

1.1 **Department of Labor and Industry**

1.2 **Adopted Permanent Rules Adopting Radon Control Methods and the 2012**
1.3 **International Energy Conservation Code Residential Provisions**

1.4 **1303.2400 PURPOSE AND SCOPE.**

1.5 Subpart 1. **Applicability; residential structures.** The purpose of parts 1303.2400 to
1.6 1303.2402 is to establish minimum requirements for passive radon control systems that
1.7 apply to all new residential structures listed in items A to H:

1.8 A. one-family dwellings;

1.9 B. two-family dwellings;

1.10 C. townhouses;

1.11 D. apartment buildings;

1.12 E. condominiums;

1.13 F. multistory buildings that include any residential occupancy;

1.14 G. mixed-occupancy buildings that include any residential occupancy; and

1.15 H. any addition to an existing dwelling that currently has a radon control system
1.16 incorporated into the existing building.

1.17 If a fan is installed in a passive radon control system, this creates an active radon control
1.18 system that must comply with the requirements of parts 1303.2400 to 1303.2403.

1.19 Subp. 2. **Applicability; design features.** The requirements in parts 1303.2400 to
1.20 1303.2402 shall apply to any structure identified in subpart 1, items A to H, if the structure
1.21 is designed with any of the features identified in items A to F:

1.22 A. a basement concrete slab in contact with the earth;

1.23 B. a crawl space within the building's conditioned space that has a concrete
1.24 or earth floor;

- 2.1 C. a wood foundation floor constructed on or directly above the earth;
- 2.2 D. slab on grade construction designs;
- 2.3 E. attached or tuck-under garages, unless the floor, wall, and ceiling assemblies
- 2.4 separating the garage from the dwellings are sealed; and
- 2.5 F. any building configuration that allows radon gas to enter the residential
- 2.6 dwelling.

2.7 **Exceptions:**

- 2.8 1. Crawl spaces outside the conditioned space of the residential dwelling, when the
- 2.9 crawl space is ventilated directly to the outside atmosphere according to IRC sections
- 2.10 R408.1 and R408.2; IBC sections 1203.3 and 1203.3.1; Code of Federal Regulations,
- 2.11 section 3285.505; and Minnesota Rules, chapter 1350.
- 2.12 2. Hotels and motels.
- 2.13 3. Additions to existing dwellings that do not currently have a radon control system
- 2.14 incorporated into the existing dwelling.

2.15 Subp. 3. **Mixed occupancy or multistory mixed occupancy buildings.** When the

2.16 nonresidential occupancy is in contact with the earth, all assemblies that separate the

2.17 occupancies must be sealed to prevent the movement of air and airborne gases between the

2.18 nonresidential and residential occupancies. When the residential occupancy is in contact

2.19 with the earth and adjacent to a nonresidential occupancy, the residential occupancy shall

2.20 incorporate a radon control system and all assemblies that separate the nonresidential and

2.21 residential occupancy shall be sealed to prevent the movement of air or airborne gases.

2.22 **1303.2401 DEFINITIONS.**

2.23 Subpart 1. **Terms not defined.** For purposes of parts 1303.2400 to 1303.2403, where

2.24 terms are not defined in parts 1303.2400 to 1303.2403, Merriam-Webster's Collegiate

2.25 Dictionary, available at www.m-w.com, shall be considered as providing ordinarily

3.1 accepted meanings. The dictionary is incorporated by reference, is subject to frequent
3.2 change, and is available through the Minitex interlibrary loan system.

3.3 Subp. 2. **Definitions.** For the purposes of parts 1303.2400 to 1303.2403, the terms
3.4 defined in this part have the meanings given them.

3.5 **ACTIVE RADON CONTROL SYSTEM.** "Active radon control system" means a
3.6 system designed to achieve lower air pressure below the soil-gas membrane relative to the
3.7 indoor air pressure by use of a fan that has been added to the passive radon control system.

3.8 **APPROVED.** "Approved" means approval by the building official, pursuant to the
3.9 Minnesota State Building Code, by reason of inspection, investigation, or testing; accepted
3.10 principles; computer simulations; research reports; or testing performed by either a
3.11 licensed engineer or by a locally or nationally recognized testing laboratory.

3.12 **CFR.** "CFR" means Code of Federal Regulations, title 24, chapter 3285.

3.13 **GAS PERMEABLE MATERIAL.** A "gas permeable material" means any of the
3.14 following:

3.15 1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The
3.16 aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and
3.17 be retained by a 1/4-inch (6.4 mm) sieve.

3.18 2. A uniform layer of sand, native or fill, a minimum of 4 inches (102 mm) thick,
3.19 overlain by a layer or strips of geotextile drainage matting designed to allow the lateral
3.20 flow of soil gases.

3.21 3. Other materials, systems, or floor designs if the material, system, or floor design is
3.22 professionally engineered to provide depressurization under the entire soil-gas membrane.

3.23 **IBC.** "IBC" means the International Building Code incorporated by reference except
3.24 as qualified and amended in Minnesota Rules, chapter 1305.

3.25 **IRC.** "IRC" means the International Residential Code incorporated by reference
3.26 except as qualified and amended in Minnesota Rules, chapter 1309.

4.1 **PASSIVE RADON CONTROL SYSTEM.** "Passive radon control system" means a
4.2 system designed to achieve lower air pressure below the soil-gas membrane relative to the
4.3 indoor air pressure by use of a vent pipe that relies on stack effect to provide an upward
4.4 flow of air from beneath the soil-gas membrane.

4.5 **RADON GAS.** "Radon gas" means a naturally occurring, chemically inert, radioactive gas.

4.6 **SEALED.** "Sealed" means to prevent the movement of air or airborne gases through a
4.7 floor, wall, or ceiling assembly.

4.8 **SOIL-GAS MEMBRANE.** "Soil-gas membrane" means a continuous membrane of 6-mil
4.9 (0.15 mm) polyethylene, or 3-mil (0.075 mm) cross-laminated polyethylene.

4.10 **VENT PIPE.** "Vent pipe" means a 3-inch (76 mm) or 4-inch (102 mm) diameter ABS
4.11 or PVC pipe used to vent subsoil gases that have collected under the soil-gas membrane
4.12 to the exterior of the dwelling.

4.13 **1303.2402 REQUIREMENTS FOR PASSIVE RADON CONTROL SYSTEMS.**

4.14 Subpart 1. **Gas permeable material preparation.** A gas-permeable material shall
4.15 be placed on the prepared subgrade under all floor systems.

4.16 Subp. 2. **Soil-gas membrane installation.** A soil-gas membrane shall be placed on
4.17 top of the gas-permeable material prior to placing a floor on top of or above the soil.
4.18 The soil-gas membrane shall cover the entire floor area. Separate sections of membrane
4.19 must be lapped at least 12 inches (305 mm). The membrane shall fit closely around any
4.20 penetration of the membrane to reduce the leakage of soil gases. All punctures or tears in
4.21 the soil-gas membrane shall be repaired by sealing and patching the soil-gas membrane
4.22 with the same kind of material, maintaining a minimum 12-inch (305 mm) lap.

