



DEPARTMENT OF
LABOR AND INDUSTRY

CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Mike Moore](#)

Model Code: [2024 IMC](#)

Date: [April 23, 2024](#)

Code or Rule Section:
[2024 IMC Section 401 and 403, Chpt 15](#)

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Code or rule section to be changed: [2024 IMC Sections 401 and 403, Chpt 15](#)

Intended for Technical Advisory Group ("TAG"): [Mechanical](#)

General Information

Yes No

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

- change language contained in the model code book? If so, list section(s).
[2024 IMC Section 401, 403, and Chapter 15.](#)
- change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- delete language contained in the model code book? If so, list section(s).
[Various places in Section 401 and 403. See proposal.](#)
- delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
[This proposal does not propose to carry forward any amendments to Minnesota Rules 1346.](#)
- add new language that is not found in the model code book or in Minnesota Rule.
[Most of the proposed language is either in the model code book or in the Minnesota Rules, but some of the language is new.](#)

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation. Adoption of this proposed code change, which is based on requirements in the model codes and Minnesota’s Rules, is supported (but not required) by Sec. 29. Minnesota Statutes 2023, section 326B.106, subdivision 1 which states, “(c) Beginning with the 2018 edition of the model building codes and every six years thereafter, the commissioner shall review the new model building codes and adopt the model codes as amended for use in Minnesota, within two years of the published edition date. The commissioner may adopt amendments to the building codes prior to the adoption of the new building codes to advance construction methods, technology, or materials, or, where necessary to protect the health, safety, and welfare of the public, or to improve the efficiency or the use of a building.”
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strike through~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes. Please see the proposal appended to the end of this document.
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts. No other sections are expected to be affected.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

Proposal Overview: Minnesota Rules currently require balanced mechanical ventilation for IRC buildings and for low-rise multifamily dwelling units. This proposal would extend this requirement to high-rise multifamily dwelling units, which currently have no requirement for mechanical ventilation. The following table provides a summary of current and proposed requirements.

Occupancy	Current Requirement	Proposed Requirement
IRC Buildings	Balanced ventilation system	This proposal: balanced ventilation system (no change) Energy Code TAG: HERV required*
R-2, R-3, and R-4 Dwelling Units, 3-stories or less	Balanced ventilation system	This proposal: balanced ventilation system (no change) Energy Code TAG: HERV required*
R-2, R-3, and R-4 Dwelling Units, more than 3 stories	Natural or mechanical ventilation	This proposal: <u>balanced ventilation system</u> Energy Code TAG: HERVs required in prescriptive path*

*The Minnesota Energy Code TAG recently recommended approval of proposals RE-7 and RE-19.1, which would modify the IECC-Residential energy code to require that the balanced ventilation system be a heat or energy recovery ventilator (HERV) for single-family, two-family, townhome, and low-rise multifamily dwelling units across all of Minnesota’s climate zones. The Energy Code TAG recommended maintaining the ASHRAE 90.1 prescriptive path requirements for dwelling unit HERVs in all of Minnesota’s climate zones (i.e., applicable to R-2, R-3, and R-4 non-transient dwelling units in buildings more than 3 stories).

If approved, this proposal would accomplish the following:

1. Relocate ventilation requirements for IRC buildings to the IRC. Additionally, a companion proposal is being submitted to relocate MN Rules chapter 1322 ventilation requirements to the IRC.
2. Clarify where mechanical ventilation is required for various applications.
3. Establish the same ventilation requirements for R-2, R-3, and R-4 dwelling units, regardless of building height (consistent with the objective of proposal M19, which was approved for the 2024 IMC).
4. Extend the current requirement for balanced mechanical ventilation systems in IRC buildings and low-rise dwelling units to also apply to high-rise dwelling units.

5. Align with ASHRAE 90.1 and IECC-C prescriptive requirement for HERVs in R-2, R-3, and R-4 dwelling units that are in buildings greater than 3 stories.
6. Align with the Energy Code TAG's recent recommendation to require an HERV for single-family, two-family, townhome, and low-rise R-2, R-3, and R-4 dwelling units.

