

MINNESOTA RULES, CHAPTER 1322
ADOPTION OF THE 2012 INTERNATIONAL ENERGY
CONSERVATION CODE (IECC)
(RESIDENTIAL PROVISIONS)

1322.0010 ADOPTION OF INTERNATIONAL ENERGY CONSERVATION CODE (IECC) BY REFERENCE.

Subpart 1. **Generally.** The 2012 edition of the International Energy Conservation Code (IECC) as promulgated by the International Code Council (ICC), Falls Church, Virginia, is incorporated by reference and made part of the Minnesota State Building Code except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. The IECC is not subject to frequent change and a copy of the IECC, with amendments for use in Minnesota, is available in the office of the commissioner of labor and industry. Portions of this chapter reproduce text and tables from the IECC. The IECC is copyright 2011 by the ICC. All rights reserved.

Subpart 2. **Mandatory chapters.** The 2012 IECC RE Chapters 2 through 5, must be administered by any municipality that has adopted the code, except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended by this chapter.

Subpart 3. **Replacement chapters.** The following 2012 IECC chapters are being deleted and replaced with the provisions listed below:

A. Chapter 1(RE) of the 2012 IECC and any references to code administration in this code are deleted and replaced with Minnesota Rules, chapter 1300, Minnesota Administration Code.

1322.0020 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL (ICC) CODES.

Subpart 1. **Generally.** References to other codes and standards promulgated by the International Code Council in the 2012 International Energy Conservation Code are modified in subparts 2 to 11.

Subpart 2. **Building code.** References to the International Building Code in this code mean the Minnesota Building Code, adopted pursuant to Minnesota Rules, chapter 1305, and Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 3. **Residential code.** References to the International Residential Code in this code mean the Minnesota Residential Code, adopted under Minnesota Rules, chapter 1309, and Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 4. **Electrical code.** References to the International Code Council, Electrical Code in this code mean the Minnesota Electrical Code, Minnesota Rules, chapter 1315, adopted under Minnesota Statutes, section 326B.35.

Subpart 5. **Fuel gas code.** References to the International Fuel Gas Code in this code mean the Minnesota Mechanical Code, Minnesota Rules, chapter 1346, adopted under Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 6. **Mechanical code.** References to the International Mechanical Code in this code mean the Minnesota Mechanical Code, Minnesota Rules, chapter 1346, adopted under Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 7. **Plumbing code.** References to the International Plumbing Code in this code mean the Minnesota Plumbing Code, Minnesota Rules, chapter 4715, adopted under Minnesota Statutes, section 326B.106, subdivisions 1 and 2.

Subpart 8. **Private sewage disposal code.** References to the International Private Sewage Disposal Code in this code mean the Minnesota Pollution Control Agency's minimum standards and criteria for individual sewage treatment systems in Minnesota Rules, chapter 7080, adopted under Minnesota Statutes, chapters 103F, 103G, 115, and 116.

Subpart 9. **Energy conservation code.** References to the International Energy Conservation Code in this code mean the Minnesota Energy Code, Minnesota Rules, chapter 1322 and chapter 1323 adopted under Minnesota Statutes, section 326B.106.

Subpart 10. **Property maintenance code.** References to the International Property Maintenance Code in this code do not apply.

Subpart 11. **Accessibility code.** References to accessibility in this code mean the Minnesota Accessibility Code, Minnesota Rules, chapter 1341.

1322.0030 ADMINISTRATIVE PROCEDURE CRITERIA.

Procedures relating to the administration and enforcement of this code under Minnesota Statutes, section 326B.101, are contained in Minnesota Rules, chapter 1300, Minnesota Administration Code. Minnesota Rules, chapter 1300, governs the application of this code.

1322.0040 VIOLATION.

A violation of this code is a misdemeanor under Minnesota Statutes, section 326B.082.

1322.0100, ADMINISTRATION FOR RESIDENTIAL ENERGY

Subpart 1. Notwithstanding 1322.0030, the following administrative provisions apply.

