

1.1 **Department of Labor and Industry**

1.2 **Proposed 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 DEFINITIONS ADOPTION OF INTERNATIONAL ENERGY**
 8.9 **CONSERVATION CODE (IECC) BY REFERENCE.**

8.10 ~~**ACCESSIBLE.** Signifies access that requires the removal of an access panel or similar~~
 8.11 ~~removable obstruction.~~

8.12 ~~**ACCESSIBLE, READILY.** Signifies access without the necessity for removing a panel~~
 8.13 ~~or similar obstruction.~~

8.14 ~~**ACCA.** "Air Conditioning Contractors of America" or "ACCA" means the Air~~
 8.15 ~~Conditioning Contractors of America.~~

8.16 ~~**AIR CIRCULATION, FORCED.** A means of providing space conditioning utilizing~~
 8.17 ~~movement of air through ducts or plenums by mechanical means.~~

8.18 ~~**AIR, EXHAUST.** Air discharged from any space to the outside by the residential~~
 8.19 ~~ventilation system.~~

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

8.22 ~~**AIR-CONDITIONING SYSTEM.** A system that consists of heat exchangers, blowers,~~
 8.23 ~~filters, supply, exhaust and return-air systems, and shall include any apparatus installed~~
 8.24 ~~in connection therewith.~~

8.25 ~~**ASHRAE.** "ASHRAE" means the American Society of Heating, Refrigerating, and~~
 8.26 ~~Air-Conditioning Engineers.~~

9.1 ~~**ASTM.** "ASTM" means ASTM International, formerly known as the American Society~~
9.2 ~~for Testing and Materials.~~

9.3 ~~**BALANCED VENTILATION SYSTEM.** A residential ventilation system where the~~
9.4 ~~design fan powered exhaust air is equal to the fan powered supply air.~~

9.5 ~~**BUILDING.** Building means only a one- or two-family dwelling or portion thereof,~~
9.6 ~~including townhouses, that is used, or designed or intended to be used, for human~~
9.7 ~~habitation, living, or sleeping, or any combination thereof, and shall include accessory~~
9.8 ~~structures.~~

9.9 ~~**CONDITIONED SPACE.** For energy purposes, space within a building that is provided~~
9.10 ~~with heating or cooling equipment or systems capable of maintaining, through design or~~
9.11 ~~heat loss or gain, 50 degrees Fahrenheit (10 degrees Celsius) winter design conditions and~~
9.12 ~~85 degrees Fahrenheit (29 degrees Celsius) at summer design conditions, or communicates~~
9.13 ~~directly with a conditioned space. For mechanical purposes, an area, room, or space being~~
9.14 ~~heated or cooled by any equipment or appliance.~~

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

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

9.20 ~~**EXHAUST VENTILATION SYSTEM.** A residential ventilation system where a fan~~
9.21 ~~provides exhaust air and supply air is not fan powered.~~

9.22 ~~**FORCED-AIR CIRCULATION SYSTEM.** An air heating or cooling system.~~

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

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

9.27 ~~**HVI.** "Home Ventilating Institute" or "HVI" means the Home Ventilating Institute.~~

10.1 ~~**INTERNATIONAL BUILDING CODE OR IBC.** "International Building Code" or~~
 10.2 ~~"IBC" means the International Building Code, as promulgated by the International Codes~~
 10.3 ~~Council, Falls Church, VA 22041, and as adopted by reference in part 1305.0011.~~

10.4 ~~**INTERNATIONAL RESIDENTIAL CODE OR IRC.** "International Residential Code"~~
 10.5 ~~or "IRC" means the International Residential Code, as promulgated by the International~~
 10.6 ~~Codes Council, Falls Church, VA 22041, and as adopted by reference in part 1309.0010.~~

10.7 ~~**MANUFACTURER'S INSTALLATION INSTRUCTIONS.** Printed instructions~~
 10.8 ~~included with equipment as part of the conditions of listing and labeling.~~

10.9 ~~**MECHANICAL VENTILATION.** The mechanical process of supplying conditioned or~~
 10.10 ~~unconditioned air to, or removing such air from, any space.~~

10.11 ~~**NATIONAL FENESTRATION RATING COUNCIL OR NFRC.** "National~~
 10.12 ~~Fenestration Rating Council" or "NFRC" means the National Fenestration Rating Council.~~

