Submittal Documents Required With Residential Permit Application

1. Two complete sets of working drawings. Label windows with fall protection required.

Drawings shall include:

Wall bracing details with braced wall panels identified and label with length in inches and type. All calculations done to determine wall bracing required and provided.

Plot plan with setbacks, elevations and drainage.

R Values and U Factors for building components.

Additional Documentation:

Actual heating and cooling calculations in accordance with procedures described in the ASHRAE/ACCA Standard 183 or approved equivalent using the design parameters specified in Chapter 3 of the International Energy Conservation Code.

Mechanical equipment with ventilation calculations, makeup air calculations, and combustion air calculation using forms provide in the Minnesota Mechanical Code Table 501.4.1, Table 501.4.2 and R403.5 Minnesota Energy Code for Ventilation requirements.

Residential Automatic Sprinkler system design if floor area is 4500 square feet or more and all Townhomes.

Townhomes

Provide with permit application: Listed fire resistant assemblies for rated walls and other assemblies. These listed assemblies must be followed for wall to meet listing.

Minnesota 2015 Building Code
Plan Review :

No permit will be issued until the following information is provided to Inspection Department.

1. Wall bracing details
2. Heat Loss actual calculations showing how heat loss was calculated. Section 312 **Load Calculations.** Heating and cooling system design loads for the purpose of sizing systems, appliances and equipment shall be determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. or approved equivalent using the design parameters specified in Chapter 3 of the International Energy Conservation Code.
3. All mechanical equipment with ventilation calculations, makeup air calculations, and combustion air calculation using forms provide in the Minnesota Mechanical Code.
4. Two complete sets of drawing with plot plan showing setbacks and elevations.
5. Sprinkler system design if required by Code.

Things you should be aware of:

1. Waterproofing to inside top of foundation, or use spray foam in rim and seal.

2. R-15 insulation for foundations. R-10 Minimum exterior with R-5 interior. If air changes per hour (blower door test) do not exceed 2.6 ACH, R-5 doesn't need to be installed.

3. Radon System: **Gas permeable Material** A uniform layer of clean aggregate, a minimum of 4 inches thick. The aggregate material that will pass through a 2 inch sieve and be retained by a 1/4 inch sieve. A uniform layer of sand with geotexile drainage matting designed to allow the lateral flow of soil gases. Other material professionally engineered. See MN. Rules 1303.2401

4. Radon pipe 3 or 4 inch diameter and insulated with minimum R-4 when in unconditioned space.

5. Unfinished basement ceiling are to have 1/2 inch gypsum board installed Exception: 2x10 or 2x12 floor joist. 80 square feet is exempt but must be fire blocked from floor system.

6. 2"x2" washers are still required on full foundations.

7. Foundation drainage in every core of block foundations.

8. Minimum 75 % of Lighting fixtures to be high efficiency.

9. Balanced ventilation system required.

10. Mandatory programmable thermostats.

11. Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.

12. Attic access is to weather stripped with insulation equal to attic insulation. Taping shut is no longer accepted.

13. Window fall prevention. Openings less than 36 inches from the finished floor and more than 72 inches above finished grade or surface below shall meet the fall protection requirements of R312.2. (4 inch sphere shall not pass through).

14. Added to existing language: Glazing that is less than 60 inches measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool. See R308.4.5

15. Glazing adjacent to the bottom stair landing. Hazardous location less than 36 inches above landing and within 60 inches horizontally from the bottom tread. See R308.4.7

16. All townhomes are to be fully sprinkled using 13D (done by licensed sprinkler contractor or P2904 (by licensed master plumber certified by material manufacturer)

17. Building framing cavities shall not be used as ducts or plenums. All ducts are to be sealed. If any ducts that are outside of the building thermal envelope must be tested. See R403.2.2 for Post-construction or rough-in tests. (Energy Code)

15. Dryer vent pipe Min. 26 gage galv. or aluminum pipe and fire caulked at wall or floor penetration. An approved noncombustible dryer exhaust duct wall receptacle may also be used. The maximum length of the exhaust duct shall be 35 feet from the connection to the transition duct. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 504.6.4.1 in the Mechanical Code. Where the exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet of the exhaust duct connection.