4.23 Subp. 3. **"T" fitting.** A "T" fitting shall be installed beneath the soil-gas membrane
4.24 with a minimum of 10 feet of perforated pipe connected to any two openings of the "T"
4.25 fitting, or by connecting the two openings to the interior drain tile system. The third
4.26 opening of the "T" fitting shall be connected to the vent pipe. The perforated pipe or drain

5.1 tile and the "T" fitting shall be the same size as the vent pipe. All connections to the
5.2 "T" fitting shall be tight fitting.

5.3 Subp. 4. **Potential entry routes.** Potential entry routes for radon gas shall be sealed
5.4 according to this subpart, as applicable.

5.5 A. **Floor openings.** Floor openings around bathtubs, showers, water closets,
5.6 pipes, wires, or other objects that penetrate the soil-gas membrane and the concrete slab or
5.7 other floor systems, shall be sealed.

5.8 B. **Concrete joints.** All control joints, isolation joints, construction joints,
5.9 or any other joints in the concrete slab, or the joint between the concrete slab and a
5.10 foundation wall, shall be sealed. All gaps and joints shall be cleared of all loose material
5.11 prior to sealing.

5.12 C. **Foundation walls.** Penetrations of all foundation wall types shall be sealed.
5.13 Joints, cracks, or other openings around all penetrations of both exterior and interior
5.14 surfaces of foundation walls shall be sealed.

5.15 (1) Hollow block masonry foundation walls shall be constructed with either:

5.16 (a) a continuous course of solid masonry at or above the exterior
5.17 ground surface;

5.18 (b) one course of masonry grouted solid at or above the exterior
5.19 ground surface; or

5.20 (c) a solid concrete beam at or above the finished exterior ground
5.21 surface.

5.22 (2) When a brick veneer or other masonry ledge is installed, the masonry
5.23 course immediately below the veneer or ledge shall be solid or filled.

6.1 D. **Unconditioned crawl spaces.** All penetrations through floors or walls into
6.2 unconditioned crawl spaces shall be sealed. Access doors into unconditioned crawl spaces
6.3 shall be gasketed. Crawl space ventilation shall be provided according to part 1303.2400.

6.4 E. **Sumps.** A sump connected to interior drain tile may serve as the termination
6.5 point for the vent pipe, if the sump cover is sealed or gasketed and designed to
6.6 accommodate the vent pipe. The sump pump water discharge pipe shall have a backflow
6.7 preventer installed.

6.8 Subp. 5. **Vent pipes.**

6.9 A. **Single vent pipe.** The vent pipe shall be primed and glued at all fittings and
6.10 shall extend up from the radon control system's collection point to a point terminating
6.11 a minimum of 12 inches (305 mm) above the roof. The vent pipe shall be located at
6.12 least 10 feet (3,048 mm) away from any window or other opening into the conditioned
6.13 spaces of the building. Vent pipes routed through unconditioned spaces shall be insulated
6.14 with a minimum of R-4 insulation. Vent pipes within the conditioned envelope of the
6.15 building shall not be insulated.

6.16 B. **Multiple vent pipes.** In buildings where interior footings or other barriers
6.17 separate the gas-permeable material into two or more areas, each area shall be fitted with
6.18 an individual radon control system in accordance with item A, or connected to a single
6.19 radon gas vent pipe terminating above the roof in accordance with item A.

6.20 C. **Vent pipe drainage.** All components of the radon gas vent pipe system shall
6.21 be installed to provide drainage to the ground beneath the soil-gas membrane.

6.22 D. **Vent pipe accessibility.** Radon gas vent pipes shall be provided with space
6.23 around the vent pipe for future installation of a fan. The space required for the future fan
6.24 installation shall be a minimum of 24 inches in diameter, centered on the axis of the vent
6.25 pipe, and shall extend a minimum distance of 3 vertical feet.

7.1 **Exception:** Accessibility to the radon gas vent pipe is not required if the future fan
7.2 installation is above the roof system and there is an approved rooftop electrical supply
7.3 provided.

7.4 E. **Vent pipe identification.** All radon gas vent pipes shall be identified with at
7.5 least 1 label on each story and in attics and crawl spaces. The label shall read: "Radon
7.6 Gas Vent System."

7.7 F. **Combination foundations.** Combination basement/crawl space or slab-on
7.8 grade/crawl space foundations shall have separate radon gas vent pipes installed in each
7.9 type of foundation area. Each radon gas vent pipe shall terminate above the roof or shall
7.10 be connected to a single vent pipe that terminates above the roof.

7.11 Subp. 6. **Power source.** A power source consisting of an electrical circuit
7.12 terminating in an approved electrical box shall be installed during construction in the
7.13 anticipated location of the vent pipe fan to allow for the future installation of a fan into
7.14 a passive radon control system to make the system an active radon control system. The
7.15 power source shall not be installed in any conditioned space, basement, or crawl space.

7.16 **1303.2403 REQUIREMENTS FOR ACTIVE RADON CONTROL SYSTEMS.**

7.17 When an active radon control system is installed, all the requirements for the passive
7.18 radon control system in parts 1303.2400 to 1303.2402 shall be met. In addition, an active
7.19 radon control system shall incorporate items A to C in this part.

7.20 A. **Radon gas vent pipe fan.** A radon gas vent pipe fan manufactured for radon
7.21 control systems and rated for continuous operation that provides a minimum measurement
7.22 of 50 cubic feet per minute at 1/2-inch water column shall be installed in the vertical vent
7.23 pipe. The fan shall be attached to a radon gas vent pipe that connects the air below the
7.24 soil-gas membrane with outdoor air and relies on the fan to provide upward air flow in the
7.25 vent pipe. The radon gas vent pipe fan shall be installed outdoors, in attics, or in garages.
7.26 The radon gas vent pipe fan shall not be installed in conditioned spaces of a building,

8.1 basement, or crawl space. The radon gas vent pipe fan shall not be located where it
8.2 positively pressurizes any portion of the vent pipe that is located inside conditioned space.

8.3 **B. System monitoring device.** An audible alarm, a manometer, or other similar
8.4 device shall be installed to indicate when the fan is not operating.

8.5 **C. Luminaire and receptacle outlet.** A switch-controlled luminaire and the
8.6 receptacle outlet near the fan shall be installed according to the Minnesota Electrical Code.
8.7 The requirements of the International Mechanical Code, section 306, do not apply.

8.8 **1322.0010 ADOPTION OF INTERNATIONAL ENERGY CONSERVATION**
8.9 **CODE (IECC) BY REFERENCE.**

8.10 Subpart 1. **General.** Chapters 2(RE) to 5(RE) of the Residential Provisions of the
8.11 2012 edition of the International Energy Conservation Code (IECC) as promulgated by
8.12 the International Code Council, Inc. (ICC), Washington, DC, is incorporated by reference
8.13 and made part of the Minnesota State Building Code except as qualified by the applicable
8.14 provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. Portions of
8.15 this publication reproduce excerpts from the 2012 IECC, International Code Council, Inc.
8.16 Washington, DC, copyright 2012, reproduced with permission, all rights reserved. The
8.17 2012 IECC is not subject to frequent change and a copy of the 2012 IECC with amendments
8.18 for use in Minnesota is available in the office of the commissioner of labor and industry.