A. **R101.2 Scope.** This Code applies to Residential Buildings as defined and their associated systems and equipment.

B. **R101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions,

alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. Attic insulation shall not be installed unless accessible attic bypasses have been sealed. An attic bypass is any air passageway between a conditioned space and an unconditioned attic.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
- 6.5. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
- 7.6. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
- 8.7. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

C. R101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

D. R101.4.5 Change in space conditioning. Any non-conditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

E. R101.4.6 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC – Commercial and Residential Provisions.

F. R101.5 Compliance. *Residential buildings* shall meet the provisions of IECC – Residential Provisions. *Commercial buildings* shall meet the provisions of IECC – Commercial Provisions.

G. R101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

H. R101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies

complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h . ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

I. R103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved by the code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems, and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with watt-age and control narrative; and air sealing details.

J. R106.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 5, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference as regulated by this code.

1322.0201 SECTION R201, GENERAL.

IECC Section R201.4 is amended to read as follows:

R201.4 Terms Not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

R201.4 Terms not defined. Where terms are not defined through the methods authorized by this chapter, the Merriam-Webster Collegiate Dictionary, available at www.m-w.com, shall be considered as providing ordinarily accepted meanings. The dictionary is incorporated by reference, is subject to frequent change, and is available through the Minitex interlibrary loan system.

1322.0303 SECTION R303, MATERIALS, SYSTEMS AND EQUIPMENT

IECC Section R303.1. IECC Section R303.1 is amended to read as follows:

R303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code. Materials shall be designed for the intended use, and installed in accordance with the manufacturers installation instructions, any listing, or certifications required.

IECC Section R303.1.5. IECC Section R303.1.5 is added as follows:

R303.1.5 Minnesota thermal insulation standards. Thermal insulation shall conform to Minnesota Rules, Chapter 7640, Minnesota Thermal Insulation Standards, adopted by the Department of Commerce.

1322.0401 Section R401, GENERAL

Subpart 2. IECC Section R 401.3. IECC Section R401.3 is amended to read as follows:

R401.3 Certificate (Mandatory). A building certificate shall be completed and posted on or in the electrical distribution panel by the builder or registered design professional. The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the date the certificate is installed, the dwelling address, residential contractor name and contractor license number, or homeowner (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, crawlspace wall and/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 rating, manufacturer, model number and efficiencies of heating, cooling and service water heating equipment. The certificate shall also indicate the structures calculated heat loss, cooling load and structures calculated heat gain. Where a ~~gas-fired unvented room heater,~~ “electric furnace” , or baseboard electric heater is installed in the residence, the certificate shall list ~~“gas-fired unvented room heater,”~~ “electric furnace,” or “baseboard electric heater,” as appropriate. An efficiency shall not be listed for ~~gas-fired unvented room heaters,~~ electric furnaces, or electric baseboard heaters. The certificate shall list the mechanical ventilation system type, location, and capacity and the buildings designed continuous and total ventilation rates. The certificate shall also list the type, size, and location of any make-up air system installed, and if the radon mitigation system is a passive or active system, and the location or future location of the radon fan.

1322.0402 Section R402, BUILDING THERMAL ENVELOPE

402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Table 402.1.1 based on the climate zone specified in Chapter 3 and the additional requirements of section R402.2.

402.2.1 Ceilings with attic spaces. When section R402.1.1 requires R49, it must be installed with a minimum 6” energy heel truss/framing. When Section 402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section 402.1.3 and the total UA alternative in Section 402.1.4.

IECC Table R 402.1.1. IECC Table R402.1.1 is amended to read as follows:

Table R402.1.1 Insulation and fenestration requirements by component.

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^p U-FACTOR	GLAZED FENESTRATION SHGC ^{q,u}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ^r	FLOOR R-VALUE	BASEMENT WALL R-VALUE ^{c,s}	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^{e,k} WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^t	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	21 or 20+5 or 13+10 ^h	15/20	30 ^g	15/19	10, 4-3.5 ft	15/19
7 and 8	0.32	0.55	NR	49	21 or 20+5 or 13+10 ^h	19/21	38 ^g	15/19	10, 4-5 ft	15/19

For SI: 1 foot = 304.8 mm.

