

RESIDENTIAL NEW HOME CONSTRUCTION

- Each address requires a separate permit.
- All materials and the installation of all materials must comply with the Minnesota State Building Code and the manufacturers' installation specifications for each product.

SUBMISSION CHECKLIST

ADDRESS

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

- Surveys.** New homes constructed in Mound are required to have three separate surveys completed during the construction process. Three (3) copies of the initial survey are required to be submitted with the building permit application. See "**Survey Requirements.**"
- Plans.**
 - 3 sets of structural building plans (floor plans and elevations)
 - 2 sets of plans indicating braced wall lines for each floor
 - Braced wall line worksheet (attached)
 - Roof/floor truss plan/layout
 - New Construction Energy Code Compliance Certificate (attached)
 - Worksheet E-1 ("Residential Combustion Air Calculation Method" – attached)
 - Table 501.3.1 form ("Procedure to Determine Makeup Air Quantity for Exhaust Equipment" – attached)
 - Additional information may be required by the plans examiner.
- Contact the Minnehaha Creek Watershed District (952-471-0590) related to regulations and applicable permits. **The building permit will not be released until the City is provided a copy of the MCWD permit(s) and/ or confirmation from the MCWD that no permit is needed.**
- Completed and signed Building Permit Application (including Submission and Feature Checklists), Plumbing and Mechanical Permit Applications (include license/bond numbers and contact info).**
- Demolition Permit Application (if applicable) – see separate packet**
- Hardcover Calculation Worksheet**
- Building Height Certification.** The applicant (or representative) must verify, on the form provided, that the proposed height of the new structure meets the height regulations of 2 ½ stories or 35 feet based on the Zoning Ordinance definition. Please provide the average grade (building line) calculation and the measurement to the appropriate location based on the roof type per City Code. Applicant is advised that the definition of "Building Height" is included on the General Zoning sheet for the particular zoning district of the parcel.
- Property Owner as Applicant Form** - If applicable.
- Additional Information.** A soil test may be required at the discretion of the Building Official. Engineered paver design specs will be required if pavers are used.

HOME FEATURE CHECKLIST

PLEASE CHECK ALL ITEMS THAT WILL BE INCLUDED IN THE CONSTRUCTION OF THIS HOME.

All items checked below may need to be installed and completed before a Certificate of Occupancy can be issued for this new home. If any of the items below 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 foundation to the top of the block (wall))

FOUNDATION INFORMATION

| | | | | |
|----------------------|---------------------------------------|--------------------------------------|-------------------------------------|-------------------------------|
| Typical Footing Size | x | | | |
| Foundation Type | Masonry <input type="checkbox"/> | Poured Wall <input type="checkbox"/> | ICF <input type="checkbox"/> | Wood <input type="checkbox"/> |
| Foundation Thickness | 8-inch <input type="checkbox"/> | 10-inch <input type="checkbox"/> | 12-inch <input type="checkbox"/> | Other _____ |
| ICF Only | 5.5-inch <input type="checkbox"/> | 7.5-inch <input type="checkbox"/> | 9.5-inch <input type="checkbox"/> | Other _____ |
| Design Criteria | Conventional <input type="checkbox"/> | Engineered <input type="checkbox"/> | IRC Tables <input type="checkbox"/> | |

Maximum Foundation Wall Height: 4' 5' 6' 7' 8' 9' 10' Other _____

Vertical Reinforcement Size and Spacing _____ rebar _____ inches o.c.

Waterproofing/Damp-proofing (product type) Above grade: _____ Below grade: _____

Foundation Drainage System Type _____

Applicant's Signature

Date

SURVEYS. New homes constructed in Mound are required to have three surveys completed during the construction process. See attached “Survey Requirements” for specific items to be included on each survey.

INITIAL SURVEY: This survey shall be titled “**Certificate of Survey.**” Three (3) copies of the initial survey are required to be submitted with the building permit application.

FOUNDATION SURVEY: This survey shall be titled “**Foundation Survey**” and shall certify the location and elevations of the installed foundation. This information will ensure that the structure was built where proposed. Two (2) copies of the foundation survey must be provided to the City of Mound Planning and Inspections Department and approved by staff prior to the backfill inspection.

AS-BUILT SURVEY: This survey shall be titled “**As-built Survey**” and shall certify the final grading and resulting drainage. **This information is required to be reviewed and approved by the City Engineer before a Certificate of Occupancy (CO) will be issued.** Two (2) copies of the as-built survey shall be provided to City. Keep the following in mind:

- A minimum of seven (7) days are needed to complete the as-built survey review.
- A PDF file of the as-built survey may be accepted for review prior to the submittal of the required certified copies. Such a submittal will eliminate the time delay inherent in delivering the survey to the City Offices. Issuance of a permanent CO is still conditional upon submittal of the required certified copies to the city.
- A letter of submittal/cover letter is to be sent with each survey sent.
- Builders are advised to schedule closing to accommodate time needed for potential grading corrections. Temporary C.O.’s will not be granted solely to accommodate a scheduled closing.