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

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

9.1 **1322.0015 ADMINISTRATION AND PURPOSE.**

9.2 [For text of subp 1, see M.R.]

9.3 Subp. 2. **Purpose.** The purpose of this chapter is to establish a minimum code
9.4 of standards for the construction, reconstruction, alteration, and repair of residential
9.5 buildings governing matters including design and construction standards regarding heat
9.6 loss control, illumination, and climate control, pursuant to Minnesota Statutes, sections
9.7 326B.101, 326B.106, and 326B.13.

9.8 **1322.0030 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL**
9.9 **(ICC) CODES.**

9.10 Subpart 1. **Generally.** References to other codes and standards promulgated by the
9.11 International Code Council in the International Energy Conservation Code are modified in
9.12 this part.

9.13 Subp. 2. **Building code.** References to the International Building Code mean the
9.14 Minnesota Building Code, Minnesota Rules, chapter 1305, and adopted pursuant to
9.15 Minnesota Statutes, section 326B.106, subdivision 1.

9.16 Subp. 3. **Residential code.** References to the International Residential Code mean
9.17 the Minnesota Residential Code, Minnesota Rules, chapter 1309, and adopted pursuant
9.18 to Minnesota Statutes, section 326B.106, subdivision 1.

9.19 Subp. 4. **Electrical code.** References to the International Code Council Electrical
9.20 Code mean the Minnesota Electrical Code, Minnesota Rules, chapter 1315, adopted
9.21 pursuant to Minnesota Statutes, section 326B.35.

9.22 Subp. 5. **Fuel gas code.** References to the International Fuel Gas Code mean the
9.23 Minnesota Mechanical and Fuel Gas Code, Minnesota Rules, chapter 1346, adopted
9.24 pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

10.1 Subp. 6. **Mechanical code.** References to the International Mechanical Code mean
10.2 the Minnesota Mechanical and Fuel Gas Code, Minnesota Rules, chapter 1346, adopted
10.3 pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

10.4 Subp. 7. **Plumbing code.** References to the International Plumbing Code mean
10.5 the Minnesota Plumbing Code, Minnesota Rules, chapter 4715, adopted pursuant to
10.6 Minnesota Statutes, section 326B.435.

10.7 Subp. 8. **Private sewage disposal code.** References to the International Private
10.8 Sewage Disposal Code mean the Minnesota Pollution Control Agency's minimum
10.9 standards and criteria for individual sewage treatment systems in Minnesota Rules,
10.10 chapters 7080, 7082, and 7083, adopted pursuant to Minnesota Statutes, chapters 103F,
10.11 103G, 115, and 116.

10.12 Subp. 9. **Energy conservation code.** References to the International Energy
10.13 Conservation Code mean the Minnesota Energy Code, Minnesota Rules, chapters 1322
10.14 and 1323, adopted pursuant to Minnesota Statutes, section 326B.106.

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

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

10.19 **1322.0040 ADMINISTRATIVE PROCEDURE CRITERIA.**

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

10.23 **1322.0100 ADMINISTRATION FOR RESIDENTIAL ENERGY.**

10.24 Subpart 1. **Administration.** In addition to the application of Minnesota Rules,
10.25 chapter 1300, the administrative requirements in this part shall apply.

11.1 Subp. 2. **Scope.** This code applies to residential buildings and associated systems
11.2 and equipment as defined in the Residential Provisions of the 2012 IECC.

11.3 Subp. 3. **Applicability.**

11.4 A. **Additions, alterations, renovations, or repairs.** Additions, alterations,
11.5 renovations, or repairs to an existing building, building system, or portion of a building
11.6 shall conform to the provisions of this code as they relate to new construction without
11.7 requiring the unaltered portion of the existing building or building system to comply
11.8 with this code. Additions, alterations, renovations, or repairs shall not create an unsafe
11.9 or hazardous condition or overload existing building systems. An addition shall comply
11.10 with this code if the addition alone complies or if the existing building and addition
11.11 comply with this code as a single building. Attic insulation shall not be installed unless
11.12 accessible attic bypasses have been sealed. An attic bypass is any air passageway between
11.13 a conditioned space and an unconditioned attic.

11.14 **Exceptions:** The following are excepted from this part provided the energy use of
11.15 the building is not increased:

- 11.16 1. Storm windows installed over existing windows.
- 11.17 2. Glass only replacements in an existing sash and frame.
- 11.18 3. Existing ceiling, wall, or floor cavities exposed during construction provided
11.19 that these cavities are filled with insulation.
- 11.20 4. Construction where the existing roof, wall, or floor cavity is not exposed.
- 11.21 5. Reroofing and residing.
- 11.22 6. Replacement of existing doors that separate conditioned space from the
11.23 exterior do not require the installation of a vestibule or revolving door; provided
11.24 that an existing vestibule that separates a conditioned space from the exterior
11.25 shall not be removed.
- 11.26 7. Alterations that replace less than 50 percent of the luminaires in a space,
11.27 provided that the alterations do not increase the installed interior lighting power.

12.1 8. Alterations that replace only the bulb and ballast within the existing luminaires
12.2 in a space, provided that the alteration does not increase the installed interior
12.3 lighting power.

12.4 9. Insulation R-value, air barrier, and vapor retarder requirements are not
12.5 applicable to existing foundations, crawl space walls, and basements in existing
12.6 dwellings or dwelling units when the alteration or repair requires a permit if the
12.7 original dwelling or dwelling unit permit was issued before June 1, 2009.

12.8 **B. Change in occupancy or use.** Spaces undergoing a change in occupancy
12.9 that would result in an increase in demand for either fossil fuel or electrical energy shall
12.10 comply with this code.

12.11 **C. Change in space conditioning.** Any nonconditioned space that is altered to
12.12 become conditioned space shall be brought into full compliance with this code.

12.13 **D. Mixed occupancy.** Where a building includes both residential and
12.14 commercial occupancies, each occupancy shall be separately considered and meet the
12.15 applicable provisions of this chapter and chapter 1323.

12.16 Subp. 4. **Compliance.** Residential buildings shall meet the requirements of
12.17 Minnesota Rules, chapter 1322. Commercial buildings shall meet the requirements of
12.18 Minnesota Rules, chapter 1323.

12.19 **A. Compliance materials.** The building official is permitted to approve
12.20 specific computer software, worksheets, compliance manuals, and other similar materials
12.21 that meet the intent of this code.

12.22 **B. Low energy buildings.** The following buildings, or portions thereof,
12.23 separated from the remainder of the building by building thermal envelope assemblies
12.24 complying with this code are exempt from the building thermal envelope provisions of
12.25 this code:

- 13.1 (1) those with a peak design rate of energy usage less than $3.4 \text{ Btu/h}\cdot\text{ft}^2$
13.2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes; and
13.3 (2) those that do not contain conditioned space.

