

2015 MINNESOTA RESIDENTIAL ENERGY CODE

1322.0010

ADOPTION OF INTERNATIONAL ENERGY CONSERVATION CODE (IECC) BY REFERENCE

Subpart 1. Generate Chapters 2(RR) to 5(RE) of the Residential Provisions of the 2012 edition of the *International Energy Conservation Code* (IECC) as promulgated by the International Code Council, Inc. (ICC), Washington, DC, 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. Portions of this publication reproduce excerpts from the 2012 IECC, International Code Council, Inc. Washington, DC, copyright 2012, reproduced with permission, all rights reserved. The 2012 IECC is not subject to frequent change and a copy of the 2012 IECC with amendments for use in Minnesota is available in the office of the commissioner of labor and industry.

Subp. 2. Mandatory chapters. Chapters 2(RE) to 5(RE) of the Residential Provisions of the 2012 IECC shall be administered by any municipality that has adopted the *Minnesota State Building Code*, except as qualified by applicable provisions in Minnesota Rules, Chapter 1300, and as amended by this chapter.

Subp. 3. Replacement chapters. Chapter 1 of the Residential Provisions of the IECC and any references to code administration are deleted and replaced with Minnesota Rules, Chapter 1300, Minnesota Building Code Administration.

1322.0015

ADMINISTRATION AND PURPOSE

Subpart 1. Administration. This code shall be administered according to Chapter 1300.

Subp. 2. Purpose. The purpose of this chapter is to establish a minimum code of standards for the construction, reconstruction, alteration, and repair of residential buildings governing matters including design and construction standards regarding heat loss control, illumination, and climate control, pursuant to Minnesota Statutes, Sections 326B.101, 326B.106, and 326R.13.

1322.0030

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 *International Energy Conservation Code* are modified in this part.

Subp. 2. Building code. References to the International building Code mean the *Minnesota Building Code*, Minnesota Rules, Chapter 1305, and adopted pursuant to Minnesota Statutes, Section 326B.106, subdivision 1.

Subp. 3. Residential code. References to the *International Residential Code* mean the *Minnesota Residential Code*, Minnesota Rules, Chapter 1309, and adopted pursuant to Minnesota Statutes, Section 326B.106, subdivision 1.

Subp. 4. Electrical code. References to the *National Electrical Code* mean the *Minnesota Electrical Code*, Minnesota Rules, Chapter 1315, adopted pursuant to Minnesota Statutes, Section 326B.35.

Subp. 5. Fuel gas code. References to the *International Fuel Gas Code* mean the *Minnesota Mechanical and Fuel Gas Code*, Minnesota Rules, Chapter 1346, adopted pursuant to MINNESOTA Statutes, Section 326B.106, subdivision 1.

Subp. 6. Mechanical code. References to the *International Mechanical Code* mean the *Minnesota Mechanical and Fuel Gas Code*, Minnesota Rules, Chapter 1346, adopted pursuant to Minnesota Statutes, Section 326B.106, subdivision 1.

Subp. 7. Plumbing code. References to the *International Plumbing Code* mean the *Minnesota Plumbing Code*, Minnesota Rules, Chapter 4715, adopted pursuant to Minnesota Statutes, Section 326B.435.

Subp. 8. Private sewage disposal code. References to the *International Private Sewage Disposal Code* mean the Minnesota Pollution Control Agency's minimum standards and criteria for individual sewage treatment systems in Minnesota Rules, Chapters 7080, 7082, and 7083, adopted pursuant to Minnesota Statutes, Chapters 103F, 103G, 115, and 116.

Subp. 9. Energy conservation code. References to the *International Energy Conservation Code* mean the *Minnesota Energy Code*, Minnesota Rules, Chapters 1322 and 1323, adopted pursuant to Minnesota Statutes, Section 326B.106.

Subp. 10. Property maintenance code. References to the *International Property Maintenance Code* do not apply.

Subp. 11. Accessibility code. References to accessibility mean the *Minnesota Accessibility Code*, Minnesota Rules, Chapter 1341.

1322.0040

ADMINISTRATIVE PROCEDURE CRITERIA

Procedures relating to the administration and enforcement pursuant to Minnesota Statutes, Section 326B.101, are contained in Minnesota Rules, Chapter 1300, Minnesota Building Code Administration, which govern the application of this code.