10.13 Subpart 1. **General.** Chapters 2(RE) to 5(RE) of the Residential Provisions of the
 10.14 2012 edition of the International Energy Conservation Code (IECC) as promulgated by
 10.15 the International Code Council, Inc. (ICC), Washington, DC, is incorporated by reference
 10.16 and made part of the Minnesota State Building Code except as qualified by the applicable
 10.17 provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. Portions of
 10.18 this publication reproduce excerpts from the 2012 IECC, International Code Council, Inc.
 10.19 Washington, DC, copyright 2012, reproduced with permission, all rights reserved. The
 10.20 2012 IECC is not subject to frequent change and a copy of the 2012 IECC with amendments
 10.21 for use in Minnesota is available in the office of the commissioner of labor and industry.

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

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

11.4 **1322.0015 ADMINISTRATION AND PURPOSE.**

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

11.6 Subp. 2. **Purpose.** The purpose of this chapter is to establish a minimum code
11.7 of standards for the construction, reconstruction, alteration, and repair of residential
11.8 buildings governing matters including design and construction standards regarding heat
11.9 loss control, illumination, and climate control, ~~and radon control methods~~ pursuant to
11.10 Minnesota Statutes, sections 326B.101, 326B.106, and 326B.13.

11.11 **1322.0030 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL**
11.12 **(ICC) CODES.**

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

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

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

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

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

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

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

12.10 Subp. 8. **Private sewage disposal code.** References to the International Private
12.11 Sewage Disposal Code mean the Minnesota Pollution Control Agency's minimum
12.12 standards and criteria for individual sewage treatment systems in Minnesota Rules,
12.13 chapters 7080, 7082, and 7083, adopted pursuant to Minnesota Statutes, chapters 103F,
12.14 103G, 115, and 116.

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

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

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

12.22 **1322.0040 ADMINISTRATIVE PROCEDURE CRITERIA.**

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

13.1 **1322.0100 ADMINISTRATION FOR RESIDENTIAL ENERGY.**

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

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

13.6 Subp. 3. **Applicability.**

13.7 A. **Additions, alterations, renovations, or repairs.** Additions, alterations,
13.8 renovations, or repairs to an existing building, building system, or portion of a building
13.9 shall conform to the provisions of this code as they relate to new construction without
13.10 requiring the unaltered portion of the existing building or building system to comply
13.11 with this code. Additions, alterations, renovations, or repairs shall not create an unsafe
13.12 or hazardous condition or overload existing building systems. An addition shall comply
13.13 with this code if the addition alone complies or if the existing building and addition
13.14 comply with this code as a single building. Attic insulation shall not be installed unless
13.15 accessible attic bypasses have been sealed. An attic bypass is any air passageway between
13.16 a conditioned space and an unconditioned attic.

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

13.19 1. Storm windows installed over existing windows.

13.20 2. Glass only replacements in an existing sash and frame.

13.21 3. Existing ceiling, wall, or floor cavities exposed during construction provided
13.22 that these cavities are filled with insulation.

13.23 4. Construction where the existing roof, wall, or floor cavity is not exposed.

13.24 5. Reroofing and residing.

13.25 6. Replacement of existing doors that separate conditioned space from the

13.26 exterior do not require the installation of a vestibule or revolving door; provided

14.1 that an existing vestibule that separates a conditioned space from the exterior
14.2 shall not be removed.

14.3 7. Alterations that replace less than 50 percent of the luminaires in a space,
14.4 provided that the alterations do not increase the installed interior lighting power.

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

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

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

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

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

14.20 Subp. 4. **Compliance.** Residential buildings shall meet the requirements of
14.21 Minnesota Rules, chapter 1322. Commercial buildings shall meet the requirements of
14.22 Minnesota Rules, chapter 1323.

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

15.1 B. Low energy buildings. The following buildings, or portions thereof,
15.2 separated from the remainder of the building by building thermal envelope assemblies
15.3 complying with this code are exempt from the building thermal envelope provisions of
15.4 this code:

15.5 (1) those with a peak design rate of energy usage less than 3.4 Btu/h•ft²
15.6 (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes; and

15.7 (2) those that do not contain conditioned space.

15.8 **1322.0103 CONSTRUCTION DOCUMENTS.**

15.9 Construction documents shall be drawn to scale upon suitable material. Electronic
15.10 media documents are permitted to be submitted when approved by the building official.