13.4 **1322.0103 CONSTRUCTION DOCUMENTS.**

13.5 Construction documents shall be drawn to scale upon suitable material. Electronic
13.6 media documents are permitted to be submitted when approved by the building official.
13.7 Construction documents shall be of sufficient clarity to indicate the location, nature, and
13.8 extent of the work proposed, and show in sufficient detail pertinent data and features of
13.9 the building, systems, and equipment as herein governed. The details shall include the
13.10 following when applicable:

- 13.11 A. insulation materials and their R-values;
13.12 B. fenestration U-factors and SHGCs;
13.13 C. area-weighted U-factor and SHGC calculations;
13.14 D. mechanical system design criteria;
13.15 E. mechanical and service water heating system and equipment types, sizes,
13.16 and efficiencies;
13.17 F. equipment and systems controls;
13.18 G. fan motor horsepower (hp) and controls;
13.19 H. duct sealing, and the location and insulation of ducts and pipes;
13.20 I. lighting fixture schedule with wattage and control narrative; and
13.21 J. air sealing details.

13.22 **1322.0201 SECTION R201, GENERAL.**

13.23 IECC section R201.4 is amended to read as follows:

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

14.6 **1322.0202 SECTION R202, GENERAL DEFINITIONS.**

14.7 Subpart 1. **Amended definitions.** IECC section R202 is modified by amending the
14.8 following definitions to read as follows:

14.9 **ACCESSIBLE.** Signifies access that requires the removal of an access panel or similar
14.10 removable obstruction.

14.11 **APPROVED.** "Approved" means approval by the building official, pursuant to the State
14.12 Building Code, by reason of: inspection, investigation, or testing; accepted principles;
14.13 computer simulations; research reports; or testing performed by either a licensed engineer
14.14 or by a locally or nationally recognized testing laboratory.

14.15 Subp. 2. **Added definitions.** IECC section R202 is modified by adding the following
14.16 definitions to read as follows:

14.17 **ACCESSIBLE, READILY.** Signifies access without the necessity for removing a panel
14.18 or similar obstruction.

14.19 **AIR CIRCULATION, FORCED.** A means of providing space conditioning using
14.20 movement of air through ducts or plenums by mechanical means.

14.21 **AIR, EXHAUST.** Air discharged from any space to the outside by the residential
14.22 ventilation system.

14.23 **AIR, OUTDOOR.** The air that is taken from the external atmosphere, and therefore not
14.24 previously circulated through the HVAC system or the conditioned space.

15.1 **AIR-CONDITIONING SYSTEM.** A system that consists of heat exchangers, blowers,
15.2 filters, and supply, exhaust, and return-air systems, and includes any apparatus installed
15.3 in connection with the system.

15.4 **BALANCED SYSTEM.** A ventilation system in which the air intake is within ten
15.5 percent of the exhaust output.

15.6 **CODE.** For purposes of this chapter, "this code" or "the code" means the Minnesota
15.7 Residential Energy Code, Minnesota Rules, chapter 1322.

15.8 **CUBIC FEET PER MINUTE (CFM).** The quantity of air moved in one minute. A
15.9 measurement typically applied to ventilation equipment.

15.10 **ENERGY RECOVERY VENTILATOR (ERV).** A device or combination of devices
15.11 applied to transfer energy and moisture from the exhaust air stream for use within the
15.12 dwelling.

15.13 **FURNACE.** A vented heating appliance designed or arranged to discharge heated air into
15.14 a conditioned space or through a duct or ducts.

15.15 **HEAT RECOVERY VENTILATOR (HRV).** A device or combination of devices
15.16 applied to transfer energy from the exhaust air stream for use within the dwelling.

15.17 **MANUFACTURER'S INSTALLATION INSTRUCTIONS.** Printed instructions
15.18 included with equipment, the provision of which is one of the conditions for listing and
15.19 labeling.

15.20 **MECHANICAL VENTILATION.** The mechanical process of supplying conditioned
15.21 or unconditioned air to, or removing it from, any space.

15.22 **1322.0303 SECTION R303, MATERIALS, SYSTEMS, AND EQUIPMENT.**

15.23 Subpart 1. **Section R303.1.** IECC section R303.1 is amended to read as follows:

15.24 **R303.1 Identification.** Materials, systems, and equipment shall be identified in a
15.25 manner that will allow a determination of compliance with the applicable provisions
15.26 of this code. Materials used shall be: (1) listed for the intended use; (2) installed in
15.27 accordance with the manufacturer's installation instructions; and (3) installed by an

16.1 installer who is certified by a manufacturer to install that specific product, if such
16.2 certification exists. (Subsections R303.1.1, R303.1.1.1, R303.1.2, R303.1.3, and
16.3 R303.1.4 still apply.)

16.4 Subp. 2. **Section R303.1.5.** IECC section R303.1 is amended by adding a subsection
16.5 to read as follows:

16.6 **R303.1.5 Minnesota thermal insulation standards.** Thermal insulation shall
16.7 comply with Minnesota Rules, chapter 7640, Minnesota Thermal Insulation
16.8 Standards, adopted by the Department of Commerce.

16.9 **1322.0401 SECTION R401, GENERAL.**

16.10 IECC section R401.3 is amended to read as follows:

16.11 **R401.3 Certificate (mandatory).** A building certificate shall be completed and posted
16.12 on or in the electrical distribution panel by the builder or registered design professional.
16.13 The certificate shall not cover or obstruct the visibility of the circuit directory label,
16.14 service disconnect label, or other required labels. The certificate shall list: the date
16.15 the certificate is installed; the dwelling address; residential contractor name and
16.16 contractor license number, or homeowner name, if acting as the general contractor;
16.17 the predominant installed R-values, their location, and type of insulation installed in
16.18 or on ceiling/roof, walls, rim/band joist, foundation, slab, basement wall, crawl space
16.19 wall or floor, and ducts outside conditioned spaces; U-factors for fenestration and the
16.20 solar heat gain coefficient (SHGC) of fenestration; and the results of any required duct
16.21 system and building envelope air leakage testing done on the building. Where there is
16.22 more than one value for each component, the certificate shall list the value covering
16.23 the largest area. The certificate shall list the types, input ratings, manufacturers, model
16.24 numbers and efficiencies of heating, cooling, and service water heating equipment.
16.25 The certificate shall also list the structure's calculated heat loss, calculated cooling
16.26 load, and calculated heat gain. Where an electric furnace or baseboard electric heater
16.27 is installed in the residence, the certificate shall list "electric furnace" or "baseboard

17.1 electric heater," as appropriate. An efficiency shall not be listed for electric furnaces
 17.2 or electric baseboard heaters. The certificate shall list the mechanical ventilation
 17.3 system type, location, and capacity, and the building's designated continuous and total
 17.4 ventilation rates. The certificate shall also list the type, size, and location of any
 17.5 make-up air system installed and the location or future location of the radon fan.