1322.0100

ADMINISTRATION FOR RESIDENTIAL ENERGY

Subpart 1. Administration. In addition to the application of MINNESOTA Rules, Chapter 1300, the administrative requirements in this part shall apply.

TABLE R403.2.1
MINIMUM REQUIRED DUCT AND PLENUM
INSULATION FOR DWELLING UNITS

DUCT TYPE/LOCATION	REQUIREMENTS
Exterior of building	R-8, V and W
Attics, garages, and ventilated crawl spaces	R-8 and V
Outdoor air intakes within conditioned spaces	R3.3 and V
Exhaust ducts within conditioned spaces	R3.3 and V
Within concrete slab or within ground	R3-5 and V
Within conditioned spaces and in basements with insulated walls	None Required

R403.2.2 Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

R403.2.2.1 Sealed air handler. Air handlers shall have a manufacturer's designation for an air leakage of no more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

R403.2.3 Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums.

R403.3 Mechanical system piping insulation (Mandatory). Mechanical system piping capable of carrying fluids above 105°F (4FC) or below 55°F (13°C) shall be insulated to a minimum of R-3.

R403.3.1 Protection of piping insulation. Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance, and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted.

R403.4 Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1 and R403.4.2.

R403.4.1 Circulating hot water systems (Mandatory). Circulating hot water systems shall be provided with an automatic or readily accessible manual switch that can turn off the hot-water circulating pump when the system is not in use.

R403.4.2 Hot water pipe Insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (R-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
5. Piping from the water heater to a distribution manifold.
6. Piping located under a floor slab.
7. Buried piping.
8. Supply and return piping in recirculation systems other than demand recirculation systems.
9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

TABLE R403.4.2
MAXIMUM RUN LENGTH (feet)^a

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	0	1/2	3/4	> 1
Maximum Run Length	30	20	10	5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

R403.5 Mechanical ventilation (mandatory). The building shall be provided with a balanced mechanical ventilation system that is +/-10 percent of the system's design capacity and meets the requirements of Section R403.5.5, which establishes the continuous and total mechanical ventilation requirements for dwelling unit ventilation. All conditioned unfinished basements, conditioned crawl spaces, and conditioned levels shall be provided with a minimum ventilation rate of 0.02 cfm (0.57 L/min) per square foot or a minimum of 1 supply duct and 1 return duct. The supply and return ducts shall be separated by V₂ 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.

Exceptions 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:

- Equation R403.5.2 Total ventilation rate:** Total ventilation rate (cfm) = $(0.02 \times \text{square feet of conditioned space}) \div (15 \times (\text{number of bedrooms} + 1))$
- Equation R403.5.2.1 Continuous ventilation rate:** Continuous ventilation rate (cfm) = Total ventilation rate/2

R403.5.3 Continuous ventilation 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 con-

tinuous 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:

- The requirements of HVI Standard 920, 72 hours minus 13°F (-10°C) cold weather test; or
- 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.

Exceptions 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

Conditioned space ¹ (in sq. ft.)	1	2	3	4	5	6 ²
	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.

R403.5.6 Installation requirements. All mechanical systems shall meet the requirements of Section R403.5.6. 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 using one of the following methods:

- 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 (4.25 L/min) per square foot of the conditioned floor area; or
- When the outdoor air supply is ducted to the forced air system, the mixed air temperature shall not be less than the heating equipment manufacturer's installation instructions. The controls shall be installed to allow the forced air circulation system to provide an average flow rate not less than 0.075 cfm (2.12 L/min) per square foot of conditioned floor area.

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 (566 L/min) or greater, the system shall be designed and installed to temper incoming air to not less than 40°F (4°C) measured at the point of distribution into the space.

R403.5.6.1.3 Airflow verification. All mechanical ventilation system airflows greater than 30 cfm (849 L/min) at the building exhaust or intake shall be tested and verified. 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 at the point of air discharge or intake as determined by Section R403.5.2 and according to HVI Standard 916. Fans shall be designed and certified by the equipment manufacturer to be capable of continuous operation at the maximum fan-rated cfm. Surface mounted fans used to comply with the continuous ventilation requirement of the mechanical ventilation system shall have a maximum 1.0 sone, according to HVI Standard 915. Fans used to comply with the intermittent ventilation requirement of the mechanical ventilation system shall have a maximum 2.5 sone,

according to HVI Standard 915. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1.