- a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.
- b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate Zones 1-3 where the SHGC for such skylights does not exceed 0.30.
- c. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- d. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs. For slabs in Climate Zones 6 and 7, insulation shall be installed to the depth indicated or to the top of the footing whichever is less.
- e. There are no SHGC requirements in the Marine Zone.
- f. Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.
- g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.
- i. The second R-value applies when more than half the insulation is on the interior of the mass wall.
- j. When using log type construction for thermal mass walls the following shall apply:
 - (1) A minimum of a 7-inch diameter log shall be used; and
 - (2) The u-value of fenestration products shall be 0.29 overall on average or better.
- k. Foundation Insulation shall be installed in accordance with the manufacturers installation instructions, shall comply with the R-values stated in this table and shall comply with the applicable provisions addressing durability that are found in sections R402.1.1.1 through R402.1.1.7, or shall comply with the Foundation Wall Performance option in Section R402.1.1.8

R402.1.1.1 Integral foundation insulation requirements. Any insulation assembly installed integral to the foundation walls shall be manufactured for its intended use and installed according to the manufacturer's specifications.

R402.1.1.2 Exterior foundation insulation requirements. Any insulation assembly installed on the exterior of the foundation walls and the perimeter of slabs-on-grade:

1. shall be of water-resistant materials manufactured for its intended use;
2. shall be installed according to the manufacturer's specifications;
3. shall comply with either ASTM C578, C612, or C1029 as applicable; and
4. shall have a rigid, opaque, and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of six inches (152 mm) below grade. The insulation and protective covering system shall be flashed in accordance with IRC Section R703.8.

R402.1.1.3 Interior foundation insulation requirements. Any insulation assembly installed on the interior of foundation walls shall meet the following provisions:

1. Masonry foundation walls shall be drained through each masonry block core, to an approved interior drainage system.
2. If a frame wall is installed, it shall not be in direct contact with the foundation wall unless that interior side of the foundation wall has been waterproofed.
3. Comply with the interior air barrier requirements Of Section R402.4.
4. Comply with Section R402.1.1.4, R402.1.1.5, R402.1.1.6, or R402.1.1.7, as applicable.

R402.1.1.4 Rigid interior insulation. Rigid interior insulation shall comply with the following:

1. Either ASTM C578 or ASTM C1289.
2. Dampproofing, waterproofing, or a water repellent shall be applied to the exposed above grade foundation walls or a layer of dampproofing or waterproofing shall be installed on the entire inside surface of the foundation wall. Dampproofing and waterproofing shall be in compliance with the provisions of dampproofing or waterproofing located in the International Residential Code (IRC). Water-repellent materials shall comply with ASTM E514 with 90 percent or greater reduction in water permeance when compared to an untreated sample.
3. Installation requirements:
 - a. must be in contact with the foundation wall surface;
 - b. vertical edges shall be sealed with acoustic sealant;
 - c. all interior joints, edges, and penetrations shall be sealed against air and water vapor penetration;
 - d. horizontally continuous acoustic sealant exists between the foundation wall and the insulation at the top of the foundation wall; and
 - e. horizontally continuous acoustic sealant exists between the basement floor and the bottom insulation edge.
4. The insulation shall not be penetrated by the placement of utilities or by fasteners or connectors used to install a frame wall.

R402.1.1.5 Spray-applied interior foam insulation. Spray-applied interior foam insulation shall comply with the following as applicable for:

1. Closed cell foam.
 - a. ASTM C1029 compliant with a permeance not greater than 1.0 in accordance with ASTM E96 procedure A.
 - b. Sprayed directly onto the foundation wall surface. There must be a one-inch minimum gap between the foundation wall surface and any framing.
 - c. The insulation shall not be penetrated by the placement of utilities.
 - d. Through penetrations shall be sealed.
2. Open cell foam.
 - a. Sprayed directly onto the foundation wall surface. There must be a one-inch minimum gap between the foundation wall surface and any framing.
 - b. The insulation shall not be penetrated by the placement of utilities.
 - c. Through penetrations shall be sealed.
 - d. A vapor retarder and air barrier shall be applied to the warm in winter side of the assembly.