17.6 **1322.0402 SECTION R402, BUILDING THERMAL ENVELOPE.**

17.7 Subpart 1. **Table R402.1.1.** IECC Table R402.1.1 is amended to read as follows:

17.8 **Table R402.1.1 Insulation and fenestration requirements by component.^a**

17.9				Glazed		
17.10	Climate Zone	Fenestration U-Factor ^b	Skylight ^b U-Factor	Fenestration SHGC ^{b,e}	Ceiling ^j R-Value	Wood Frame Wall R-Value ^f
17.11	6	0.32	0.55	NR	49	21 <u>20, 13+5</u>
17.12	7	0.32	0.55	NR	49	21

17.14 **Table R402.1.1 Insulation and fenestration requirements by component.**

17.15	Mass Wall R-Value ^{i,g,h}	Floor R-Value	Basement Wall R-Value ^{c,i}	Slab R-Value and Depth ^d	Crawl Space Wall R-Value ^{c,i}
17.16	15/20	30 ^e	15	10, 3.5 ft	15
17.17	19/21	38 ^e	15	10, 5 ft	15

17.18 For SI: 1 foot = 304.8 mm.

17.19 a. R-values are minimums. U-factors and SHGC are maximums. When
 17.20 insulation is installed in a cavity that is less than the label or design thickness of
 17.21 the insulation, the installed R-value of the insulation shall not be less than the
 17.22 R-value specified in the table.

17.23 b. The fenestration U-factor column excludes skylights. The SHGC column
 17.24 applies to all glazed fenestration.

17.25 c. See section R402.2.8.

17.26 d. Insulation R-values for heated slabs shall be installed to the depth indicated or
 17.27 to the top of the footing, whichever is less.

- 18.1 e. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- 18.2 f. First value is cavity insulation, second is continuous insulation or insulated
- 18.3 siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or
- 18.4 insulated siding. If structural sheathing covers 40 percent or less of the exterior,
- 18.5 the continuous insulation R-value is permitted to be reduced by no more than
- 18.6 R-3 in the locations where structural sheathing is used to maintain a consistent
- 18.7 total sheathing thickness.
- 18.8 g. The second R-value applies when more than half the insulation is on the
- 18.9 interior of the mass wall.
- 18.10 h. When using log-type construction for thermal mass walls the following applies:
- 18.11 (1) a minimum of a 7-inch diameter log shall be used; and
- 18.12 (2) the U-value of fenestration products shall be 0.29 overall on average
- 18.13 or better.
- 18.14 i. See section 402.2.8. A minimum R-19 cavity insulation is required in wood
- 18.15 foundation walls.
- 18.16 j. Roof/ceiling assemblies shall have a minimum 6-inch energy heel.

18.17 Subp. 2. **Section R402.1.1 Insulation and fenestration criteria.** IECC section

18.18 R402.1.1 is amended to read as follows:

18.19 **R402.1.1 Insulation, waterproofing, and fenestration criteria.** The building

18.20 thermal envelope shall meet the requirements of Table R402.1.1 based on the

18.21 climate zone specified in chapter 3, and the requirements contained in section

18.22 R402.2. Cast-in-place concrete and masonry block foundation walls shall be

18.23 waterproofed according to IRC section R406 and the following requirements:

- 18.24 1. The waterproofing shall extend from the top interior wall edge, across the
- 18.25 top of the wall, and down the exterior wall face to the top of the footing. If a
- 18.26 full width, closed-cell material is installed to create a seal between the sill

19.1 plate and the top of the foundation wall, the installation is deemed to meet
19.2 the requirements for the top of the wall waterproofing.

19.3 2. If the walls are exposed to the exterior environment, the waterproofing
19.4 system shall have a rigid, opaque, and weather-resistant protective covering
19.5 to prevent degradation of the waterproofing system. The protective covering
19.6 shall cover the exposed waterproofing and extend a minimum of 6 inches
19.7 (152 mm) below grade. The protective covering system shall be flashed in
19.8 accordance with IRC section R703.8.

19.9 **R402.1.1.1 Integral foundation insulation requirements.** Any insulation
19.10 assembly installed integral to the foundation walls shall be manufactured for
19.11 that intended use and installed according to the manufacturer's installation
19.12 instructions.

19.13 **R402.1.1.2 Exterior draining foundation insulation requirements.** Any
19.14 insulation assembly installed on the exterior of the foundation walls and on
19.15 the perimeter of slabs-on-grade that permits water drainage shall:

- 19.16 1. be made of water-resistant materials manufactured for that intended
19.17 use;
- 19.18 2. be installed according to the manufacturer's installation instructions;
- 19.19 3. comply with either ASTM C578, C612, or C1029, as applicable; and
- 19.20 4. have a rigid, opaque, and weather-resistant protective covering to
19.21 prevent the degradation of the insulation's thermal performance. The
19.22 protective covering shall cover the exposed exterior insulation and
19.23 extend a minimum of 6 inches (152 mm) below grade. The insulation
19.24 and protective covering system shall be flashed in accordance with
19.25 IRC section R703.8.

19.26 **R402.1.1.3 Exterior nondraining foundation insulation requirements.**
19.27 Any insulation assembly installed on the exterior of the foundation walls or

20.1 on the perimeter of slabs-on-grade that does not permit bulk water drainage
20.2 shall:

- 20.3 1. be made of water-resistant materials manufactured for that intended
20.4 use;
- 20.5 2. be installed according to the manufacturer's installation instructions;
- 20.6 3. comply with either ASTM C578 or C1029, as applicable;
- 20.7 4. be covered with a 6-mil polyethylene slip sheet over the entire
20.8 exterior surface; and
- 20.9 5. have a rigid, opaque, and weather-resistant protective covering to
20.10 prevent degradation of the insulation's thermal performance. The
20.11 protective covering shall cover the exposed exterior insulation and
20.12 extend a minimum of 6 inches (152 mm) below grade. The insulation
20.13 and protective covering system shall be flashed in accordance with
20.14 IRC section R703.8.

20.15 **R402.1.1.4 Interior foundation insulation requirements.** Any insulation
20.16 assembly installed on the interior of foundation walls shall meet the
20.17 following requirements:

- 20.18 1. Masonry foundation walls shall be drained through each masonry
20.19 block core to an approved interior drainage system.
- 20.20 2. If a frame wall is installed, it shall not be in direct contact with the
20.21 foundation wall.
- 20.22 3. The insulation assembly shall comply with the interior air barrier
20.23 requirements of section R402.4.
- 20.24 4. The insulation assembly shall comply with section R402.1.1.5,
20.25 R402.1.1.6, or R402.1.1.7, as applicable.