15.11 Construction documents shall be of sufficient clarity to indicate the location, nature, and
15.12 extent of the work proposed, and show in sufficient detail pertinent data and features of
15.13 the building, systems, and equipment as herein governed. The details shall include the
15.14 following when applicable:

15.15 A. insulation materials and their R-values;

15.16 B. fenestration U-factors and SHGCs;

15.17 C. area-weighted U-factor and SHGC calculations;

15.18 D. mechanical system design criteria;

15.19 E. mechanical and service water heating system and equipment types, sizes,
15.20 and efficiencies;

15.21 F. equipment and systems controls;

15.22 G. fan motor horsepower (hp) and controls;

15.23 H. duct sealing, and the location and insulation of ducts and pipes;

15.24 I. lighting fixture schedule with wattage and control narrative; and

16.1 J. air sealing details.

16.2 **1322.0201 SECTION R201, GENERAL.**

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

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

16.9 **1322.0202 SECTION R202, GENERAL DEFINITIONS.**

16.10 Subpart 1. Amended definitions. IECC section R202 is modified by amending the
16.11 following definitions to read as follows:

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

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

16.18 Subp. 2. Added definitions. IECC section R202 is modified by adding the following
16.19 definitions to read as follows:

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

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

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

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

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

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

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

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

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

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

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

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

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

17.24 **1322.0303 SECTION R303, MATERIALS, SYSTEMS, AND EQUIPMENT.**

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

17.26 **R303.1 Identification.** Materials, systems, and equipment shall be identified in a
17.27 manner that will allow a determination of compliance with the applicable provisions

18.1 of this code. Materials used shall be: (1) listed for the intended use; (2) installed in
18.2 accordance with the manufacturer's installation instructions; and (3) installed by an
18.3 installer who is certified by a manufacturer to install that specific product, if such
18.4 certification exists. (Subsections R303.1.1, R303.1.1.1, R303.1.2, R303.1.3, and
18.5 R303.1.4 still apply.)

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

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

18.11 **1322.0401 SECTION R401, GENERAL.**

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

18.13 **R401.3 Certificate (mandatory).** A building certificate shall be completed and posted
18.14 on or in the electrical distribution panel by the builder or registered design professional.
18.15 The certificate shall not cover or obstruct the visibility of the circuit directory label,
18.16 service disconnect label, or other required labels. The certificate shall list: the date
18.17 the certificate is installed; the dwelling address; residential contractor name and
18.18 contractor license number, or homeowner name, if acting as the general contractor;
18.19 the predominant installed R-values, their location, and type of insulation installed in
18.20 or on ceiling/roof, walls, rim/band joist, foundation, slab, basement wall, crawl space
18.21 wall or floor, and ducts outside conditioned spaces; U-factors for fenestration and the
18.22 solar heat gain coefficient (SHGC) of fenestration; and the results of any required duct
18.23 system and building envelope air leakage testing done on the building. Where there is
18.24 more than one value for each component, the certificate shall list the value covering
18.25 the largest area. The certificate shall list the types, input ratings, manufacturers, model
18.26 numbers and efficiencies of heating, cooling, and service water heating equipment.
18.27 The certificate shall also list the structure's calculated heat loss, calculated cooling

19.1 load, and calculated heat gain. Where an electric furnace or baseboard electric heater
 19.2 is installed in the residence, the certificate shall list "electric furnace" or "baseboard
 19.3 electric heater," as appropriate. An efficiency shall not be listed for electric furnaces
 19.4 or electric baseboard heaters. The certificate shall list the mechanical ventilation
 19.5 system type, location, and capacity, and the building's designated continuous and total
 19.6 ventilation rates. The certificate shall also list the type, size, and location of any
 19.7 make-up air system installed and the location or future location of the radon fan.

19.8 **1322.0402 SECTION R402, BUILDING THERMAL ENVELOPE.**

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

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

Climate Zone	Fenestration U-Factor ^b	Skylight ^b U-Factor	Glazed Fenestration SHGC ^{b,e}	Ceiling ⁱ R-Value	Wood Frame Wall R-Value ^f
<u>6</u>	<u>0.32</u>	<u>0.55</u>	<u>NR</u>	<u>49</u>	<u>21</u>
<u>7</u>	<u>0.32</u>	<u>0.55</u>	<u>NR</u>	<u>49</u>	<u>21</u>

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

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

19.21 For SI: 1 foot = 304.8 mm.

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

19.26 b. The fenestration U-factor column excludes skylights. The SHGC column
 19.27 applies to all glazed fenestration.

