

1322.0403 SECTION R403, SYSTEMS.

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

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

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

- a. Insulation is only required in the conditioned space for a distance of 3 feet (914 mm) from the exterior or unconditioned space.
- b. V means the vapor retarder required in accordance with IMC section 604.11. When a vapor retarder is required, duct insulation required by this section shall be installed without respect to other building envelope insulation.
- c. W means an approved weatherproof barrier.

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

Duct Type/Location	Requirements
Exterior of building	R-8, V, and W
Attics, garages, and ventilated crawl spaces	R-8 and V
Outdoor air intakes within conditioned spaces	R-3.3 and V
Exhaust ducts within conditioned spaces	R-3.3 and V
Within concrete slab or within ground	R-3.5 and V
Within conditioned spaces and in basements with insulated walls	None required

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

R403.5 Mechanical ventilation (mandatory). The building shall be provided with a balanced mechanical ventilation system that is +/- 10 percent of the system's design capacity and meets the requirements of section R403.5.5, which establishes the continuous and total mechanical ventilation requirements for dwelling unit ventilation. All conditioned unfinished basements, conditioned crawl spaces, and conditioned levels shall be provided with a minimum ventilation rate of 0.02 cfm per square foot or a minimum of 1 supply duct and 1 return duct. The supply and return ducts shall be separated by 1/2 the diagonal dimension of the basement to avoid a short circuit of

the air circulation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

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

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

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

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

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

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

Table R403.5.2

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

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

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

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

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

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

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

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

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

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

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

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

R403.5.6.1.1 Forced air circulation systems. When outdoor air is supplied directly through a forced air circulation system, the

requirements of this section shall be met using one of the following methods:

- a. when an outdoor air supply is not ducted to the forced air system, controls shall be installed to allow the forced air system to provide an average circulation flow rate each hour of not less than 0.15 cfm per square foot of the conditioned floor area; or
- b. when the outdoor air supply is ducted to the forced air system, the mixed air temperature shall not be less than the heating equipment manufacturer's installation instructions. The controls shall be installed to allow the forced air circulation system to provide an average flow rate not less than 0.075 cfm per square foot of conditioned floor area.

R403.5.6.1.2 Directly ducted and individual room inlets. When outdoor air is supplied directly to habitable spaces with an airflow of 20 cfm or greater, the system shall be designed and installed to temper incoming air to not less than 40°F (4°C) measured at the point of distribution into the space.

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

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

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

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

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

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

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

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

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

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

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

heat exchangers to the building structure. Isolation duct connectors shall be used to mitigate noise transmission.

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

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

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

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

R403.5.17 Climatic design conditions.

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

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

TABLE R403.5.17 Climatic Data Design Conditions

City	Summer Db/Wb °F	Winter Db °F
Aitkin	82/72	-24
Albert Lea	85/72	-15
Alexandria	86/70	-21

Bemidji	84/68	-24
Cloquet	82/68	-20
Crookston	84/70	-27
Duluth	81/67	-20
Ely	82/68	-29
Eveleth	82/68	-26
Faribault	86/73	-16
Fergus Falls	86/71	-21
Grand Rapids	81/67	-23
Hibbing	82/68	-19
International Falls	83/67	-28
Litchfield	85/71	-18
Little Falls	86/71	-20
Mankato	86/72	-15
Minneapolis/St. Paul	88/72	-15
Montevideo	86/72	-17
Mora	84/70	-21
Morris	84/72	-21
New Ulm	87/73	-15
Owatonna	86/73	-16
Pequot Lakes	84/68	-23
Pipestone	85/73	-15
Redwood Falls	89/73	-17
Rochester	85/72	-17
Roseau	82/70	-29
St. Cloud	86/NA	-20
Thief River Falls	82/68	-25
Tofte	75/61	-14
Warroad	83/67	-29
Wheaton	84/71	-20

Willmar	85/71	-20
Winona	88/74	-13
Worthington	84/71	-14

Db = dry bulb temperature, degrees Fahrenheit

Wb = wet bulb temperature, degrees Fahrenheit

Subp. 3. **Section R403.12.** IECC section R403 is amended by adding section R403.12 as follows:

R403.12 Photovoltaic modules and systems: Installation of photovoltaic modules and systems shall meet the requirements of Minnesota Rules, chapter 1315.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106*

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