R402.1.1.6 Semi-rigid interior insulation. Semi-rigid interior insulation shall comply with the following:

1. ASTM C1621 with a maximum permeance of 1.1 per inch.
2. Must have a minimum density of 1.3 pcf and have a fungal resistance per ASTM C1338.
3. Installation requirements:
 - a. Must be in contact with the foundation wall surface;
 - b. Vertical edges shall be sealed with acoustic sealant;
 - c. All interior joints, edges, and penetrations shall be sealed against air and water vapor penetration;
 - d. Horizontally continuous acoustic sealant shall be applied between the foundation wall and the insulation at the top of the foundation wall; and
 - e. Horizontally continuous acoustic sealant shall be applied between the basement floor and the bottom insulation edge.

R402.1.1.7 Fiberglass batt interior insulation. Fiberglass batt interior insulation shall comply with the following:

1. Waterproofing shall be applied to the entire inside surface of the foundation wall.
2. The top and bottom plates must be air sealed to the foundation wall surface and the basement floor.
3. In addition, an air barrier material and vapor retarder material with a minimum permeance of at least 1, in accordance with ASTM E96 procedure A, shall be installed on the warm-in-winter side of the foundation insulation meeting the following:
 - a. Air sealed to the framing with construction adhesive or equivalent at the top and bottom plates and where the adjacent wall is insulated;
 - b. Air sealed utility boxes and other penetrations; and
 - c. All seams shall be overlapped at least six inches and sealed with compatible sealing tape or equivalent.

R402.1.1.8 Foundation wall insulation performance option. Insulated foundation systems designed and installed under the performance option shall meet the requirements of this section.

Water separation plane. The foundation shall be designed and built to have a continuous water separation plane between the interior and exterior. The interior side of the water separation plane must:

1. have a stable annual wetting/drying cycle whereby foundation wall system water (solid, liquid, and vapor) transport processes produce no net accumulation of ice or water over a full calendar year and the foundation wall system is free of absorbed water for at least four months over a full calendar year;
2. prevent conditions of moisture and temperature to prevail for a time period favorable to mold growth for the materials used; and
3. prevent liquid water from the foundation wall system from reaching the foundation floor system at any time during a full calendar year.

Documentation. The foundation insulation system designer shall provide documentation certified by a professional engineer licensed in Minnesota demonstrating how the requirements of this section are fulfilled. The foundation insulation system designer shall also specify the design conditions for the wall and

the design conditions for the interior space for which the water separation plane will meet the requirements of this section. The foundation insulation system designer shall provide a label disclosing these design conditions. The label shall be posted in accordance with Section N1101.8.

Installation. The water separation plane shall be designed and installed to prevent external liquid or capillary water flow across it after the foundation is backfilled.

Foundation air barrier. The foundation insulation system shall be designed and installed to have a foundation air barrier system between the interior and the exterior. The foundation air barrier system must be a material or combination of materials that is continuous with all joints sealed and is durable for the intended application. Material used for the foundation air barrier system must have an air permeability not to exceed 0.004 ft³ /min.ft² under a pressure differential of 0.3 inches water (1.57 psf) (0.02 L/s.m² at 75Pa) as determined by either commonly accepted engineering tables or by being labeled by the manufacturer as having these values when tested in accordance with ASTM E2178.

1322.0403 Section R403, SYSTEMS

IEEC Section R403.2.1 IECC Section R403.2.1 is deleted in its entirety and replaced with the following language:

R403.2.1 Insulation (Prescriptive). All exhaust, supply, and return air ducts and plenums shall be insulated according to Table R403.2.1.

TABLE R403.2.1
MINIMUM REQUIRED DUCT AND PLENUM INSULATION FOR DWELLING
UNITS
(see notes for explanations)

<u>Duct Type/Location</u>	<u>Requirements</u>
<u>Exterior of building</u>	<u>R-8, V and W</u>
<u>Attics, garages and ventilated crawl spaces</u>	<u>R-8 and V</u>
<u>Outdoor air intakes within conditioned spaces</u>	<u>R-6 and V</u>
<u>Exhaust ducts in attics, garages and ventilated crawl spaces</u>	<u>R-6 and V</u>
<u>Exhaust ducts within conditioned spaces*</u>	<u>R-6 and V</u>
<u>Within cement slab or within ground</u>	<u>R-6 and V</u>
<u>Within conditioned spaces and in basements with insulated walls</u>	<u>None required</u>

Notes:

*Insulation is only required in the conditioned space for a distance of 3 feet (914 mm) from the exterior or unconditioned space.