19.28 c. See section R402.2.8.

- 20.1 d. Insulation R-values for heated slabs shall be installed to the depth indicated or
20.2 to the top of the footing, whichever is less.
- 20.3 e. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- 20.4 f. If structural sheathing covers 40 percent or less of the exterior, the continuous
20.5 insulation R-value is permitted to be reduced by no more than R-3 in the
20.6 locations where structural sheathing is used to maintain a consistent total
20.7 sheathing thickness.
- 20.8 g. The second R-value applies when more than half the insulation is on the
20.9 interior of the mass wall.
- 20.10 h. When using log-type construction for thermal mass walls the following applies:
20.11 (1) a minimum of a 7-inch diameter log shall be used; and
20.12 (2) the U-value of fenestration products shall be 0.29 overall on average
20.13 or better.
- 20.14 i. See section 402.2.8. A minimum R-19 cavity insulation is required in wood
20.15 foundation walls.
- 20.16 j. Roof/ceiling assemblies shall have a minimum 6-inch energy heel.

20.17 Subp. 2. **Section R402.1.1 Insulation and fenestration criteria.** IECC section
20.18 R402.1.1 is amended to read as follows:

20.19 **R402.1.1 Insulation, waterproofing, and fenestration criteria.** The building
20.20 thermal envelope shall meet the requirements of Table R402.1.1 based on the
20.21 climate zone specified in chapter 3, and the requirements contained in section
20.22 R402.2. Cast-in-place concrete and masonry block foundation walls shall be
20.23 waterproofed according to IRC section R406 and the following requirements:

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

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

21.3 2. If the walls are exposed to the exterior environment, the waterproofing
21.4 system shall have a rigid, opaque, and weather-resistant protective covering
21.5 to prevent degradation of the waterproofing system. The protective covering
21.6 shall cover the exposed waterproofing and extend a minimum of 6 inches
21.7 (152 mm) below grade. The protective covering system shall be flashed in
21.8 accordance with IRC section R703.8.

21.9 **R402.1.1.1 Integral foundation insulation requirements.** Any insulation
21.10 assembly installed integral to the foundation walls shall be manufactured for
21.11 that intended use and installed according to the manufacturer's installation
21.12 instructions.

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

- 21.16 1. be made of water-resistant materials manufactured for that intended
21.17 use;
- 21.18 2. be installed according to the manufacturer's installation instructions;
- 21.19 3. comply with either ASTM C578, C612, or C1029, as applicable; and
- 21.20 4. have a rigid, opaque, and weather-resistant protective covering to
21.21 prevent the degradation of the insulation's thermal performance. The
21.22 protective covering shall cover the exposed exterior insulation and
21.23 extend a minimum of 6 inches (152 mm) below grade. The insulation
21.24 and protective covering system shall be flashed in accordance with
21.25 IRC section R703.8.

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

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

- 22.3 1. be made of water-resistant materials manufactured for that intended
- 22.4 use;
- 22.5 2. be installed according to the manufacturer's installation instructions;
- 22.6 3. comply with either ASTM C578 or C1029, as applicable;
- 22.7 4. be covered with a 6-mil polyethylene slip sheet over the entire
- 22.8 exterior surface; and
- 22.9 5. have a rigid, opaque, and weather-resistant protective covering to
- 22.10 prevent degradation of the insulation's thermal performance. The
- 22.11 protective covering shall cover the exposed exterior insulation and
- 22.12 extend a minimum of 6 inches (152 mm) below grade. The insulation
- 22.13 and protective covering system shall be flashed in accordance with
- 22.14 IRC section R703.8.

22.15 **R402.1.1.4 Interior foundation insulation requirements.** Any insulation
22.16 assembly installed on the interior of foundation walls shall meet the
22.17 following requirements:

- 22.18 1. Masonry foundation walls shall be drained through each masonry
- 22.19 block core to an approved interior drainage system.
- 22.20 2. If a frame wall is installed, it shall not be in direct contact with the
- 22.21 foundation wall.
- 22.22 3. The insulation assembly shall comply with the interior air barrier
- 22.23 requirements of section R402.4.
- 22.24 4. The insulation assembly shall comply with section R402.1.1.5,
- 22.25 R402.1.1.6, or R402.1.1.7, as applicable.