18. Maximum height to egress window opening is 44 inches.

19. Wall bracing key points, **Simplified method**, no wood foundation, continuous load paths to foundation , no more than two stories above top of foundation, no wall height over 10 feet, maximum eave to ridge height of 15 feet, exterior walls shall have minimum 1/2 gypsum board on interior, no cripple wall permitted in two story buildings, maximum dimension 60 feet with 3:1 maximum ratio between long and short side, Maximum cantilever 24 inches, Truss heal heights added bracing required. See R602.12
Wall Bracing Provisions: See IRC R602.10 A whole lot of information. Key point is continuous load path to foundation. If either method can not be followed, a structural engineered design will be required.

20. Mechanical ventilation system fan efficacy is specified in Table R403.5.1 of Minnesota Energy Code.

21. Locking access port caps are now required on outdoor refrigerant circuit access ports or shall otherwise be secured to prevent unauthorized access.

22. Footings per Table R402.2 Minnesota Building Code. Minimum specified compressive strength of concrete: 5000 minimum or provide 2500 psi compressive strength, with approved admixture that provides a water and vapor resistance at least equivalent to 5,000 psi concrete. Table R402.2 also covers basement floors, walls, garage floors, carport slabs, steps etc.

Example of U-Factor alternative

Wall component	Cavity	R-values Studs ,Plates	Headers	
Outside air film	0.25	0.25	0.25	
Vinyl Siding	0.62	0.62	0.62	
House wrap	0.06	0.06	0.06	
7/16 OSB	0.54	0.54	0.54	
Wood Studs 2x6	0	6.88	4.36	
Cavity Insulation	19	0	0	
1/2 Gypsum board	0.45	0.45	0.45	
Interior air film	0.68	0.68	0.68	
Sum of thermal resistance	21.6	9.48	6.96	
Studs 16 inches on center				
U =	0.75	0.21	0.04	
	21.6	9.48	6.96	0.06255

Maximum from Table R402.1.3: 0.048

R-19 does not meet minimum code
With fiberglass insulation 2.5 inches thick in header space, U-factor is still 0.05942 and doesn't meet code.

23. Address on house 4 inch high and min. 1/2 inch strokes contrasting color. If home has long driveway it would be fixed on pole or monument.

24. Additional lateral load requirements for decks. See Section R507 for deck attachment to band joist. Tables and diagrams are provided in the code.

25. Footings minimum 5,000 psi compressive strength or 2500 psi, with an approved admixture that provides a water and vapor resistance at least equivalent to 5,000 psi concrete.

26. Minnesota provisions: Slab on grade construction not larger than 1,000 sq. ft. 1303.1600

27. Change : Post Compliance certificate on or in electrical distribution panel. Added information is now required on certificate.

28. Certificate shall list: residential contractor name and contractor license number, or homeowners name, if acting as the general contractor; the predominant installed R-values, their location, and type of insulation installed in or on ceiling/roof, walls, rim/band joist, foundation, slab, basement wall, crawl space wall or floor, and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration; and the results of any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types, input ratings, manufacturers, model numbers and efficiencies of heating, cooling, and service water heating equipment. The certificate shall also list the structure's calculated heat loss, calculated cooling load, and calculated heat gain. The certificate shall list the mechanical ventilation system type, location, and capacity, and the building's designated continuous and total ventilation rates. The certificate shall also list the type, size, and location of any make-up air system installed and the location or future location of the radon fan.

