

## RESIDENTIAL NEW HOME CONSTRUCTION

- 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.

**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 this page**, 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.
    - 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 installed and completed before a Certificate of Occupancy can be issued. If any of the items are not checked, but are added to the plan after the building 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).
- **Braced Wall Panel Inspection:** Prior to installing house wrap.
- **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 with poly taped and sealed, for this inspection. The wall and roof sheathing must be protected from weather on the exterior, and the roof must be shingled.
- **Drywall/Fire Rated Assemblies (if applicable):** Assemblies must be installed per approved plans.
- **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).

# 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 (R703.7.2.1)
- Protective covering over exposed exterior waterproofing and/or insulation, extends a minimum of 6" below grade (MREC R402.1.1)
- Ventilation intake/exhaust outlets have permanent, weather-resistant ID labels (MREC 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 (R703.1)
- Roofing: kick-out flashing (where required) (R903.2.1)
- Roofing: ventilation as required (R806)
- Ramps (if installed) (R311.8)
- Deck: handrails (R311.7.8) and guardrails (R312.1)
- Steps and landing to house (R311.3), and handrails (R311.7.8)
- Stairway illumination (R311.7.9)

## **GARAGE:**

- Garage fire separations: walls/ceiling (R302.6)
- Sealed: attic access (see "General" item below) (MREC402.2.4)
- Door 1: Garage overhead door meets 115 mph rating (R301.2.1)
- Door 1: GDO Test: reverse, sensors, obstruction, resistance (R309.4)
- Door 2: Garage overhead door meets 115 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 and landing to home, (R11.3) handrails (R311.7.8) or guards (R312.1)

## **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') (R315.3) and inside any sleeping room containing a fuel burning appliance. (R315.3)
- Safety glazing on windows/doors where required (R308)
- Blocked patio doors (where required) (R312.1)
- Attic insulation card, insulation installer's certification and builder's certificate signed/posted (MREC401.3)
- Blower door test results – Minimum 3 air changes per hour (MREC402.4.1.2) and must be less than 2.6 air changes per hour to meet the R-10 exception for foundation insulation (MREC 402.4.8) *(This section continued on next page...)*

P F N/A

**GENERAL (continued)**

- Light (natural or artificial) in every habitable room (R303.1)
- Minimum 75% of lamps in permanent fixtures are high-efficiency (MREC404.1)
- Hallway/corridor widths minimum 3' (R311.6)
- Ceiling height minimum 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: Minimum 22"x30" and sealed. If located in a wall the vertical dimension is 30" and the horizontal is 22" (R807.1)
- Exposed poly is fire rated (R302.10.1)
- Gas line shut-offs on all gas appliances, AGA-approved flex connectors installed and all CCST tubing not protected by an arc-resistant jacket is bonded (MFC 310.2)

**BEDROOM(S):**

1 2 3 4

- Cranks on windows (R310.1.1), egress size and sill height (R310.2)
- Window fall protection (R312.2)
- Heat register covers installed
- Smoke detector (R314) and CO detector (if applicable) (R315.3)

**BATHROOM(S):**

1 2 3 4

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

**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 (R302.10.1)
- 1/2" drywall installed on underside of floor joists (R302.13)
- 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.

|  |                   |
|--|-------------------|
| Date Certificate Posted                          |                   |
| Mailing Address of the Dwelling or Dwelling Unit | Municipality      |
| 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, Isocyanurate |
| 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    |  |                            |                   |                   |                   |                |                      |                             |                     |

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           |                |                       |                 | Make-up Air <i>Select a Type</i> |  |
|------------------------------|----------------|-----------------------|-----------------|----------------------------------|--|
| Appliances                   | Heating System | Domestic Water Heater | Cooling System  | <input type="checkbox"/>         | Not required per mech. code                |
| Fuel Type                    |                |                       |                 | <input type="checkbox"/>         | Passive                                    |
| Manufacturer                 |                |                       |                 | <input type="checkbox"/>         | Powered                                    |
| Model                        |                |                       |                 | <input type="checkbox"/>         | Interlocked with exhaust device. Describe: |
| Rating or Size               | Input in BTUS: | Capacity in Gallons:  | Output in Tons: | <input type="checkbox"/>         | Other, describe:                           |
| Efficiency                   | AFUE or HSPF%  |                       | SEER /EER       | Location of duct or system:      |  |
| Residential Load Calculation | Heating Loss   | Heating Gain          | Cooling Load    |                                  |  |
|                              |                |                       |                 | 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): |  |      |       | <input type="checkbox"/>            |  |
| <b>Select Type</b>   |  |      |       | <input type="checkbox"/>            |  |
| <input type="checkbox"/>   | Heat Recover Ventilator (HRV) capacity in cfm's:   | Low: | High: | Passive                             |  |
| <input type="checkbox"/>   | Energy Recover Ventilator (ERV) capacity in cfm's: | Low: | High: | <input type="checkbox"/>            |  |
| <input type="checkbox"/>   | Balanced Ventilation capacity in cfm's:            |      |       | Other, describe:                    |  |
| Location of fan(s), describe:  |  |      |       | Location of duct or system:         |  |
| Capacity continuous ventilation rate in cfm's:   |  |      |       | Cfm's                               |  |
| Total ventilation (intermittent + continuous) rate in cfm's:   |  |      |       | " round duct OR " Flex              |  |
|  |  |      |       | " metal duct                        |  |