V = Vapor retarder required in accordance with IMC Section 604.11. When a vapor retarder is required, duct insulation required by this section shall be installed without respect to other building envelope insulation.

W = Approved weatherproof barrier.

IEEC Section R403.5. IECC Section R403.5 is deleted in its entirety and replaced with the following language:

R403.5 Mechanical Ventilation (Mandatory)

R403.5 Mechanical Ventilation (Mandatory). The building shall be provided with a balanced mechanical ventilation system (+/- 10%) that meets the requirements of this section. This section covers the continuous and total mechanical ventilation requirements for dwelling unit ventilation. All unfinished basements, crawl spaces, and levels, shall be provided with a minimum ventilation rate of 0.02 cfm per square foot. Or a minimum of one supply duct and one return duct. The supply and return ducts shall be separated by one-half the diagonal 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 this section

R403.5.2 Total ventilation Rate: The Mechanical ventilation system shall provide sufficient outdoor air to equal the total ventilation rate average, for each one 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 heat recovery ventilators or energy recovery ventilators, the average hourly ventilation capacity must be determined in consideration of any reduction of exhaust or outdoor air intake, or both, for defrost or other equipment cycling per HVI Standard 920 or certified by a registered professional engineer when installed in accordance with manufacturers instructions

Table R403.5.2

	<u>Number of Bedrooms</u>					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6²</u>
<u>Conditioned space¹ (in sq. ft.)</u>	<u>Total/Continuo us</u>	<u>Total/Continuo us</u>	<u>Total/Continuo us</u>	<u>Total/Continuo us</u>	<u>Total/Continuo us</u>	<u>Total/Continuo s</u>
<u>1000 – 1500</u>	<u>60/40</u>	<u>75/40</u>	<u>90/45</u>	<u>105/53</u>	<u>120/60</u>	<u>135/68</u>
<u>1501 – 2000</u>	<u>70/40</u>	<u>85/43</u>	<u>100/50</u>	<u>115/58</u>	<u>130/65</u>	<u>145/73</u>
<u>2001 – 2500</u>	<u>80/40</u>	<u>95/48</u>	<u>110/55</u>	<u>125/63</u>	<u>140/70</u>	<u>155/78</u>
<u>2501 – 3000</u>	<u>90/45</u>	<u>105/53</u>	<u>120/60</u>	<u>135/68</u>	<u>150/75</u>	<u>165/83</u>
<u>3001 – 3500</u>	<u>100/50</u>	<u>115/58</u>	<u>130/65</u>	<u>145/73</u>	<u>160/80</u>	<u>175/88</u>
<u>3501 – 4000</u>	<u>110/55</u>	<u>125/63</u>	<u>140/70</u>	<u>155/78</u>	<u>170/85</u>	<u>185/93</u>
<u>4001 – 4500</u>	<u>120/60</u>	<u>135/68</u>	<u>150/75</u>	<u>165/83</u>	<u>180/90</u>	<u>195/98</u>
<u>4501 – 5000</u>	<u>130/65</u>	<u>145/73</u>	<u>160/80</u>	<u>175/88</u>	<u>190/95</u>	<u>205/103</u>
<u>5001 – 5500</u>	<u>140/70</u>	<u>155/78</u>	<u>170/85</u>	<u>185/93</u>	<u>200/100</u>	<u>215/108</u>
<u>5501 – 6000²</u>	<u>150/75</u>	<u>165/83</u>	<u>180/90</u>	<u>195/98</u>	<u>210/105</u>	<u>225/113</u>

1 Conditioned space includes the basement

2 If conditioned space exceeds 6000 sq. ft. or there are more than 6 bedrooms, Use equation 403.5.2.

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

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

R403.5.3 Continuous Ventilation: A Minimum of 50 percent of the total ventilation rate, but not less than 40 cfm, shall be provided, on a continuous rate average for each one-hour period according to Table 403.5.2 or equation 403.5.2. The portion of the ventilation system that is intended to be continuous may have automatic cycling controls providing the average flow rate for each hour.