20.26 **R402.1.1.5 Rigid interior insulation.** Rigid interior insulation shall comply
20.27 with ASTM C578 or ASTM C1289 and the following requirements:

- 21.1 1. For installation:
- 21.2 a. the insulation shall be in contact with the foundation wall surface;
- 21.3 b. vertical edges shall be sealed with acoustic sealant;
- 21.4 c. all interior joints, edges, and penetrations shall be sealed against
- 21.5 air and water vapor penetration;
- 21.6 d. continuous acoustic sealant shall be applied horizontally
- 21.7 between the foundation wall and the insulation at the top of the
- 21.8 foundation wall; and
- 21.9 e. continuous acoustic sealant shall be applied horizontally between
- 21.10 the basement floor and the bottom insulation edge.
- 21.11 2. The insulation shall not be penetrated by the placement of utilities,
- 21.12 fasteners, or connectors used to install a frame wall, with the exception
- 21.13 of through penetrations.
- 21.14 3. Through penetrations shall be sealed around the penetrating products.
- 21.15 **R402.1.1.6 Spray-applied interior foam insulation.** Spray-applied interior
- 21.16 foam insulation shall comply with the following:
- 21.17 1. Closed-cell foam:
- 21.18 a. The foam shall comply with ASTM C1029 and have a
- 21.19 permeance not greater than 0.8, in accordance with ASTM E96
- 21.20 procedure A, and a permeance of not less than 0.3, in accordance
- 21.21 with ASTM E96 procedure B.
- 21.22 b. The foam shall be sprayed directly onto the foundation wall
- 21.23 surface. There shall be a 1-inch minimum gap between the
- 21.24 foundation wall surface and any framing.
- 21.25 c. The insulation surface shall not be penetrated by the placement
- 21.26 of utilities, fasteners, or connectors used to install a frame wall,
- 21.27 with the exception of through penetrations.

22.1 d. Through penetrations shall be sealed around the penetrating
 22.2 products.

22.3 2. Open-cell foam:

22.4 a. The foam shall be sprayed directly onto the foundation wall
 22.5 surface. There shall be a 1-inch minimum gap between the
 22.6 foundation wall surface and any framing.

22.7 b. The insulation surface shall not be penetrated by the placement
 22.8 of utilities, fasteners, or connectors used to install a frame wall,
 22.9 with the exception of through penetrations.

22.10 c. Through penetrations shall be sealed around the penetrating
 22.11 product.

22.12 d. A vapor retarder and air barrier shall be applied to the
 22.13 warm-in-winter side of the assembly with a permeance not greater
 22.14 than 1.0, in accordance with ASTM E96 procedure A, and a
 22.15 permeance not less than 0.3, in accordance with ASTM E96
 22.16 procedure B.

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

22.19 1. The above-grade exposed foundation wall height shall not exceed
 22.20 1.5 ft.

22.21 2. The top and bottom plates shall be air sealed to the foundation wall
 22.22 surface and the basement floor.

22.23 3. A vapor retarder and air barrier shall be applied to the warm in winter
 22.24 side of the wall with a permeance not greater than 1.0 in accordance with
 22.25 ASTM E96 procedure A and a permeance not less than 0.3 in accordance
 22.26 with ASTM E96 procedure B meeting the following requirements:

- 23.1 a. the vapor and air barrier shall be sealed to the framing with
- 23.2 construction adhesive or equivalent at the top and bottom plates
- 23.3 and where the adjacent wall is insulated;
- 23.4 b. the vapor and air barrier shall be sealed around utility boxes and
- 23.5 other penetrations; and
- 23.6 c. all seams in the vapor and air barrier shall be overlapped at least
- 23.7 6 inches and sealed with compatible sealing tape or equivalent.

23.8 **R402.1.1.8 Foundation wall insulation performance option.** Insulated
 23.9 foundation systems designed and installed under the performance option
 23.10 shall meet the requirements of this section and the foundation, basement, or
 23.11 crawl space wall equivalent U-factor from Table 402.1.3.

23.12 1. **Water separation plane.** The foundation shall be designed and built
 23.13 to have a continuous water separation plane between the interior and
 23.14 exterior. The interior side of the water separation plane shall:

- 23.15 a. have a stable annual wetting and drying cycle whereby
- 23.16 foundation wall system water (solid, liquid, and vapor) transport
- 23.17 processes produce no net accumulation of ice or water over a full
- 23.18 calendar year and the foundation wall system is free of absorbed
- 23.19 water for at least 4 months over a full calendar year;
- 23.20 b. prevent conditions of moisture and temperature to prevail for a
- 23.21 time period favorable to mold growth for the material used; and
- 23.22 c. prevent liquid water from the foundation wall system from
- 23.23 reaching the foundation floor system at any time during a full
- 23.24 calendar year.

23.25 2. **Documentation.** The foundation insulation system designer shall
 23.26 provide documentation certified by a professional engineer licensed
 23.27 in Minnesota demonstrating how the requirements of this section are

24.1 fulfilled. The foundation insulation system designer shall also specify
24.2 the design conditions for the wall and the design conditions for the
24.3 interior space for which the water separation plane will meet the
24.4 requirements of this section. The foundation insulation system designer
24.5 shall provide a label disclosing these design conditions. The label shall
24.6 be posted according to section R401.3.

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

24.10 **4. Foundation air barrier.** The foundation insulation system shall be
24.11 designed and installed to have a foundation air barrier system between
24.12 the interior and the exterior. The foundation air barrier system shall be a
24.13 material or combination of materials that is continuous with all joints
24.14 sealed and is durable for the intended application. Material used for
24.15 the foundation air barrier system shall have an air permeability not to
24.16 exceed $0.004 \text{ ft}^3/\text{min}\cdot\text{ft}^2$ under a pressure differential of 0.3 inches water
24.17 (1.57 psf) ($0.02 \text{ L/s}\cdot\text{m}^2$ at 75Pa) as determined by either commonly
24.18 accepted engineering tables or by being labeled by the manufacturer as
24.19 having these values when tested according to ASTM E2178.

24.20 Subp 3. **Section R402.2.8, Basement walls.** IECC section R402.2.8, Basement
24.21 walls, is amended to read as follows:

24.22 **R402.2.8 Basement walls.** Walls associated with conditioned basements shall be
24.23 insulated from the top of the basement wall down to 10 feet (3048 mm) below
24.24 grade or to the top of the footing, whichever is less. Foundation insulation
24.25 shall be installed according to the manufacturer's installation instructions.

24.26 Walls associated with unconditioned basements shall meet the requirements of

- 25.1 this section unless the floor overhead is insulated in accordance with sections
25.2 R402.1.1 and R402.2.7 and the following requirements:
- 25.3 a. R-15 insulation for concrete and masonry foundations shall be installed
25.4 according to R402.1.1.1 to R402.1.1.8 and a minimum of a R-10 shall be
25.5 installed on the exterior of the wall. Interior insulation, other than closed
25.6 cell spray foam, shall not exceed R-11. Foundations shall be waterproofed
25.7 in accordance with the applicable provisions of the International Residential
25.8 Code (IRC).
- 25.9 **Exception:** R-10 continuous insulation on the exterior of each
25.10 foundation wall shall be permitted to comply with this code if the tested
25.11 air leakage rate required in section R402.4.1.2 does not exceed 2.6 air
25.12 changes per hour and the total square feet between the finished grade
25.13 and the top of each foundation wall does not exceed 1.5 multiplied by
25.14 the total lineal feet of each foundation wall that encloses conditioned
25.15 space. Interior insulation, other than closed cell spray foam, shall not
25.16 exceed R-11. See footnote c to Table R402.2.1.
- 25.17 b. Minimum R-19 cavity insulation is required in wood foundation walls.
25.18 See footnote 1 to Table R402.2.1.