**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:<br/> <input type="checkbox"/> Draft Hood    <input type="checkbox"/> Fan Assisted    <input type="checkbox"/> Direct Vent    Input: _____ Btu/hr<br/>                 (Not fan Assisted)    &amp; Power Vent</p> <p>Water Heater:<br/> <input type="checkbox"/> Draft Hood    <input type="checkbox"/> Fan Assisted    <input type="checkbox"/> Direct Vent    Input: _____ Btu/hr<br/>                 (Not fan Assisted)    &amp; Power Vent</p>   |
| <p><b>Step 2:</b> Calculate the volume of the Combustion Appliance Space (CAS) containing combustion appliances.<br/>                 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><br/>                 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><br/>                 Total Btu/hr input of all combustion appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr<br/>                 Use Standard Method column in Table E-1 to find Total Required Volume (TRV)    TRV: _____ ft<sup>3</sup><br/>                 If CAS Volume (from Step 2) is <i>greater than</i> TRV then no outdoor openings are needed.<br/>                 If CAS Volume (from Step 2) is <i>less than</i> TRV then go to STEP 5.</p> <p><b>4b. Known Air Infiltration Rate (KAIR) Method</b><br/>                 Total Btu/hr input of all fan-assisted and power vent appliances (DO NOT COUNT DIRECT VENT APPLIANCES)    Input: _____ Btu/hr<br/>                 Use Fan-Assisted Appliances column in Table E-1 to find Required Volume Fan Assisted (RVFA)    RVFA: _____ ft<sup>3</sup><br/>                 Total Btu/hr input of all non-fan-assisted appliances    Input: _____ Btu/hr<br/>                 Use Non-Fan-Assisted Appliances column in Table E-1 to find Required Volume Non-Fan-Assisted (RVNFA)    RVNFA: _____ ft<sup>3</sup><br/>                 Total Required Volume (TRV) = RVFA + RVNFA    TRV = _____ + _____ = _____ ft<sup>3</sup><br/>                 If CAS Volume (from Step 2) is <i>greater than</i> TRV then no outdoor openings are needed.<br/>                 If CAS Volume (from Step 2) is <i>less than</i> TRV then go to STEP 5.</p> |
| <p><b>Step 5:</b> Calculate the ratio of available interior volume to the total required volume.<br/>                 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).<br/>                 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.<br/>                 Total Btu/hr input of all Combustion Appliances in the same CAS (EXCEPT DIRECT VENT) Input: _____ Btu/hr<br/>                 Combustion Air Opening Area (CAOA):<br/>                 Total Btu/hr <i>divided by</i> 3000 Btu/hr per in<sup>2</sup>    CAOA = _____ / 3000 Btu/hr per in<sup>2</sup> = _____ in<sup>2</sup></p>  |
| <p><b>Step 8:</b> Calculate Minimum CAOA.<br/>                 Minimum CAOA = CAOA <i>multiplied by</i> RF    Minimum CAOA = _____ x _____ = _____ in<sup>2</sup></p>   |
| <p><b>Step 9:</b> Calculate Combustion Air Opening Diameter (CAOD)<br/>                 CAOD = 1.13 <i>multiplied by the square root of</i> Minimum CAOA    CAOD = 1.13 x <math>\sqrt{\text{Minimum CAOA}}</math> = _____ 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<br>(Btu/hr) | STANDARD METHOD<br>(ft <sup>2</sup> ) | KNOWN AIR INFILTRATION RATE (KAIR) METHOD<br>(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)  | 0.15  | 0.09  | 0.6  | 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 the largest exhaust rating (cfm):  | _____   | _____   | _____  | _____   |
| (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.