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

- 23.1 1. For installation:
- 23.2 a. the insulation shall be in contact with the foundation wall surface;
- 23.3 b. vertical edges shall be sealed with acoustic sealant;
- 23.4 c. all interior joints, edges, and penetrations shall be sealed against
- 23.5 air and water vapor penetration;
- 23.6 d. continuous acoustic sealant shall be applied horizontally
- 23.7 between the foundation wall and the insulation at the top of the
- 23.8 foundation wall; and
- 23.9 e. continuous acoustic sealant shall be applied horizontally between
- 23.10 the basement floor and the bottom insulation edge.
- 23.11 2. The insulation shall not be penetrated by the placement of utilities,
- 23.12 fasteners, or connectors used to install a frame wall, with the exception
- 23.13 of through penetrations.
- 23.14 3. Through penetrations shall be sealed around the penetrating products.
- 23.15 **R402.1.1.6 Spray-applied interior foam insulation.** Spray-applied interior
- 23.16 foam insulation shall comply with the following:
- 23.17 1. Closed-cell foam:
- 23.18 a. The foam shall comply with ASTM C1029 and have a
- 23.19 permeance not greater than 0.8, in accordance with ASTM E96
- 23.20 procedure A, and a permeance of not less than 0.3, in accordance
- 23.21 with ASTM E96 procedure B.
- 23.22 b. The foam shall be sprayed directly onto the foundation wall
- 23.23 surface. There shall be a 1-inch minimum gap between the
- 23.24 foundation wall surface and any framing.
- 23.25 c. The insulation surface shall not be penetrated by the placement
- 23.26 of utilities, fasteners, or connectors used to install a frame wall,
- 23.27 with the exception of through penetrations.

24.1 d. Through penetrations shall be sealed around the penetrating
24.2 products.

24.3 2. Open-cell foam:

24.4 a. The foam shall be sprayed directly onto the foundation wall
24.5 surface. There shall be a 1-inch minimum gap between the
24.6 foundation wall surface and any framing.

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

24.10 c. Through penetrations shall be sealed around the penetrating
24.11 product.

24.12 d. A vapor retarder and air barrier shall be applied to the
24.13 warm-in-winter side of the assembly with a permeance not greater
24.14 than 1.0, in accordance with ASTM E96 procedure A, and a
24.15 permeance not less than 0.3, in accordance with ASTM E96
24.16 procedure B.

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

24.19 1. The above-grade exposed foundation wall height shall not exceed
24.20 1.5 ft.

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

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

- 25.1 a. the vapor and air barrier shall be sealed to the framing with
25.2 construction adhesive or equivalent at the top and bottom plates
25.3 and where the adjacent wall is insulated;
25.4 b. the vapor and air barrier shall be sealed around utility boxes and
25.5 other penetrations; and
25.6 c. all seams in the vapor and air barrier shall be overlapped at least
25.7 6 inches and sealed with compatible sealing tape or equivalent.

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

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

- 25.15 a. have a stable annual wetting and drying cycle whereby
25.16 foundation wall system water (solid, liquid, and vapor) transport
25.17 processes produce no net accumulation of ice or water over a full
25.18 calendar year and the foundation wall system is free of absorbed
25.19 water for at least 4 months over a full calendar year;
25.20 b. prevent conditions of moisture and temperature to prevail for a
25.21 time period favorable to mold growth for the material used; and
25.22 c. prevent liquid water from the foundation wall system from
25.23 reaching the foundation floor system at any time during a full
25.24 calendar year.

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

26.1 fulfilled. The foundation insulation system designer shall also specify
26.2 the design conditions for the wall and the design conditions for the
26.3 interior space for which the water separation plane will meet the
26.4 requirements of this section. The foundation insulation system designer
26.5 shall provide a label disclosing these design conditions. The label shall
26.6 be posted according to section R401.3.