2. A test approved by the building official verifies proper operation of vented combustion *appliances*.

501.4.2 Makeup air supply. *Makeup air* shall be provided by one of the following methods:

1. Passive *makeup air* shall be provided by passive openings according to the following:
   1.1. Passive *makeup air* openings from the outdoors shall be sized according to IMC Table 501.4.2.
   1.2. Barometric dampers are prohibited in passive *makeup air* openings when any atmospherically vented *appliance* is installed.
   1.3. Single passive openings larger than 8 inches (204 mm) diameter, or equivalent, shall be provided with a motorized damper that is electrically interlocked with the largest exhaust system.
2. Powered *makeup air* shall be provided if the size of a single opening or multiple openings exceeds 11 inches (280 mm) diameter, or equivalent, when sized according to IMC Table 501.4.2. Powered *makeup air* shall comply with the following:
   2.1. Powered *makeup air* shall be electrically interlocked with the largest exhaust system.

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

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

A. Use this column if there are other than fan-assisted or atmospherically vented gas or oil *appliances* or if there are no *combustion appliances*.
B. Use this column if there is one fan-assisted *appliance* per venting system. Other than atmospherically vented *appliances* may also be included.
C. Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil *appliance* per venting system or one solid fuel *appliance*.
D. Use this column if there are multiple atmospherically vented gas or oil *appliances* using a common vent or if there are atmospherically vented gas or oil *appliances* and solid fuel *appliances*.

2.2. Powered makeup air shall be matched to the airflow of the largest exhaust system.

3. *Makeup air* shall be provided by a combination of passive openings and powered means according to IMC Table 501.4.2 and the following:

3.1. Passive makeup air openings shall comply with item 1.

3.2. Powered *makeup air* shall be supplied for the quantity of airflow in excess of the passive *makeup air* opening provided, and it shall be electrically interlocked with the exhaust system.

501.4.2.1 Makeup air ducts. *Makeup air* ducts shall be constructed and installed according to IMC Chapter 6 and Section 501.4.2.

501.4.2.2 Makeup air intake. *Makeup air* intake openings shall be located to avoid intake of exhaust air in accordance with IMC Section 401.4 and IFGC Section 503.8, and shall be covered with corrosion resistant screen of not less than $^1/_4$ inch (6.4 mm) mesh. *Makeup air* intake openings shall be located at least 12 inches (305 mm) above adjoining grade level.

501.4.2.3 Makeup air location. *Makeup air* requirements of 175 cubic feet per minute (cfm) (0.084 m^3/s) and greater shall be introduced to the dwelling in one of the following locations:

1. In the space containing the vented *combustion appliances.*
2. In the space containing the exhaust system.
3. In a space that is freely communicating with the exhaust system and is *approved* by the building official.

501.4.2.4 Makeup air termination restriction. A *makeup air* opening shall not terminate in the return air plenum of a forced air heating system unless it is installed according to the heating appliance manufacturer's installation instructions.

501.4.2.5 Separate makeup air and combustion air openings. When both makeup air and *combustion* air openings are required, they shall be provided through separate openings to the outdoors, subject to IFGC Section 304, to determine requirements for air for *combustion* and ventilation:

Exception: Combination *makeup air* and *combustion air* systems may be approved by the building official where they are reasonably equivalent in terms of health, safety, and durability.

TABLE 501.4.2
MAKEUP AIR OPENING SIZING TABLE FOR NEW AND EXISTING DWELLING UNITS

TYPE OF OPENING OR SYSTEM	ONE OR MULTIPLE POWER VENT OR DIRECT VENT APPLIANCES OR NO COMBUSTION APPLIANCES[A]	ONE OR MULTIPLE FAN-ASSISTED APPLIANCES AND POWER VENT OR DIRECT VENT APPLIANCES[B]	ONE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCE OR ONE SOLID FUEL APPLIANCE[C]	MULTIPLE APPLIANCES THAT ARE ATMOSPHERICALLY VENTED GAS OR OIL APPLIANCES OR SOLID FUEL APPLIANCES[D]	PASSIVE MAKEUP AIR OPENING DUCT DIAMETER[E, F, G]
	(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 *appliances.*
E. An equivalent length of 100 feet of round smooth metal duct is assumed. Subtract 40 feet for the exterior hood and ten feet for each 90-degree elbow to determine the remaining length of straight duct allowable.
F. If flexible duct is used, increase the duct diameter by one inch. Flexible duct shall be stretched with minimal sags.
G. Barometric dampers are prohibited in passive *makeup air* openings when any atmospherically vented *appliance* is installed.
H. Powered *makeup air* shall be electrically interlocked with the largest exhaust system.