Exception to sone requirements: Sone requirements do not apply to forced air circulation systems and remotely mounted fans. If the remotely mounted fan is not in a habitable space and there are at least 4 feet (1219 mm) of ductwork between the fan and grille, then the fan sone rating shall be 2.5 sone or less. Where mechanical ventilation fans are integral to tested and listed HVAC equipment, the fans shall be powered by an electronically commutated motor.

R403.5.8 Multifan 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. When air ducts are directly connected to the forced air circulation system, the outdoor air shall be supplied directly to the forced air circulation system, or the exhaust air shall be drawn directly from the forced air circulation system, but not both. To meet the mechanical ventilation system requirements, the air duct shall be installed according to the manufacturer's installation instructions.

Exception: Both outdoor air and exhaust air may be connected to the forced air circulation system only if controls are installed to operate the forced air circulation system when the mechanical ventilation system is operating or other means are provided to prevent short circuiting of ventilation 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 according to the *Minnesota Mechanical Code*, Minnesota Rules, Chapter 1346, and shall be covered with a corrosion-resistant screen of not less than V_4 -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 location shall be prior to the air entering the thermal conditioning components, blower, or habitable space. The filter shall be installed so it is readily accessible and facilitates regular service.

R403.5.13 Noise and vibration. Mechanical ventilation system components shall be installed to minimize

transmission of noise and vibration. The equipment manufacturer's installation instructions shall be followed and any materials provided by the equipment manufacturer for installation 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. Isolation duct connectors shall be used to mitigate noise transmission.

R403.5.14 Controls. Balanced mechanical ventilation system controls shall comply with all the following:

1. When the mechanical ventilation system is not designed to operate whenever the forced air circulation system is operating, 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 manufacturer's installation and operating instructions.
3. Controls shall be installed to operate the mechanical ventilation system as designed.
4. Each control shall be readily accessible to occupants and shall be labeled to indicate the control's function.

R403.5.15 Labeling. All ventilation intake and exhaust outlets shall include permanent, weather-resistant identification labels on the building's exterior.

R403.5.16 Documentation. Documentation, which includes proper operation and maintenance instructions, shall accompany all mechanical ventilation systems. The documentation shall be in a conspicuous and readily accessible location.

R403.5.17 Climatic design conditions.

- A. HVAC equipment shall be sized according to the ACCA Manual S or an equivalent method, based on the building's heating and cooling load calculations by using ASHRAE Handbook of Fundamentals or the ACCA Manual J. Oversizing of heating equipment shall not exceed 40 percent of the calculated load requirements and oversizing of cooling equipment shall not exceed 15 percent of the calculated load requirements.
- B. Design conditions shall be determined according to Table 403.5.17. Design condition adjustments may be determined by the building official if local climates differ from the tabulated temperatures based on local climate data.

**TABLE R403.5.17
CLIMATIC DATA DESIGN CONDITIONS**

CITY	SUMMER Db/Wb °F	WINTER Db °F
Aitkin	82/72	-24
Albert Lea	85/72	-15
Alexandria	86/70	-21
Bemidji	84/68	-24
Cloquet	82/68	-20
Crookston	84/70	-27
Duluth	81/67	-20
Ely	82/68	-29
Eveleth	82/68	-26
Faribault	86/73	-16
Fergus Falls	86/71	-21
Grand Rapids	81/67	-23
Hibbing	82/68	-19
International Falls	83/67	-28
Litchfield	85/71	-18
Little Falls	86/71	-20
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 Lakes	84/68	-23
Pipestone	85/73	-15
Redwood Falls	89/73	-17
Rochester	85/72	-17
Roseau	82/70	-29
St. Cloud	86/71	-20
Thief River Falls	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

For SI: °C = [(°F)-32]/1.8.

Db = dry bulb temperature, degrees Fahrenheit

Wb = wet bulb temperature, degrees Fahrenheit