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

26.10 4. **Foundation air barrier.** The foundation insulation system shall be
26.11 designed and installed to have a foundation air barrier system between
26.12 the interior and the exterior. The foundation air barrier system shall be a
26.13 material or combination of materials that is continuous with all joints
26.14 sealed and is durable for the intended application. Material used for
26.15 the foundation air barrier system shall have an air permeability not to
26.16 exceed $0.004 \text{ ft}^3/\text{min}\cdot\text{ft}^2$ under a pressure differential of 0.3 inches water
26.17 (1.57 psf) ($0.02 \text{ L/s}\cdot\text{m}^2$ at 75Pa) as determined by either commonly
26.18 accepted engineering tables or by being labeled by the manufacturer as
26.19 having these values when tested according to ASTM E2178.

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

26.22 **R402.2.8 Basement walls.** Walls associated with conditioned basements shall be
26.23 insulated from the top of the basement wall down to 10 feet (3048 mm) below
26.24 grade or to the top of the footing, whichever is less. Foundation insulation
26.25 shall be installed according to the manufacturer's installation instructions.
26.26 Walls associated with unconditioned basements shall meet the requirements of

27.1 this section unless the floor overhead is insulated in accordance with sections
27.2 R402.1.1 and R402.2.7 and the following requirements:

27.3 a. R-15 insulation for concrete and masonry foundations shall be installed
27.4 according to R402.1.1.1 to R402.1.1.8 and a minimum of a R-10 shall be
27.5 installed on the exterior of the wall. Interior insulation, other than closed
27.6 cell spray foam, shall not exceed R-11. Foundations shall be waterproofed
27.7 in accordance with the applicable provisions of the International Residential
27.8 Code (IRC).

27.9 **Exception:** R-10 continuous insulation on the exterior of each
27.10 foundation wall shall be permitted to comply with this code if the tested
27.11 air leakage rate required in section R402.4.1.2 does not exceed 2.6 air
27.12 changes per hour and the total square feet between the finished grade
27.13 and the top of each foundation wall does not exceed 1.5 multiplied by
27.14 the total lineal feet of each foundation wall that encloses conditioned
27.15 space. Interior insulation, other than closed cell spray foam, shall not
27.16 exceed R-11. See footnote c to Table R402.2.1.

27.17 b. Minimum R-19 cavity insulation is required in wood foundation walls.
27.18 See footnote 1 to Table R402.2.1.

27.19 **1322.0403 SECTION R403, SYSTEMS.**

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

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

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

27.25 a. Insulation is only required in the conditioned space for a distance of 3 feet
27.26 (914 mm) from the exterior or unconditioned space.

- 28.1 b. V means the vapor retarder required in accordance with IMC section
 28.2 604.11. When a vapor retarder is required, duct insulation required by
 28.3 this section shall be installed without respect to other building envelope
 28.4 insulation.
- 28.5 c. W means an approved weatherproof barrier.

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

28.8	<u>Duct Type/Location</u>	<u>Requirements</u>
28.9	<u>Exterior of building</u>	<u>R-8, V, and W</u>
28.10	<u>Attics, garages, and ventilated crawl spaces</u>	<u>R-8 and V</u>
28.11	<u>Outdoor air intakes within conditioned spaces</u>	<u>R-6 and V</u>
28.12	<u>Exhaust ducts within conditioned spaces</u>	<u>R-6 and V</u>
28.13	<u>Within cement slab or within ground</u>	<u>R-6 and V</u>
28.14 28.15	<u>Within conditioned spaces and in basements with insulated walls</u>	<u>None required</u>

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

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

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

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

29.5 **R403.5.2 Total ventilation rate.** The mechanical ventilation system shall
 29.6 provide sufficient outdoor air to equal the total ventilation rate average for each
 29.7 1-hour period in accordance with Table R403.5.2, or equation R403.5.2, based
 29.8 on the number of bedrooms and square footage of conditioned space, including
 29.9 the basement and conditioned crawl spaces.

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

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

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

29.15 **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</u> <u>space¹ (in sq.</u> <u>ft.)</u>	<u>Total/</u> <u>Continuous</u>	<u>Total/</u> <u>Continuous</u>	<u>Total/</u> <u>Continuous</u>	<u>Total/</u> <u>Continuous</u>	<u>Total/</u> <u>Continuous</u>	<u>Total/</u> <u>Continuous</u>
29.21 <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>
29.22 <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>
29.23 <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>
29.24 <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>
29.25 <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>
29.26 <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>
29.27 <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>
29.28 <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>

30.1 5001-5500 140/70 155/78 170/85 185/93 200/100 215/108

30.2 5501-6000² 150/75 165/83 180/90 195/98 210/105 225/113

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

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

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

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

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

30.16 A heat recovery ventilator (HRV) or energy recovery ventilator (ERV) shall
30.17 meet either:

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

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

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

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

31.4 **R403.5.6 Installation requirements.** All mechanical systems shall meet the
31.5 requirements of section R403.5.6. The mechanical ventilation system and its
31.6 components shall also be installed according to the Minnesota Mechanical Code,
31.7 Minnesota Rules, chapter 1346, and the equipment manufacturer's installation
31.8 instructions.