R403.5.4 Intermittent ventilation: The difference between the total ventilation rate and the continuous ventilation rate, is considered the intermittent ventilation rate.

R403.5.5 Balanced, and HRV/ERV systems. A heat recovery ventilator (HRV) or energy recovery ventilator (ERV) shall meet either:

1. the requirements of HVI Standard 920, 72 hour minus 13°F cold weather test, or
2. certified by a registered professional engineer and installed per manufactures 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 R403.5.3 under low capacity and meet the total ventilation rate specified in R403.5.2 under high capacity.

All balanced systems shall be balanced so that the air intake is within ten percent of the exhaust output.

Exception: The balanced HRV/ERV system may include an exhaust fan(s) to meet the intermittent ventilation rate. Surface mounted fan(s) shall have a maximum 2.5 sones per HVI Standard 915.

R403.5.6 Installation requirements. All mechanical systems shall meet the requirements of this section. The mechanical ventilation system and its components shall also be installed according to the Minnesota Mechanical Code, Minnesota Rules Chapter 1346, and the equipment manufacturer’s installation instructions.

R403.5.6.1 Air distribution/circulation. Outdoor air shall be delivered to each habitable space by a forced air circulation system, separate duct system, or individual inlets.

R403.5.6.1.1 Forced air circulation systems. When outdoor air is supplied directly through a forced air circulation system, the requirements of this section shall be met by either:

(a) When an outdoor air supply is not ducted to the forced air system, controls shall be installed to allow the forced air system to provide an average circulation flow rate each hour, of not less than 0.15 cfm per square foot of the conditioned floor area.

(b) When the outdoor air supply is ducted to the forced-air system, the mixed air temperature shall be not less than the heating equipment manufacturers’ installation instructions, and controls shall be installed to allow the forced air circulation system to provide an average flow rate not less than 0.075 cfm per square foot of conditioned floor area.

Table R403.5.6.1.1 Indirect Circulation Air Flow Rates for Forced Air Circulation Systems (in cfm)

Conditioned Floor Area	Average Air Flow each Hr (cfm)	Forced-Air Circulation Systems Flow Rate (cfm)							
		600	800	1000	1200	1400	1600	1800	2000
		Number of Minutes per Hour, if cycled							
1000 – 1500	225	23	17	14	12	10	9	8	7
1501 – 2000	300	30	23	18	15	13	12	10	9
2001 – 2500	375	38	29	23	19	16	14	13	12
2501 – 3000	450	45	34	27	23	20	17	15	14
3001 – 3500	525	53	40	32	27	23	20	18	16
3501 – 4000	600	60	45	36	30	26	23	20	18
4001 – 4500	675	na ¹	51	41	34	29	26	23	21
4501- 5000	750	na ¹	57	45	38	33	29	25	23
5001 – 5500	825	na ¹	na ¹	50	42	36	31	28	25
5501 – 6000	900	na ¹	na ¹	54	45	39	34	3	27

¹Not allowed

R403.5.6.1.2 Directly ducted and individual room inlets . When outdoor air is supplied directly to habitable spaces with an airflow of 20 CFM or greater, the system

shall be designed and installed to temper incoming air to not less than 40 degrees F measured at the point of distribution into the space.

Table R403.5.6.1.2 Direct Distribution Air Flow Rates Using Forced Air Circulation Systems (in cfm)

Conditioned Floor Area	Average Air Flow each Hr (cfm)	Forced-Air Circulation Systems Flow Rate (cfm)							
		600	800	1000	1200	1400	1600	1800	2000
		Number of Minutes per Hour, if cycled							
1000 – 1500	115	13	9	7	6	5	5	4	4
1501 – 2000	150	15	13	9	8	7	6	5	5
2001 – 2500	190	19	15	13	10	8	7	7	6
2501 – 3000	225	23	17	14	13	10	9	8	7
3001 – 3500	265	27	20	15	14	13	10	9	8
3501 – 4000	300	30	23	18	15	13	13	10	9
4001 – 4500	340	34	26	21	17	15	13	13	11
4501- 5000	375	38	24	23	19	17	15	13	13
5001 – 5500	415	42	32	25	21	18	16	14	13
5501 – 6000	450	45	34	27	23	20	17	15	14