Rationale supporting mechanical ventilation and balanced ventilation in R-2, R-3, and R-4 dwelling units that are in buildings greater than 3 stories

The IMC, IRC, and ASHRAE 62.2 require mechanical ventilation of all dwelling units within their scopes (with limited exceptions in very mild climates where windows are expected to be open almost continuously without significant energy penalty). By doing so, these codes and standards ensure that occupants are provided with equipment to control their air quality while minimizing the energy required to maintain a comfortable indoor environment. Increasingly, single-family and multi-family dwelling units are built very tightly. Since 2012, the IECC-R has required air sealing and blower door testing of low-rise dwelling units, and in 2021, the IECC-C began requiring blower door testing to confirm air sealing of high-rise dwelling units. Energy codes incentivize builders to seal their dwelling units even more tightly than the already stringent code-minimum requirements. Years before the I-codes required mechanical ventilation for all dwelling units, Minnesota was out front, requiring tight construction and balanced ventilation for single-family and low-rise multi-family dwelling units. However, since Minnesota's last code update, the IMC leapfrogged the Minnesota Mechanical Code when the 2021 IMC began requiring mechanical ventilation for not only low-rise dwelling units, but also for high-rise dwelling units. By doing so, the IMC ruled that access to mechanical ventilation and acceptable indoor air quality in a dwelling unit should no longer be determined by the number of stories that its building happens to occupy.

This proposal would update Minnesota Rules chapter 1346 by aligning with the 2021 and 2024 IMC requirements for mechanical ventilation of all energy-efficient dwelling units. Additionally, it proposes that a balanced ventilation system be provided, consistent with current Minnesota Rules' requirements for all low-rise dwelling units (both single-family and multi-family). By specifying a balanced ventilation system, it avoids exhaust-only and supply-only outdoor air ventilation systems that support pressure imbalances across a dwelling unit's boundary, which could limit the volume of fresh air provided or lead to contaminant and odor transfer between dwelling units and corridors. Note that exhaust-only outdoor air ventilation systems are no longer permitted by ASHRAE 62.2 for attached dwelling units on enclosed corridors.

Unlike exhaust-only and supply-only systems, balanced ventilation systems are not configured to induce pressure differentials across dwelling units. Additionally, balanced systems are able to provide filtered air directly from the outdoors and to temper the outdoor air (if provided with a heat or energy recovery core – as proposed by the Energy Code TAG to be required within Minnesota Rules 1322 for all IRC dwelling units and now required by the IECC-C and ASHRAE 90.1 for high-rise dwelling units following the prescriptive compliance path), increasing the likelihood of energy-efficient system operation by occupants.

2. Why is the proposed code change a reasonable solution?
See answer to #1.
3. What other factors should the TAG consider?
See answer to #1.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
Where a balanced ventilation system is not currently installed, this will increase costs. Exhaust ventilation is typically provided in dwelling units, so no additional incremental costs are assumed for the exhaust component of the balanced ventilation system. Supply-side equipment can retail for \$200 - \$300, with additional costs for installing and for providing ducts. A rough estimate for the retail equipment price of an HERV is \$1000.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
Improvements in indoor air quality could improve health outcomes and reduce health costs. Where an HERV is specified for the balanced ventilation system, energy cost savings can result. The 2024 IECC-R has requirements for HERVs in climate zones 7 and 8; ASHRAE 90.1 and the 2024 IECC-C have requirements for HERVs in dwelling units following the prescriptive path in climate zones 6, 7, and 8. These requirements were adopted based on cost effectiveness studies.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
The occupants and/or owners of dwelling units would bear the cost of the increase.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
Yes, introducing a requirement for mechanical ventilation of high-rise dwelling units where no such requirement currently exists could be expected to increase the cost of compliance for builders/developers/owners and increase the cost of enforcement for authorities having jurisdiction.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
If a small city were to purchase a new high-rise apartment building, the cost of complying could exceed the \$25,000 threshold. However, this situation is not expected to be typical.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Builders, developers, contractors, and tenants could all be affected by this proposed code change.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
At a minimum, mechanical ventilation should be required for all dwelling units, consistent with the IMC. Consistent with ASHRAE 62.2, an exhaust-only outdoor air ventilation system should not be permitted (i.e., the outdoor air should be supplied directly to the dwelling unit). Consistent with longstanding Minnesota Rules requirements, supply ventilation should be tempered prior to introduction. This rationale leads to the specification of balanced ventilation systems with heat or energy recovery (HERVs); note that the Energy Code TAG has recommended that HERVs be required for all single-family, two-family, townhome, and low-rise multifamily dwelling units and that an HERV be required when following the energy code's prescriptive path for high-rise multifamily dwelling units.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
If MN does not adopt this code change proposal, tenants in high-rise multifamily dwelling units may not be provided with mechanical ventilation and may not be able to achieve acceptable indoor air quality. This could lead to poor health outcomes and associated health costs that are borne by tenants, corporations, institutions, and states.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

No.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.