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

31.12 **R403.5.6.1.1 Forced air circulation systems.** When outdoor air
31.13 is supplied directly through a forced air circulation system, the
31.14 requirements of this section shall be met using one of the following
31.15 methods:

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

31.20 b. when the outdoor air supply is ducted to the forced air system,
31.21 the mixed air temperature shall not be less than the heating
31.22 equipment manufacturer's installation instructions. The controls
31.23 shall be installed to allow the forced air circulation system to
31.24 provide an average flow rate not less than 0.075 cfm per square
31.25 foot of conditioned floor area.

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

32.1 20 cfm or greater, the system shall be designed and installed to temper
32.2 incoming air to not less than 40°F (4°C) measured at the point of
32.3 distribution into the space.

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

32.8 **R403.5.7 Fans.** When used as part of the mechanical ventilation system, fans
32.9 shall be capable of delivering the designed air flow at the point of air discharge
32.10 or intake as determined by section R403.5.2 and according to HVI Standard 916.
32.11 Fans shall be designed and certified by the equipment manufacturer to be capable
32.12 of continuous operation at the maximum fan-rated cfm. Surface mounted fans
32.13 used to comply with the continuous ventilation requirement of the mechanical
32.14 ventilation system shall have a maximum 1.0 sone, according to HVI Standard
32.15 915. Fans used to comply with the intermittent ventilation requirement of the
32.16 mechanical ventilation system shall have a maximum 2.5 sone, according to
32.17 HVI Standard 915. Mechanical ventilation system fans shall meet the efficacy
32.18 requirements of Table R403.5.1.

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

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

33.1 **R403.5.9 Connection to forced air circulation systems.** When air ducts are
33.2 directly connected to the forced air circulation system, the outdoor air shall be
33.3 supplied directly to the forced air circulation system, or the exhaust air shall be
33.4 drawn directly from the forced air circulation system, but not both. To meet
33.5 the mechanical ventilation system requirements, the air duct shall be installed
33.6 according to the manufacturer's installation instructions.

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

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

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

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

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

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

34.3 **R403.5.13 Noise and vibration.** Mechanical ventilation system components
34.4 shall be installed to minimize transmission of noise and vibration. The equipment
34.5 manufacturer's installation instructions shall be followed and any materials
34.6 provided by the equipment manufacturer for installation shall be used. In the
34.7 absence of specific materials or instructions, vibration dampening materials, such
34.8 as rubber grommets and flexible straps, shall be used when connecting fans and
34.9 heat exchangers to the building structure. Isolation duct connectors shall be
34.10 used to mitigate noise transmission.

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

- 34.13 1. When the mechanical ventilation system is not designed to operate
34.14 whenever the forced air circulation system is operating, the mechanical
34.15 ventilation system shall incorporate an accessible backflow damper to
34.16 prevent flow from the outside when the mechanical ventilation system is off.
- 34.17 2. Controls shall be compatible with the mechanical ventilation system, its
34.18 components, and the manufacturer's installation and operating instructions.
- 34.19 3. Controls shall be installed to operate the mechanical ventilation system
34.20 as designed.
- 34.21 4. Each control shall be readily accessible to occupants and shall be labeled
34.22 to indicate the control's function.

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

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

35.1 **R403.5.17 Climatic design conditions.**

35.2 A. HVAC equipment shall be sized according to the ACCA Manual S or
 35.3 an equivalent method, based on the building's heating and cooling load
 35.4 calculations by using ASHRAE Handbook of Fundamentals or the ACCA
 35.5 Manual J. Oversizing of heating equipment shall not exceed 40 percent of
 35.6 the calculated load requirements and oversizing of cooling equipment shall
 35.7 not exceed 15 percent of the calculated load requirements.

35.8 B. Design conditions shall be determined according to Table 403.5.17.
 35.9 Design condition adjustments may be determined by the building official if
 35.10 local climates differ from the tabulated temperatures based on local climate
 35.11 data.