PERMITS. Plumbing, mechanical, and electrical permits are issued separately. Licensed contractors are required for new home construction and non-owner occupied housing.

FEES. This is a partial listing of expected fees. The park dedication fee, utility trunk charges, street assessments or other charges may be applicable.

| | |
|----------------------------------|---|
| Building Permit | Based on current fee schedule adopted by Council |
| Plan Review | 65% of the base fee |
| State Surcharge | .0005 x building valuation |
| Sewer Connection | \$240 per unit for new sewer service |
| Water Connection | \$240 per unit for new water service |
| Water Meter | \$392 (2 meters – 1 deduct, 1 regular) see comments below |
| Sewer Availability Charge (SAC) | Current charge at the time permit is issued (\$2,485 in 2016) |
| SAC charge is per housing unit. | Funds are transferred to the Metropolitan Waste Control Commission. |
| Erosion Control Escrow | \$1,000 |
| Project Management Escrow | \$5,000 |
| Pre-Construction Site Inspection | \$100 |
| Water & Sewer Trunk Charges | \$2,000 water, \$2000 sewer per dwelling unit (if applicable) |
| Park Dedication | \$1,100 per dwelling unit (if applicable) |

WATER METERS. The City now requires new home contractors/homeowners to purchase an extra meter from the City of Mound that would be used for metering water used outside for lawn and garden watering. The City ordinance states that “the sewer rates shall be based on the actual water used. Water used, but not placed into the sanitary sewer, may be deducted provided it is metered.” Sprinkler meters must be obtained from the City and new home customers are charged for 2 meters on the building permit. Customers are also responsible for installation of both according to the approved installation guidelines.

IT WILL TAKE APPROXIMATELY 15 BUSINESS DAYS TO PROCESS A COMPLETE APPLICATION. IF ALL REQUIRED ITEMS ARE NOT SUBMITTED, REVIEW COULD TAKE LONGER.

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:

- **MUST** schedule during office hours **AT LEAST** one business day prior to required inspection. If a specific date and/or time will be required, more notice may be needed – please plan ahead. A re-inspection fee may be charged for failure to cancel an inspection for which you are not ready, or for failure to pass an inspection.
- Office Hours: Monday - Friday • 8:00 a.m. - 4:30 p.m.
- Phone: (952) 442-7520 or (888) 446-1801
- **Permit card and approved plans MUST be on site for each inspection and should be protected from the weather.**
- Post address on construction site and visible from the street.

Inspections: See your permit card to determine which of the following inspections are required for your project. The card and plans must be on site for EVERY inspection!

- **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**
- **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.
- **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.

Warning: The inspector may issue an order to remove materials to verify compliance with the MN State Building Code and manufacturer's installation requirements.

If a re-inspection is required, a re-inspection fee will apply. The permit holder (the signing applicant) or the permit holder's representative must meet the inspector at the site to provide access. The re-inspection will not be conducted if the re-inspection fee is not paid.

Note: The State of Minnesota requires that all residential building contractors, remodelers, roofers, plumbers, and electricians obtain a state license unless they qualify for a specific exemption from the licensing requirements. 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 can be issued. To determine whether a particular contractor is required to be licensed or to check on the licensing status of individual contractors, please call the Minnesota Department of Labor & Industry at 651-284-5065 or toll free 1-800-342-5354.

Note: For specific code requirements, please contact the Building Inspection Department at 952-442-7520 or 888-446-1801 or e-mail: info@mnspect.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 (R703.6.2.1)
- 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 R4013 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 | 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 | | | | | | | | | | |

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) | Not applicable, all ducts located in conditioned space |
| Solar Heat Gain Coefficient (SHGC): | R-value |

MECHANICAL SYSTEMS

Make-up Air Select a Type

| Appliances | Domestic Water Heater | Cooling System | Make-up Air |
|------------------------------|-----------------------|----------------------|-----------------------------|
| Fuel Type | | | Not required per mech. code |
| Manufacturer | | | Passive |
| Model | | | Powered |
| Rating or Size | Input in BTUS: | Capacity in Gallons: | Output in Tons: |
| Efficiency | AFUE or HSPF% | | SEER /EER |
| Residential Load Calculation | Heating Loss | Heating Gain | Cooling Load |
| | | | |
| | | | |
| | | | 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 cfm's: | Low: | High: |
| Energy Recover Ventilator (ERV) capacity in cfm's: | Low: | High: |
| Balanced Ventilation capacity in cfm's: | | |