dimension of the basement to avoid a short circuit of the air circulation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

Exception: Kitchen and bath fans that are not included as part of the mechanical ventilation system are exempt from these requirements.

R403.5.1 Alterations. Alterations to existing buildings are exempt from meeting the requirements of Section R403.5.

R403.5.2 Total ventilation rate. The mechanical ventilation system shall provide sufficient outdoor air to equal the total ventilation rate average for each 1-hour period in accordance with Table R403.5.2, or Equation R403.5.2, based on the number of bedrooms and square footage of conditioned space, including the basement and conditioned crawl spaces.

For the purposes of Table R403.5.2 and Section R403.5.3, the following applies:

a. Equation R403.5.2 Total ventilation rate: Total ventilation rate (cfm) = (0.02 × square feet of conditioned space) + (15 × (number of bedrooms + 1))

b. Equation R403.5.2.1 Continuous ventilation rate: Continuous ventilation rate (cfm) = Total ventilation rate/2

R403.5.3 Continuous ventilation rate. Continuous ventilation rate (CVR) is a minimum of 50 percent of the total ventilation rate (TVR). The CVR shall not be less than 40 cfm (1133 L/min) and shall provide a continuous average cfm rate according to Table R403.5.2 or according to Equation R403.5.2 for every 1-hour period. The portion of the ventilation system that is intended to be continuous may have automatic cycling controls to provide the average flow rate for each hour.

R403.5.4 Intermittent ventilation rate. Intermittent ventilation rate means the difference between the total ventilation rate and the continuous ventilation rate.

R403.5.5 Balanced and HRV/ERV systems. All balanced systems shall be balanced so that the air intake is within 10 percent of the exhaust output. A heat recovery ventilator (HRV) or energy recovery ventilator (ERV) shall meet either:

1. The requirements of HVI Standard 920, 72 hours minus 13°F (-10°C) cold weather test; or
2. Certified by a registered professional engineer and installed per manufacturer's installation instructions.

An HRV or ERV intended to comply with both the continuous and total ventilation rate requirements shall meet the rated design capacity of the continuous ventilation rate specified in Section R403.5.3 under low capacity and meet the total ventilation rate specified in Section R403.5.2 under high capacity.

Exception: The balanced system and HRV/ERV system may include exhaust fans to meet the intermittent ventilation rate. Surface mounted fans shall have a maximum 1.0 sone per HVI Standard 915.

TABLE R403.5.1
MECHANICAL VENTILATION SYSTEM FAN EFFICACY

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

For SI: 1 cfm = 28.3 L/min.

TABLE R403.5.2
NUMBER OF BEDROOMS

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

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

Description _____ Date [ ]

IRC Table R602.10.3 (2)
Wind Adjustment Factors (Table 3.4)
Exposure Category
Roof Eave -to- Ridge Height
Wall Height
Number of Braced Wall Lines

Numbered Wall Lines	Lettered Wall Lines

Braced Wall Line	Bracing Method	Braced Wall Line Spacing (ft)	Required Bracing (ft)	Wind Factor Total	Total Required Bracing Length (ft)	Bracing Length Provided (ft)	Status
1							
2							
3							
4							
5							
A							
B							
C							
D							
E							

Builder _____
Prepared By _____

Exposure Category _____
Ceiling Height _____
Construction Method for Braced Wall Panels. _____
Eave to Ridge Height _____
Number of braced wall lines _____