Revise the 2024 IMC as follows:

BALANCED VENTILATION SYSTEM. A ventilation system that simultaneously supplies outdoor air to and exhaust air from a space, where the mechanical supply airflow rate and the mechanical exhaust airflow rate are each within 10 percent of the average of the two airflow rates.

AIR-HANDLING UNIT. A blower or fan used for the purpose of distributing supply air to a room, space, or area.

SECTION 401 GENERAL

401.2 Ventilation required. ~~Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Dwelling units complying with the air leakage requirements of the International Energy Conservation Code or ASHRAE 90.1 shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407. Every other occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403.~~

SECTION 403 MECHANICAL VENTILATION

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or exhaust air ~~except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies shall be provided by an exhaust system, supply system or combination thereof.~~ The amount of supply air shall be approximately equal to the amount of return and exhaust air. The system shall not be prohibited from producing negative or positive pressure. The system to convey ventilation air shall be designed and installed in accordance with Chapter 6.

403.3 Outdoor air and local exhaust airflow rates. Dwelling units in Group R-2, R-3 and R-4 occupancies ~~three stories and less in height above grade plane~~ shall be provided with outdoor air and local exhaust in accordance with Section 403.3.2. Other spaces within buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

403.3.1 Spaces other than dwelling units in Group R-2, R-3, and R-4 occupancies. ~~Other buildings intended to be occupied.~~ The design of local exhaust systems and ventilation systems for outdoor air for ~~spaces~~ occupancies other than dwelling units in Group R-2, R-3 and R-4 occupancies shall comply with Sections 403.3.1.1 through 403.3.1.4.

403.3.2 Dwelling units in Group R-2, R-3 and R-4 occupancies. The design of local exhaust systems and ventilation systems for outdoor air for dwelling units in Group R-2, R-3 and R-4 occupancies shall comply with Sections 403.3.2.1 through 403.3.2.5.

403.3.2.1 Outdoor air for dwelling units. ~~An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. A balanced ventilation system shall be installed to provide outdoor air for each dwelling unit.~~ The outdoor air balanced ventilation system shall be designed to provide the required rate of outdoor air continuously

Commented [RC(1)]: The 2024 IMC has the same definition for air-handling unit, so no need to add as a new definition.

Commented [M2]: This definition is copied from the 2024 IECC-R.

Commented [M3]: In Minnesota, all dwelling units would need to comply with 90.1, so this clause can be deleted.

Commented [MM4]: This exception would no longer apply to dwelling units that are required to have balanced ventilation systems, so it can be deleted.

Commented [MM5]: Use "spaces within buildings" because section 403.3.1 uses this term and because mechanical ventilation requirements are primarily determined on a space basis, not a building basis.

Commented [RC(6)]: Strike out "local exhaust systems and" add "balanced" before ventilation systems? Does the model code language allow exhaust only ventilation without a fan powered outside air intake?

during the period that the *building* is occupied. The minimum continuous *outdoor air flow* rate shall be determined in accordance with Equation 4-9.

$$Q_{OA} = 0.03A_{floor} + 7.5(Nbr + 1) \text{ (Equation 4-9)}$$

where:

Q_{OA} = outdoor air flow rate, cfm

A_{floor} = conditioned floor area, ft²

Nbr = number of bedrooms; not to be less than one

Exceptions:

1. The ~~outdoor air-balanced~~ ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor air flow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.

2. The minimum ~~mechanical ventilation outdoor air~~ rate determined in accordance with Equation 4-9 shall be reduced by 30 percent provided that ~~both of the following conditions apply:~~

~~2.1. A~~ ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

2.1.1. Living room.

2.1.2. Dining room.

2.1.3. Kitchen.

~~2.2. The whole house ventilation system is a balanced ventilation system.~~

~~403.3.2.2 Outdoor air for other spaces. Corridors and other common areas within the conditioned space shall be provided with outdoor air at a rate of not less than 0.06 cfm per square foot [0.0003 m³/(s • m²)] of floor area.~~

~~403.3.2.3 Local exhaust. Local exhaust systems shall be provided in kitchens, bathrooms, and toilet rooms and shall have the capacity to exhaust the minimum airflow rate determined in accordance with Table 403.3.2.32.~~

Commented [MM7]: This section should be deleted, as it is now proposed to be addressed within Section 403.3.1, "Spaces other than dwelling units of Group R-2, R-3, and R-4 occupancies."