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 |

Location of fan(s), describe:

Capacity continuous ventilation rate in cfm's:

Total ventilation (intermittent + continuous) rate in cfm's:

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: _____ Btu/hr (Not fan Assisted) & Power Vent Water Heater: ___ Draft Hood ___ Fan Assisted ___ Direct Vent Input: _____ Btu/hr (Not fan Assisted) & Power Vent |
| 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) <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 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 TRV = _____ + _____ = _____ ft ³ 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 STEP 5 . |
| Step 5: | 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 = ___ / ___ = ___ |
| Step 6: | Calculate Reduction Factor (RF). RF = 1 <i>minus</i> 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 <i>divided by</i> 3000 Btu/hr per in ² CAOA = _____ /3000 Btu/hr per in ² = _____ in ² |
| Step 8: | Calculate Minimum CAOA. Minimum CAOA = CAOA <i>multiplied by</i> RF Minimum CAOA = _____ x _____ = _____ in ² |
| Step 9: | Calculate Combustion Air Opening Diameter (CAOD) CAOD = 1.13 <i>multiplied by the square root of</i> Minimum CAOA CAOD = 1.13 x √Minimum CAOA = _____ in |

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

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 ³) | Known Air Infiltration Rate (KAIR) Method (ft ³) | | | |
| | | Fan Assisted | | Non-Fan-Assisted | |
| | | 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 |

¹The 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.

²This 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 501.3.1
Procedure to Determine Makeup Air Quantity for Exhaust Equipment in Dwellings
 Use the Appropriate Column to Estimate House Infiltration

| | 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 atmospherically vented gas or oil appliances or solid fuel appliances ^D |
|---|---|---|--|---|
| 1a) 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 x 1b] | | | | |
| 2. Exhaust Capacity | | | | |
| a) continuous exhaust-only ventilation systems (cfm): (not applicable to balanced ventilation systems such as HRV) | | | | |
| b) clothes dryer | 135 | 135 | 135 | 135 |
| c) 80% of largest exhaust rating (cfm): (not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust) | | | | |
| d) 80% of next largest exhaust rating (cfm): (not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust) | not applicable | | | |
| Total Exhaust Capacity (cfm): [2a+2b+2c+2d] | | | | |
| 3. Makeup 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 501.3.2 | | | | |

- ^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.

| | 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 atmospherically vented gas or oil appliances or solid fuel appliances ^D | Passive makeup air opening duct diameter ^{E,F,G} |
|---------------------------------------|---|---|--|---|---|
| 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 ^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 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.

TABLE R602.10.3(1) BRACING REQUIRED BASED ON WIND

| ≤90 MPH | Minimum total length of braced wall panels required along each braced wall line (ft) ^a | | | | |
|---------|---|------|------|--------------------------------------|---------------------|
| | BWL SPACING | LIB | GB | DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB | CS-WSP, CS-G, CS-PF |
| | 10 | 3.5 | 3.5 | 2.0 | 2.0 |
| | 20 | 7.0 | 7.0 | 4.0 | 3.5 |
| | 30 | 9.5 | 9.5 | 5.5 | 5.0 |
| | 40 | 12.5 | 12.5 | 7.5 | 6.0 |
| | 50 | 15.5 | 15.5 | 9.0 | 7.5 |
| | 60 | 18.5 | 18.5 | 10.5 | 9.0 |
| | 10 | 7.0 | 7.0 | 4.0 | 3.5 |
| | 20 | 13.0 | 13.0 | 7.5 | 6.5 |
| | 30 | 18.5 | 18.5 | 10.5 | 9.0 |
| | 40 | 24.0 | 24.0 | 14.0 | 12.0 |
| | 50 | 29.5 | 29.5 | 17.0 | 14.5 |
| | 60 | 35.0 | 35.0 | 20.0 | 17.0 |
| | 10 | NP | 10.5 | 6.0 | 5.0 |
| | 20 | NP | 19.0 | 11.0 | 9.5 |
| | 30 | NP | 27.5 | 15.5 | 13.5 |
| | 40 | NP | 35.5 | 20.5 | 17.5 |
| | 50 | NP | 44.0 | 25.0 | 21.5 |
| | 60 | NP | 52.0 | 30.0 | 25.5 |

