**

- Exposed poly is fire rated (302.10.1)
- 1/2" drywall installed on underside of floor joists (R501.3)
- Crawl space access: 18" x 24" floor; 16" x 24" wall (R408.4)
- Crawl space ventilation (R408.1)

**PERMIT CARD:**

- Mechanical final - signed
- Fireplace final (if applicable and separate permit) - signed
- Plumbing final - signed
- Sprinkler final (if applicable and separate permit) - signed
- Electric final - signed
- Building final - signed
- Site inspection was completed (if required)

# New Construction Energy Code Compliance Certificate

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

<b>Date Certificate Posted</b>
<b>Mailing Address of the Dwelling or Dwelling Unit</b>
<b>Municipality</b>
<b>Name of Residential Contractor</b>
<b>MN License Number</b>

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, Isocyanurate	Active (With fan and monometer or other system monitoring device)	
Below Entire Slab											Location (or future location) of Fan:
Foundation Wall											Other Please Describe Here
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											

<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			
Fuel Type						Not required per mech. code	
Manufacturer						Passive	
Model						Powered	
Rating or Size	Input in BTUS:		Capacity in Gallons:		Output in Tons:	Interlocked with exhaust device. Describe:	
Efficiency	AFUE or HSPF%				SEER /EER	Other, describe:	
<b>Residential Load Calculation</b>	<b>Heating Loss</b>		<b>Heating Gain</b>		<b>Cooling Load</b>		Location of duct or system:
							Cfm's
						" round duct OR " flex duct	
						" 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 cfms:		Low:		High:	Other, describe:	
	Energy Recover Ventilator (ERV) capacity in cfms:		Low:		High:	Location of duct or system:	
	Balanced Ventilation capacity in cfms:						Cfm's
Location of fan(s), describe:						" round duct OR " Flex	
Capacity continuous ventilation rate in cfms:						" metal duct	
Total ventilation (intermittent + continuous) rate in cfms:							

**APPENDIX E**

**WORKSHEET E-1 (Fuel Gas Code)**

**IFGC Appendix E, Worksheet E-1  
Residential Combustion Air Calculation Method  
(for Furnace, Boiler, and/or Water Heater in the Same Space)**

<p><b>Step 1:</b> Complete vented combustion appliance information:</p> <p>Furnace/Boiler:          ___ Draft Hood ___ Fan Assisted ___ Direct Vent      Input: _____ Btu/hr          (Not fan Assisted)                      &amp; Power Vent</p> <p>Water Heater:          ___ Draft Hood ___ Fan Assisted ___ Direct Vent      Input: _____ Btu/hr          ( Not fan Assisted)                      &amp; Power Vent</p>
<p><b>Step 2</b> 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></p>
<p><b>Step 3</b> 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).</p>
<p><b>Step 4:</b> Determine Required Volume for Combustion Air.</p> <p><b>4a. Standard Method</b>          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) <i>is greater than</i> TRV then no outdoor openings are needed.          If CAS Volume (from Step 2) <i>is less than</i> TRV then go to <b>STEP 5</b>.</p> <p><b>4b. Known Air Infiltration Rate (KAIR) Method</b>          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      TRV = _____ + _____ = _____ ft<sup>3</sup>          If CAS Volume (from Step 2) <i>is greater than</i> TRV then no outdoor openings are needed.          If CAS Volume (from Step 2) <i>is less than</i> TRV then go to <b>STEP 5</b>.</p>
<p><b>Step 5:</b> Calculate the ratio of available interior volume to the total required volume.          Ratio = CAS Volume (from Step 2) <i>divided by</i> TRV (from Step 4a or Step 4b)      Ratio = _____ / _____ = _____</p>
<p><b>Step 6:</b> Calculate Reduction Factor (RF).          RF = 1 <i>minus</i> Ratio      RF = 1 - _____ = _____</p>
<p><b>Step 7:</b> 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 <i>divided by</i> 3000 Btu/hr per in<sup>2</sup>      CAO A = _____ / 3000 Btu/hr per in<sup>2</sup> = _____ in<sup>2</sup></p>
<p><b>Step 8:</b> Calculate Minimum CAO A.          Minimum CAO A = CAO A <i>multiplied by</i> RF      Minimum CAO A = _____ x _____ = _____ in<sup>2</sup></p>
<p><b>Step 9:</b> Calculate Combustion Air Opening Diameter (CAOD)          CAOD = 1.13 <i>multiplied by the square root of</i> Minimum CAO A      CAOD = 1.13 x √Minimum CAO A = _____ in</p>

<sup>1</sup>If desired, ACH can be determined using ASHRAE calculation or blower door test. Follow procedures in Section 304.

**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

For SI: 1 cubic foot = 0.028 m<sup>3</sup>, 1 British thermal unit per hour = 0.293 W.

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.



**TABLE 501.4.1  
PROCEDURE TO DETERMINE MAKEUP AIR QUANTITY FOR EXHAUST APPLIANCES IN DWELLINGS**

	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>
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf) b) conditioned floor area (sf) (including unfinished basements)	0.15	0.09	0.6	0.03
Estimated House Infiltration (cfm): [1a × 1b]				
2. Exhaust Capacity				
a) clothes dryer b) 80% of the largest exhaust rating (cfm):	135	135	135	135
(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)				
c) 80% of the 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. Make up Air Requirement				
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)				
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.

**TABLE 501.4.2  
MAKEUP AIR OPENING SIZING TABLE FOR NEW AND EXISTING DWELLINGS**

	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>	PASSIVE MAKEUP AIR OPENING DUCT DIAMETER <sup>e, f, g</sup>
Type of opening or system	(cfm)	(cfm)	(cfm)	(cfm)	(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 <sup>h</sup>	>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 appliance(s).
- 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.