TABLE 403.3.2.32
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR DWELLING UNITS IN
GROUP R-2, R-3 AND R-4 OCCUPANCIES

AREA TO BE EXHAUSTED	EXHAUST RATE CAPACITY
Kitchens	100 cfm intermittent or 50 cfm continuous
Bathrooms and toilet rooms	50 cfm intermittent or 25 cfm continuous

~~403.3.2.43 System controls. Where provided within a dwelling unit, controls for outdoor air ventilation systems shall include text or a symbol indicating the system's function.~~

~~403.3.2.54 Ventilating equipment. Fans providing exhaust or outdoor air shall be listed and labeled to provide the minimum required air flow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51, HVI Publication 916, or HVI Publication 920.~~

~~403.3.2.5 Sound. Fans that are a component of the balanced ventilation system or that are configured for continuous operation shall have a sound rating not more than 1.0 sone. Local exhaust fans that are configured for intermittent operation shall have a sound rating not more than 3.0 sones. The sone rating shall be listed and determined based on testing in accordance with HVI Publication 915, for one or more speed settings producing an airflow not less than the rate required by Section 403.3.2.1 or Section 403.3.2, as applicable.~~

~~Exceptions: Sound ratings shall not be required for the following:~~

~~1. Space heating or cooling air-handling units.~~

~~2. Fans located outside of living space and having not less than 4 feet of ductwork between the fan and connected inlets or outlets that terminate within the living space.~~

~~3. Toilet room exhaust fans configured for intermittent operation.~~

Commented [M8]: Unitized dwelling unit HERVs are rated for airflow in accordance with HVI 920. Unitized local exhaust fans are rated for airflow in accordance with HVI 916.

Commented [M9]: This is aligned with ASHRAE 62.2 and with MN Rules chapter 1322 Section R403.5.7.

Commented [RC(10R9)]: We do not intend to adopt 62.2 and are intending to delete existing 1322 language as we are adopting the mechanical provisions of the IRC

Commented [M11]: This section and its exceptions are aligned with ASHRAE 62.2.

Commented [RC(12)]: Is sone rating really needed as code language?

Chapter 15
REFERENCED STANDARDS

HVI

Home Ventilating Institute
1740 Dell Range Blvd., Suite H, PMB 450
Cheyenne, WY 82009

Publication 916—15: Airflow Test Procedure
403.3.2.4

Publication 920-2024: Product Performance Certification and Surveillance Procedure
403.3.2.4

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

The revision 5/21/24 seeks to repeal 1346 Subpart 1: **Section 404.1.**

Repeal this part of 1346 and replace with the revised IMC 404.1 wording below.

~~**404.1 Enclosed parking garages.** Mechanical ventilation systems for enclosed parking garages shall operate automatically upon detection of certain gas concentrations. Enclosed parking garages shall be equipped with a carbon monoxide (CO) detector and a nitrogen dioxide (NO₂) detector. The mechanical ventilation system shall activate upon detection of a CO level of 25 parts per million (ppm) or greater, a NO₂ level of 3 ppm or greater, or both. Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and manufacturers' instructions.~~

404.1 Enclosed parking garages. Mechanical ventilation systems for enclosed parking garages shall operate continuously or shall be automatically operated by means of carbon monoxide (CO) detectors applied in conjunction with nitrogen dioxide (NO₂) detectors. The mechanical ventilation system shall activate when the CO level equals 25 parts per million or when the NO₂ level equals 3 ppm. The ventilation system shall deactivate when the CO level is below 25 ppm and the NO₂ level is below 3 ppm. Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and the manufacturer's instructions. Automatic operation shall cycle the ventilation system between the following two modes of operation:

1. ~~Full-on at an airflow of not less than 0.75 cfm per square foot [0.0038 m³/(s x m²)] of the floor area served.~~
2. ~~Standby at an airflow of not less than 0.05 cfm per square foot [0.00025 m³/(s x m²)] of floor area served.~~

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
The indoor parking garage detectors need to activate the garage ventilation once 25 ppm CO or 3 ppm NO₂ are detected, presumably to maintain a safe indoor air breathing environment. Once you add the words or greater, you eliminate the maximum buildup of those gases that are allowed in the garage before the detectors will activate. If you believe words need to be added after 25PPM CO or 3PMM NO₂ you should consider the words OR LESS, which should result in providing a healthier indoor air environment than 25 PPM CO or 3 PMM NO₂.
2. Why is the proposed code change a reasonable solution?
It should clarify the highest number of built-up gases allowed in the garage before triggering the ventilation system to be activated.
3. What other factors should the TAG consider?
None

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
This is an editorial change and should not impact the cost of construction.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
No cost change
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
N/A
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Architects, Contractors, Developers, Building Owners, Contractors, Building Officials
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
No
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals? **The consequences are related to creating an opportunity for higher than safe level of CO and NO2 build up in indoor parking garages.**
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can considered by the TAG.