25.19 **1322.0403 SECTION R403, SYSTEMS.**

25.20 Subpart 1. **Section R403.2.1.** IECC section R403.2.1, Insulation (prescriptive), is
25.21 deleted in its entirety and replaced with the following:

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

25.24 For the purposes of Table R403.2.1, the following applies:

- 25.25 a. Insulation is only required in the conditioned space for a distance of 3 feet
25.26 (914 mm) from the exterior or unconditioned space.

- 26.1 b. V means the vapor retarder required in accordance with IMC section
- 26.2 604.11. When a vapor retarder is required, duct insulation required by
- 26.3 this section shall be installed without respect to other building envelope
- 26.4 insulation.
- 26.5 c. W means an approved weatherproof barrier.

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

26.8	Duct Type/Location	Requirements
26.9	Exterior of building	R-8, V, and W
26.10	Attics, garages, and ventilated crawl spaces	R-8 and V
26.11	Outdoor air intakes within conditioned spaces	R-6 and V
26.12	Exhaust ducts within conditioned spaces	R-6 and V
26.13	Within cement slab or within ground	R-6 and V
26.14 26.15	Within conditioned spaces and in basements with insulated walls	None required

26.16 Subp. 2. **Section R403.5.** IECC section R403.5 and its subsections are deleted
 26.17 except for Table R403.5.1 and replaced with the following:

26.18 **R403.5 Mechanical ventilation (mandatory).** The building shall be provided
 26.19 with a balanced mechanical ventilation system that is +/- 10 percent of the system's
 26.20 design capacity and meets the requirements of section R403.5.5, which establishes
 26.21 the continuous and total mechanical ventilation requirements for dwelling unit
 26.22 ventilation. All conditioned unfinished basements, conditioned crawl spaces, and
 26.23 conditioned levels shall be provided with a minimum ventilation rate of 0.02 cfm per
 26.24 square foot or a minimum of 1 supply duct and 1 return duct. The supply and return
 26.25 ducts shall be separated by 1/2 the diagonal dimension of the basement to avoid
 26.26 a short circuit of the air circulation. Outdoor air intakes and exhausts shall have
 26.27 automatic or gravity dampers that close when the ventilation system is not operating.

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

27.3 **R403.5.1 Alterations.** Alterations to existing buildings are exempt from meeting
 27.4 the requirements of section R403.5.

27.5 **R403.5.2 Total ventilation rate.** The mechanical ventilation system shall
 27.6 provide sufficient outdoor air to equal the total ventilation rate average for each
 27.7 1-hour period in accordance with Table R403.5.2, or equation R403.5.2, based
 27.8 on the number of bedrooms and square footage of conditioned space, including
 27.9 the basement and conditioned crawl spaces.

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

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

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

27.15 **Table R403.5.2**

		Number of Bedrooms					
		1	2	3	4	5	6 ²
27.18	Conditioned						
27.19	space ¹ (in sq.	Total/	Total/	Total/	Total/	Total/	Total/
27.20	ft.)	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
27.21	1000-1500	60/40	75/40	90/45	105/53	120/60	135/68
27.22	1501-2000	70/40	85/43	100/50	115/58	130/65	145/73
27.23	2001-2500	80/40	95/48	110/55	125/63	140/70	155/78
27.24	2501-3000	90/45	105/53	120/60	135/68	150/75	165/83
27.25	3001-3500	100/50	115/58	130/65	145/73	160/80	175/88
27.26	3501-4000	110/55	125/63	140/70	155/78	170/85	185/93
27.27	4001-4500	120/60	135/68	150/75	165/83	180/90	195/98
27.28	4501-5000	130/65	145/73	160/80	175/88	190/95	205/103

28.1 5001-5500 140/70 155/78 170/85 185/93 200/100 215/108

28.2 5501-6000² 150/75 165/83 180/90 195/98 210/105 225/113

28.3 1. Conditioned space includes the basement and conditioned crawl spaces.

28.4 2. If conditioned space exceeds 6000 sq. ft. or there are more than 6 bedrooms, use
28.5 equation R403.5.2.

28.6 **R403.5.3 Continuous ventilation rate.** Continuous ventilation rate (CVR) is a
28.7 minimum of 50 percent of the total ventilation rate (TVR). The CVR shall not
28.8 be less than 40 cfm and shall provide a continuous average cfm rate according
28.9 to Table R403.5.2 or according to equation R403.5.2 for every 1-hour period.

28.10 The portion of the ventilation system that is intended to be continuous may have
28.11 automatic cycling controls to provide the average flow rate for each hour.

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

28.14 **R403.5.5 Balanced and HRV/ERV systems.** All balanced systems shall be
28.15 balanced so that the air intake is within 10 percent of the exhaust output.

28.16 A heat recovery ventilator (HRV) or energy recovery ventilator (ERV) shall
28.17 meet either:

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

28.20 2. certified by a registered professional engineer and installed per
28.21 manufacturer's installation instructions.

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

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

29.4 **R403.5.6 Installation requirements.** All mechanical systems shall meet the
29.5 requirements of section R403.5.6. The mechanical ventilation system and its
29.6 components shall also be installed according to the Minnesota Mechanical Code,
29.7 Minnesota Rules, chapter 1346, and the equipment manufacturer's installation
29.8 instructions.

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

29.12 **R403.5.6.1.1 Forced air circulation systems.** When outdoor air
29.13 is supplied directly through a forced air circulation system, the
29.14 requirements of this section shall be met using one of the following
29.15 methods:

29.16 a. when an outdoor air supply is not ducted to the forced air system,
29.17 controls shall be installed to allow the forced air system to provide
29.18 an average circulation flow rate each hour of not less than 0.15 cfm
29.19 per square foot of the conditioned floor area; or

29.20 b. when the outdoor air supply is ducted to the forced air system,
29.21 the mixed air temperature shall not be less than the heating
29.22 equipment manufacturer's installation instructions. The controls
29.23 shall be installed to allow the forced air circulation system to
29.24 provide an average flow rate not less than 0.075 cfm per square
29.25 foot of conditioned floor area.

29.26 **R403.5.6.1.2 Directly ducted and individual room inlets.** When
29.27 outdoor air is supplied directly to habitable spaces with an airflow of

30.1 20 cfm or greater, the system shall be designed and installed to temper
30.2 incoming air to not less than 40°F (4°C) measured at the point of
30.3 distribution into the space.

30.4 **R403.5.6.1.3 Airflow verification.** All mechanical ventilation system
30.5 airflows greater than 30 cfm at the building exhaust or intake shall
30.6 be tested and verified. The airflow verification results shall be made
30.7 available to the building official upon request.

30.8 **R403.5.7 Fans.** When used as part of the mechanical ventilation system, fans
30.9 shall be capable of delivering the designed air flow at the point of air discharge
30.10 or intake as determined by section R403.5.2 and according to HVI Standard 916.
30.11 Fans shall be designed and certified by the equipment manufacturer to be capable
30.12 of continuous operation at the maximum fan-rated cfm. Surface mounted fans
30.13 used to comply with the continuous ventilation requirement of the mechanical
30.14 ventilation system shall have a maximum 1.0 sone, according to HVI Standard
30.15 915. Fans used to comply with the intermittent ventilation requirement of the
30.16 mechanical ventilation system shall have a maximum 2.5 sone, according to
30.17 HVI Standard 915. Mechanical ventilation system fans shall meet the efficacy
30.18 requirements of Table R403.5.1.