TABLE R602.10.3(2) WIND ADJUSTMENT FACTORS

| Adjustment | Story/Supporting | Cond. | Factor ^{a,b} |
|--------------------------------------|---------------------|-------|-----------------------|
| Exposure Category | One-story structure | B | 1.00 |
| | | C | 1.20 |
| | | D | 1.50 |
| | Two-story structure | B | 1.00 |
| | | C | 1.30 |
| | | D | 1.60 |
| Three-story structure | B | 1.00 | |
| | C | 1.40 | |
| | D | 1.70 | |
| Roof Eave-to-Ridge Height Adjustment | Roof only | ≤5 ft | 0.70 |
| | | 10 ft | 1.00 |
| | | 15 ft | 1.30 |
| | | 20 ft | 1.60 |
| | Roof + 1 floor | ≤5 ft | 0.85 |
| | | 10 ft | 1.00 |
| | | 15 ft | 1.15 |
| | | 20 ft | 1.30 |
| | Roof + 2 floors | ≤5 ft | 0.90 |
| | | 10 ft | 1.00 |
| | | 15 ft | 1.10 |
| | | 20 ft | NP |
| Wall Height Adjustment | Any story | 8 ft | 0.90 |
| | | 9 ft | 0.95 |
| | | 10 ft | 1.00 |
| | | 11 ft | 1.05 |
| | | 12 ft | 1.10 |

Footnotes:

a. Linear interpolation allowed

Footnotes:

a. Linear interpolation allowed
 b. Use actual provided R is ≥ min. length
 c. Max header height is 10', however it may be increased to 12' with pony wall per Table R602.10.6.4

Footnotes:

a. Linear interpolation is permitted
 b. Total adjustment factor is the product of all applicable adjustment factors

TABLE R602.10.5 MINIMUM LENGTH OF BRACED WALL PANELS

| METHOD | MINIMUM LENGTH (in) ^a | | | | | Contributing Credit Length (in) | |
|------------------------------|----------------------------------|-------|-------|--------------------|--------------------|--|---------------------|
| | Wall Height (R) | | | | | | |
| | 8 ft | 9 ft | 10 ft | 11 ft | 12 ft | | |
| DWG, WSP, SFB, PBS, PCP, HPS | 48 in | 48 in | 48 in | 53 in | 58 in | Actual ^b | |
| GB | 48 in | 48 in | 48 in | 53 in | 58 in | Double sided = Actual Single sided = .05 x actual | |
| | LIB | 55 in | 62 in | 69 in | NP | NP | Actual ^b |
| ABW | 28 in | 32 in | 34 in | 38 in | 42 in | 48 in | |
| PFH | Support in roof only | 16 in | 16 in | 16 in | 18 in ^c | 20 in ^c | 48 in |
| | Supporting roof + 1 story | 24 in | 24 in | 24 in | 27 in ^c | 29 in ^c | 48 in |
| PFG | 24 in | 27 in | 30 in | 33 in ^c | 36 in ^c | 1.5 x actual ^b | |
| CS-G | 24 in | 27 in | 30 in | 33 in | 36 in | Actual ^b | |
| CS-PF | 18 in | 18 in | 20 in | 22 in ^c | 24 in ^c | Actual ^b | |
| CS-WSP CS-SFB | Adjacent Opening Height | | | | | | Actual ^b |
| | ≤ 64 in | 24 in | 27 in | 30 in | 33 in | 36 in | |
| | 68 in | 36 in | 27 in | 30 in | 33 in | 36 in | |
| | 72 in | 27 in | 27 in | 30 in | 33 in | 36 in | |
| | 76 in | 30 in | 29 in | 30 in | 33 in | 36 in | |
| | 80 in | 32 in | 30 in | 30 in | 33 in | 36 in | |
| | 84 in | 35 in | 32 in | 32 in | 33 in | 36 in | |
| | 88 in | 38 in | 35 in | 33 in | 33 in | 36 in | |
| | 92 in | 43 in | 37 in | 35 in | 35 in | 36 in | |
| | 96 in | 48 in | 41 in | 38 in | 36 in | 36 in | |
| | 100 in | | 44 in | 40 in | 38 in | 38 in | |
| | 104 in | | 49 in | 43 in | 40 in | 39 in | |
| | 108 in | | 54 in | 46 in | 43 in | 41 in | |
| | 112 in | | | 50 in | 45 in | 43 in | |
| | 116 in | | | 55 in | 48 in | 45 in | |
| | 120 in | | | 60 in | 52 in | 48 in | |
| | 124 in | | | | 56 in | 51 in | |
| 128 in | | | | 61 in | 54 in | | |
| 132 in | | | | 66 in | 58 in | | |
| 136 in | | | | | 62 in | | |
| 140 in | | | | | 66 in | | |
| 144 in | | | | | 72 in | | |

TABLE R602.10.5.2 PARTIAL CREDIT FOR BRACED WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH^a

| Actual Length of Braced Wall Panel (in) | Contributing Length of BWP | |
|---|----------------------------|------------------|
| | 8 ft wall height | 9 ft wall height |
| 48 | 48 | 48 |
| 42 | 36 | 36 |
| 36 | 27 | NA |

Footnotes:

a. Linear interpolation is permitted