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

35.13 <u>City</u>	<u>Summer Db/Wb °F</u>	<u>Winter Db °F</u>
35.14 <u>Aitkin</u>	<u>82/72</u>	<u>-24</u>
35.15 <u>Albert Lea</u>	<u>85/72</u>	<u>-15</u>
35.16 <u>Alexandria</u>	<u>86/70</u>	<u>-21</u>
35.17 <u>Bemidji</u>	<u>84/68</u>	<u>-24</u>
35.18 <u>Cloquet</u>	<u>82/68</u>	<u>-20</u>
35.19 <u>Crookston</u>	<u>84/70</u>	<u>-27</u>
35.20 <u>Duluth</u>	<u>81/67</u>	<u>-20</u>
35.21 <u>Ely</u>	<u>82/68</u>	<u>-29</u>
35.22 <u>Eveleth</u>	<u>82/68</u>	<u>-26</u>
35.23 <u>Faribault</u>	<u>86/73</u>	<u>-16</u>
35.24 <u>Fergus Falls</u>	<u>86/71</u>	<u>-21</u>
35.25 <u>Grand Rapids</u>	<u>81/67</u>	<u>-23</u>
35.26 <u>Hibbing</u>	<u>82/68</u>	<u>-19</u>
35.27 <u>International Falls</u>	<u>83/67</u>	<u>-28</u>
35.28 <u>Litchfield</u>	<u>85/71</u>	<u>-18</u>
35.29 <u>Little Falls</u>	<u>86/71</u>	<u>-20</u>

36.1	<u>Mankato</u>	<u>86/72</u>	<u>-15</u>
36.2	<u>Minneapolis/St. Paul</u>	<u>88/72</u>	<u>-15</u>
36.3	<u>Montevideo</u>	<u>86/72</u>	<u>-17</u>
36.4	<u>Mora</u>	<u>84/70</u>	<u>-21</u>
36.5	<u>Morris</u>	<u>84/72</u>	<u>-21</u>
36.6	<u>New Ulm</u>	<u>87/73</u>	<u>-15</u>
36.7	<u>Owatonna</u>	<u>86/73</u>	<u>-16</u>
36.8	<u>Pequot Lakes</u>	<u>84/68</u>	<u>-23</u>
36.9	<u>Pipestone</u>	<u>85/73</u>	<u>-15</u>
36.10	<u>Redwood Falls</u>	<u>89/73</u>	<u>-17</u>
36.11	<u>Rochester</u>	<u>85/72</u>	<u>-17</u>
36.12	<u>Roseau</u>	<u>82/70</u>	<u>-29</u>
36.13	<u>St. Cloud</u>	<u>86/NA</u>	<u>-20</u>
36.14	<u>Thief River Falls</u>	<u>82/68</u>	<u>-25</u>
36.15	<u>Tofte</u>	<u>75/61</u>	<u>-14</u>
36.16	<u>Warroad</u>	<u>83/67</u>	<u>-29</u>
36.17	<u>Wheaton</u>	<u>84/71</u>	<u>-20</u>
36.18	<u>Willmar</u>	<u>85/71</u>	<u>-20</u>
36.19	<u>Winona</u>	<u>88/74</u>	<u>-13</u>
36.20	<u>Worthington</u>	<u>84/71</u>	<u>-14</u>

36.21 Db = dry bulb temperature, degrees Fahrenheit

36.22 Wb = wet bulb temperature, degrees Fahrenheit

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

36.24 R403.12 as follows:

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

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

36.27 **1322.0500 CHAPTER 5(RE) REFERENCED STANDARDS.**

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

36.29 standards:

- 37.1 A. Standard reference number: ASHRAE Standard 52.2, referenced in section
37.2 R403.5.12;
- 37.3 B. Title: Method of Testing General Ventilation Air-Cleaning Devices for
37.4 Removal Efficiency by Particle Size;
- 37.5 C. Standard reference number: HVI Standard 915; and
- 37.6 D. Standard reference number: HVI Standard 916.
- 37.7 **REPEALER.** Minnesota Rules, parts 1322.0020; 1322.1101; 1322.1102; 1322.1103;
37.8 1322.1104; 1322.2100; 1322.2101; 1322.2102; and 1322.2103, are repealed.