30.19 **Exception to sone requirements:** Sone requirements do not apply to forced
30.20 air circulation systems and remotely mounted fans. If the remotely mounted
30.21 fan is not in a habitable space and there are at least 4 feet of ductwork
30.22 between the fan and grille, then the fan sone rating shall be 2.5 sone or less.

30.23 Where mechanical ventilation fans are integral to tested and listed HVAC
30.24 equipment, the fans shall be powered by an electronically commutated motor.

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

31.1 **R403.5.9 Connection to forced air circulation systems.** When air ducts are
31.2 directly connected to the forced air circulation system, the outdoor air shall be
31.3 supplied directly to the forced air circulation system, or the exhaust air shall be
31.4 drawn directly from the forced air circulation system, but not both. To meet
31.5 the mechanical ventilation system requirements, the air duct shall be installed
31.6 according to the manufacturer's installation instructions.

31.7 **Exception:** Both outdoor air and exhaust air may be connected to the forced
31.8 air circulation system only if controls are installed to operate the forced air
31.9 circulation system when the mechanical ventilation system is operating or
31.10 other means are provided to prevent short circuiting of ventilation air in
31.11 accordance with the manufacturer's recommendations.

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

31.15 **R403.5.11 Intake openings.** Exterior air intake openings shall be accessible
31.16 for inspection and maintenance. Intake openings shall be located according to
31.17 the Minnesota Mechanical Code, Minnesota Rules, chapter 1346, and shall be
31.18 covered with a corrosion-resistant screen of not less than 1/4-inch (6.4 mm)
31.19 mesh. Intake openings shall be located at least 12 inches (305 mm) above
31.20 adjoining grade level.

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

31.24 **R403.5.12 Filtration.** All mechanically supplied outdoor air shall have a filter
31.25 with a designated minimum efficiency of MERV 4 as defined by ASHRAE
31.26 Standard 52.2. The filter location shall be prior to the air entering the thermal

32.1 conditioning components, blower, or habitable space. The filter shall be installed
32.2 so it is readily accessible and facilitates regular service.

32.3 **R403.5.13 Noise and vibration.** Mechanical ventilation system components
32.4 shall be installed to minimize transmission of noise and vibration. The equipment
32.5 manufacturer's installation instructions shall be followed and any materials
32.6 provided by the equipment manufacturer for installation shall be used. In the
32.7 absence of specific materials or instructions, vibration dampening materials, such
32.8 as rubber grommets and flexible straps, shall be used when connecting fans and
32.9 heat exchangers to the building structure. Isolation duct connectors shall be
32.10 used to mitigate noise transmission.

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

- 32.13 1. When the mechanical ventilation system is not designed to operate
32.14 whenever the forced air circulation system is operating, the mechanical
32.15 ventilation system shall incorporate an accessible backflow damper to
32.16 prevent flow from the outside when the mechanical ventilation system is off.
- 32.17 2. Controls shall be compatible with the mechanical ventilation system, its
32.18 components, and the manufacturer's installation and operating instructions.
- 32.19 3. Controls shall be installed to operate the mechanical ventilation system
32.20 as designed.
- 32.21 4. Each control shall be readily accessible to occupants and shall be labeled
32.22 to indicate the control's function.

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

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

33.1 **R403.5.17 Climatic design conditions.**

33.2 A. HVAC equipment shall be sized according to the ACCA Manual S or
 33.3 an equivalent method, based on the building's heating and cooling load
 33.4 calculations by using ASHRAE Handbook of Fundamentals or the ACCA
 33.5 Manual J. Oversizing of heating equipment shall not exceed 40 percent of
 33.6 the calculated load requirements and oversizing of cooling equipment shall
 33.7 not exceed 15 percent of the calculated load requirements.

33.8 B. Design conditions shall be determined according to Table 403.5.17.
 33.9 Design condition adjustments may be determined by the building official if
 33.10 local climates differ from the tabulated temperatures based on local climate
 33.11 data.

33.12 **TABLE R403.5.17 Climatic Data Design Conditions**

33.13	City	Summer Db/Wb °F	Winter Db °F
33.14	Aitkin	82/72	-24
33.15	Albert Lea	85/72	-15
33.16	Alexandria	86/70	-21
33.17	Bemidji	84/68	-24
33.18	Cloquet	82/68	-20
33.19	Crookston	84/70	-27
33.20	Duluth	81/67	-20
33.21	Ely	82/68	-29
33.22	Eveleth	82/68	-26
33.23	Faribault	86/73	-16
33.24	Fergus Falls	86/71	-21
33.25	Grand Rapids	81/67	-23
33.26	Hibbing	82/68	-19
33.27	International Falls	83/67	-28
33.28	Litchfield	85/71	-18
33.29	Little Falls	86/71	-20

34.1	Mankato	86/72	-15
34.2	Minneapolis/St. Paul	88/72	-15
34.3	Montevideo	86/72	-17
34.4	Mora	84/70	-21
34.5	Morris	84/72	-21
34.6	New Ulm	87/73	-15
34.7	Owatonna	86/73	-16
34.8	Pequot Lakes	84/68	-23
34.9	Pipestone	85/73	-15
34.10	Redwood Falls	89/73	-17
34.11	Rochester	85/72	-17
34.12	Roseau	82/70	-29
34.13	St. Cloud	86/NA	-20
34.14	Thief River Falls	82/68	-25
34.15	Tofte	75/61	-14
34.16	Warroad	83/67	-29
34.17	Wheaton	84/71	-20
34.18	Willmar	85/71	-20
34.19	Winona	88/74	-13
34.20	Worthington	84/71	-14

34.21 Db = dry bulb temperature, degrees Fahrenheit

34.22 Wb = wet bulb temperature, degrees Fahrenheit

34.23 Subp. 3. **Section R403.12.** IECC section R403 is amended by adding section

34.24 R403.12 as follows:

34.25 **R403.12 Photovoltaic modules and systems:** Installation of photovoltaic modules

34.26 and systems shall meet the requirements of Minnesota Rules, chapter 1315.

34.27 **1322.0500 CHAPTER 5(RE) REFERENCED STANDARDS.**

34.28 Chapter 5(RE) of the 2012 IECC is amended by adding the following referenced

34.29 standards:

35.1 A. Standard reference number: ASHRAE Standard 52.2, Method of Testing
35.2 General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;
35.3 referenced in section R403.5.12;

35.4 ~~B. Title: Method of Testing General Ventilation Air-Cleaning Devices for~~
35.5 ~~Removal Efficiency by Particle Size;~~

35.6 ~~C. B.~~ Standard reference number: HVI Standard 915; ~~and~~

35.7 ~~D. C.~~ Standard reference number: HVI Standard 916; and

35.8 D. Standard reference number: HVI Standard 920.

35.9 **REPEALER.** Minnesota Rules, parts 1322.0020; 1322.1101; 1322.1102; 1322.1103;
35.10 1322.1104; 1322.2100; 1322.2101; 1322.2102; and 1322.2103, are repealed.