R403.5.6.1.2.1 Passive openings. When outdoor air is brought in through a passive opening, the maximum cfm of the outdoor air requirements shall be combined with the maximum makeup air requirements of Minnesota Rules, chapter 1346. The combined air rates shall be brought into the dwelling unit in accordance with chapter 1346. Controls shall be installed to distribute air throughout the dwelling unit as required by Section R403.5.6.1.1a.

R403.5.6.1.3 Airflow requirements: When the system is balanced, the exhaust and supply airflows shall be within plus or minus 10 percent of each other or manufacturer's installation instructions, whichever is more restrictive.

R403.5.6.1.4 Airflow verification. All mechanical ventilation system airflows greater than 30 cfm at the building exhaust or intake, shall be tested and verified using a flow hood, flow grid, pitot tube, or other airflow measuring device. The airflow verification results shall be made available to the building official upon request.

R403.5.7 Fans: When used as part of the mechanical ventilation system, fans shall be capable of delivering the designed air flow as determined by section 403.5.2 according to HVI Standard 916. Fan(s) shall be designed and certified by the equipment manufacturer as capable of continuous operation at the rated cfm. Surface mounted fans used to comply with the continuous ventilation part of the mechanical ventilation system shall have a maximum 1.0 sone per HVI Standard 915. Fan(s) used to comply with the intermittent ventilation part of the mechanical ventilation system shall have a maximum 2.5 sone per HVI Standard 915. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1.

Exception to the some requirements: Some requirements do not apply to forced air circulation systems and remotely mounted fans, provided the remotely mounted fan is not in a habitable space and there is at least 4 feet of ductwork between the fan and grille. Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor.

R403.5.8 Multi-fan systems. When two or more fans in a dwelling unit share a common duct, each fan shall be equipped with a backdraft damper to prevent recirculation of exhaust air into another room.

R403.5.9 Connection to forced air circulation systems. Air ducts connected directly to the forced air circulation system can be used to meet the mechanical ventilation system requirements. Either the outdoor air may be supplied to, or exhaust air may be drawn from the forced air circulation system, but not both.

Exception: Both outdoor air and exhaust air may be connected to the forced air circulation system, provided that controls are installed to ensure that the forced air circulation system is operating whenever the mechanical ventilation system is operating or other means are provided to prevent short circuiting of fresh air in accordance with the manufacturer's recommendations.

R403.5.10 Dampers. The mechanical ventilation system supply and exhaust ducts shall be provided with accessible backflow dampers to minimize flow to or from the outdoors when the ventilation system is off.

R403.5.11 Intake openings. Exterior air intake openings shall be accessible for inspection and maintenance. Intake openings shall be located in accordance with Minnesota Mechanical Code, Rules Chapter 1346, and shall be covered with corrosion resistant screen of not less than ¼ inch (6.4 mm) mesh. Intake openings shall be located at least 12 inches (305 mm) above adjoining grade level.

Exception: Combination air intake and exhaust hoods may be approved by the building official when specifically allowed by the equipment manufacturer's installation instructions.

R403.5.12 Filtration. All mechanically supplied outdoor air shall have a filter with a designated minimum efficiency of MERV 4 as defined by ASHRAE Standard 52.2. The filter shall be located prior to the air entering the thermal conditioning components, blower, or habitable space and shall be installed to be readily accessible and facilitate regular service.

R403.5.13 Noise and vibration. Mechanical ventilation system components shall be installed to minimize noise and vibration transmission. The equipment manufacturer's installation instructions shall be followed, and materials provided by the equipment manufacturer for this purpose shall be used. In the absence of specific materials or instructions, vibration dampening materials such as rubber grommets and flexible straps shall be used when connecting fans and heat exchangers to the building structure, and isolation duct connectors shall be used to mitigate noise transmission.

R403.5.14 Controls. Balanced mechanical ventilation system controls shall be provided in accordance with the following:

1. If the mechanical ventilation system is not designed to operate whenever the forced air circulation system is operating, then the mechanical ventilation system shall incorporate an accessible backflow damper to prevent flow from the outside when the mechanical ventilation system is off.
2. Controls shall be compatible with the mechanical ventilation system, its components and the manufacturers installation and operating instructions.
3. Controls shall be installed to operate the mechanical ventilation system as designed.
4. Controls shall be readily accessible to occupants and shall be labeled to indicate their function.

R403.5.15 Labeling. All ventilation intake and exhaust outlets shall include a permanent, weather resistant identification label on the buildings exterior.

R403.5.16 Documentation. All mechanical ventilation systems shall be provided with documentation that includes proper operation and maintenance instructions, the documentation shall be in a conspicuous readily accessible location.

R403.5.17 Climatic Design Conditions.

A. HVAC equipment must be sized according to the ASHRAE Handbook of Fundamentals, ACCA Manual J-S or an equivalent method. Oversizing of heating equipment must not exceed 43-40 percent and cooling equipment must not exceed 21-15 percent.

B. Design conditions must be determined from Table 403.5.17. Design condition adjustments may be made as determined by the Building Official to reflect local climates that differ from the tabulated temperatures or local weather experience.

Table R403.5.17 Climatic Data Design Conditions

<u>City</u>	<u>Summer Db/Wb °F</u>	<u>Winter Db °F</u>
<u>Aitkin</u>	<u>82/72</u>	<u>-24</u>
<u>Albert Lea</u>	<u>85/72</u>	<u>-15</u>
<u>Alexandria</u>	<u>86/70</u>	<u>-21</u>
<u>Bemidji</u>	<u>84/68</u>	<u>-24</u>
<u>Cloquet</u>	<u>82/68</u>	<u>-20</u>
<u>Crookston</u>	<u>84/70</u>	<u>-27</u>
<u>Duluth</u>	<u>81/67</u>	<u>-20</u>
<u>Ely</u>	<u>82/68</u>	<u>-29</u>
<u>Eveleth</u>	<u>82/68</u>	<u>-26</u>
<u>Faribault</u>	<u>86/73</u>	<u>-16</u>
<u>Fergus Falls</u>	<u>86/71</u>	<u>-21</u>
<u>Grand Rapids</u>	<u>81/67</u>	<u>-23</u>
<u>Hibbing</u>	<u>82/68</u>	<u>-19</u>
<u>International Falls</u>	<u>83/67</u>	<u>-28</u>
<u>Litchfield</u>	<u>85/71</u>	<u>-18</u>
<u>Little Falls</u>	<u>86/71</u>	<u>-20</u>

Mankato	86/72	-15
Minneapolis/St. Paul	88/72	-15
Montevideo	86/72	-17
Mora	84/70	-21
Morris	84/72	-21
New Ulm	87/73	-15
Owatonna	86/73	-16
Pequot Lake	84/68	-23
Pipestone	85/73	-15
Redwood Falls	89/73	-17
Rochester	85/72	-17
Roseau	82/70	-29
St. Cloud	86/NA	-20
Thief River	82/68	-25
Tofte	75/61	-14
Warroad	83/67	-29
Wheaton	84/71	-20
Willmar	85/71	-20
Winona	88/74	-13
Worthington	84/71	-14
DB = dry bulb temperature, degrees Fahrenheit		
WB = wet bulb temperature, degrees Fahrenheit		

IECC Section R403.10. IECC Section R303.10 is added as follows:

R403.10 Solar Collectors: Solar thermal collectors shall be certified as meeting SRCC Standard OG-100.

IECC Section R403.10. IECC Section R303.10 is added as follows:

R403.11 Solar Water Heating Systems: Solar water heating systems shall be either

- A. certified and labeled as meeting SRCC Standard OG-300 or
- B. Shall meet the provisions of Minnesota Rules Chapters 4715 and 1315

IECC Section R403.10. IECC Section R303.10 is added as follows:

R403.12 Photovoltaic Modules and Systems: Photovoltaic modules and systems must meet the requirements of Minnesota Rules Chapter 1315