

2021 Virginia Construction Code

CHAPTER 12 INTERIOR ENVIRONMENT

SECTION 1202 VENTILATION

1202.1 General.

Buildings shall be provided with natural ventilation in accordance with [Section 1202.5](#), or mechanical ventilation in accordance with the [International Mechanical Code](#).

Where the air infiltration rate in a *dwelling unit* is less than 5 air changes per hour where tested with a blower door at a pressure 0.2 inch w.c. (50 Pa) in accordance with [Section R402.4.1.2](#) of the *International Energy Conservation Code—Residential Provisions*, the *dwelling unit* shall be ventilated by mechanical means in accordance with [Section 403](#) of the *International Mechanical Code*. *Ambulatory care facilities* and Group I-2 occupancies shall be ventilated by mechanical means in accordance with [Section 407](#) of the *International Mechanical Code*.

1202.2 Roof ventilation.

Roof assemblies shall be ventilated in accordance with this section or shall comply with [Section 1202.3](#).

1202.2.1 Ventilated attics and rafter spaces.

Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ventilation openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. An airspace of not less than 1 inch (25 mm) shall be provided between the insulation and the roof sheathing. The net free ventilating area shall be not less than $\frac{1}{150}$ of the area of the space ventilated. Ventilators shall be installed in accordance with manufacturer's installation instructions.

Exception: The net free cross-ventilation area shall be permitted to be reduced to $\frac{1}{300}$ provided both of the following conditions are met:

1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. At least 40 percent and not more than 50 percent of the required venting area is provided by ventilators located in the upper portion of the *attic* or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the *ventilation* provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

1202.2.2 Openings into attic.

Exterior openings into the *attic* space of any building intended for human occupancy shall be protected to prevent the entry of birds, squirrels, rodents, snakes and other similar creatures. Openings for ventilation having a least dimension of not less than $\frac{1}{16}$ inch (1.6 mm) and not more than $\frac{1}{4}$ inch (6.4 mm) shall be permitted. Openings for ventilation having a least dimension larger than $\frac{1}{4}$ inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material with openings having a least dimension of not less than $\frac{1}{16}$ inch (1.6 mm) and not more than $\frac{1}{4}$ inch (6.4 mm). Where combustion air is obtained from an *attic* area, it shall be in accordance with [Chapter 7](#) of the *International Mechanical Code*.

1202.3 Unvented attic and unvented enclosed rafter assemblies.

Unvented *attics* and unvented enclosed roof framing assemblies created by ceilings applied directly to the underside of the roof framing members/rafters and the structural roof sheathing at the top of the roof framing members shall be permitted where all of the following conditions are met:

1. The unvented *attic* space is completely within the *building thermal envelope*.
2. No interior Class I vapor retarders are installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, not less than a $\frac{1}{4}$ -inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing *underlayment* above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall [comply with either Item 5.1 or 5.2, and additionally Item 5.3](#).
 - 5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
 - 5.1.1. Where only *air-impermeable insulation* is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.

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- 5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Item 5.1.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the *R*-values in [Table 1202.3](#) for condensation control.
- 5.1.3. Where both air-impermeable and air-permeable insulation are provided, the *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the *R*-values in [Table 1202.3](#) for condensation control. The *air-permeable insulation* shall be installed directly under the *air-impermeable insulation*.
- 5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.
- 5.2. In Climate Zones 1, 2 and 3, air-permeable insulation installed in unvented attics shall meet the following requirements:
- 5.2.1. A vapor diffusion port shall be installed not more than 12 inches (305 mm) from the highest point of the roof, measured vertically from the highest point of the roof to the lower edge of the port.
- 5.2.2. The port area shall be greater than or equal to $\frac{1}{600}$ of the ceiling area. Where there are multiple ports in the attic, the sum of the port areas shall be greater than or equal to the area requirement.
- 5.2.3. The vapor permeable membrane in the vapor diffusion port shall have a vapor permeance rating of greater than or equal to 20 perms when tested in accordance with Procedure A of [ASTM E96](#).
- 5.2.4. The vapor diffusion port shall serve as an air barrier between the attic and the exterior of the building.
- 5.2.5. The vapor diffusion port shall protect the attic against the entrance of rain and snow.
- 5.2.6. Framing members and blocking shall not block the free flow of water vapor to the port. Not less than a 2-inch (50 mm) space shall be provided between any blocking and the roof sheathing. Air-permeable insulation shall be permitted within that space.
- 5.2.7. The roof slope shall be greater than or equal to 3 units vertical in 12 units horizontal (3:12).
- 5.2.8. Where only air-permeable insulation is used, it shall be installed directly below the structural roof sheathing, on top the attic floor, or on top of the ceiling.
- 5.2.9. Where only air-permeable insulation is used and is installed directly below the structural roof sheathing, air shall be supplied at a flow rate greater than or equal to 50 cubic feet per minute (23.6 L/s) per 1,000 square feet (93 m²) of ceiling.
- 5.3. The air shall be supplied from ductwork providing supply air to the occupiable space when the conditioning system is operating. Alternatively, the air shall be supplied by a supply fan when the conditioning system is operating. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Exceptions:

1. [Section 1202.3](#) does not apply to special use structures or enclosures such as swimming pool enclosures, data processing centers, hospitals or art galleries.
2. [Section 1202.3](#) does not apply to enclosures in Climate Zones 5 through 8 that are humidified beyond 35 percent during the three coldest months.

TABLE 1202.3
INSULATION FOR CONDENSATION CONTROL

CLIMATE ZONE	MINIMUM <i>R</i> -VALUE OF AIR-IMPERMEABLE INSULATION ^a
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

- a. Contributes to, but does not supersede, thermal resistance requirements for attic and roof assemblies in [Section C402.2.1](#) of the *International Energy Conservation*

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Code.

1202.4 Under-floor ventilation.

The space between the bottom of the floor joists and the earth under any building except spaces occupied by basements or cellars shall be provided with ventilation in accordance with [Section 1202.4.1](#), [1202.4.2](#) or [1202.4.3](#).

1202.4.1 Ventilation openings.

Ventilation openings through foundation walls shall be provided. The openings shall be placed so as to provide cross ventilation of the under-floor space. The net area of ventilation openings shall be in accordance with [Section 1202.4.1.1](#) or [1202.4.1.2](#). Ventilation openings shall be covered for their height and width with any of the following materials, provided that the least dimension of the covering shall be not greater than $\frac{1}{4}$ inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grilles or gratings.
4. Extruded load-bearing vents.
5. Hardware cloth of 0.035-inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension not greater than $\frac{1}{8}$ inch (3.2 mm).
7. Operable louvers, where ventilation is provided in accordance with [Section 1202.4.1.2](#).

1202.4.1.1 Ventilation area for crawl spaces with open earth floors.

The net area of ventilation openings for crawl spaces with uncovered earth floors shall be not less than 1 square foot for each 150 square feet (0.67 m² for each 100 m²) of crawl space area.

1202.4.1.2 Ventilation area for crawl spaces with covered floors.

The net area of ventilation openings for crawl spaces with the ground surface covered with a Class I vapor retarder shall be not less than 1 square foot for each 1,500 square feet (0.67 m² for each 1000 m²) of crawl space area.

1202.4.2 Ventilation in cold climates.

In extremely cold climates, where a ventilation opening will cause a detrimental loss of energy, ventilation openings to the interior of the structure shall be provided.

1202.4.3 Mechanical ventilation.

Mechanical ventilation shall be provided to crawl spaces where the ground surface is covered with a Class I vapor retarder. Ventilation shall be in accordance with [Section 1202.4.3.1](#) or [1202.4.3.2](#).

1202.4.3.1 Continuous mechanical ventilation.

Continuously operated mechanical ventilation shall be provided at a rate of 1.0 cubic foot per minute (cfm) for each 50 square feet (1.02 L/s for each 10 m²) of crawl space ground surface area and the ground surface shall be covered with a Class I vapor retarder.

1202.4.3.2 Conditioned space.

The crawl space shall be conditioned in accordance with the [International Mechanical Code](#) and the walls of the crawl space shall be insulated in accordance with the [International Energy Conservation Code](#).

1202.4.4 Flood hazard areas.

For buildings in *flood hazard areas* as established in [Section 1612.3](#), the openings for under-floor ventilation shall be deemed as meeting the flood opening requirements of [ASCE 24](#) provided that the ventilation openings are designed and installed in accordance with [ASCE 24](#).

1202.5 Natural ventilation.

Natural *ventilation* of an occupied space shall be through windows, doors, louvers or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.

1202.5.1 Ventilation area required.

The openable area of the openings to the outdoors shall be not less than 4 percent of the floor area being ventilated.

1202.5.1.1 Adjoining spaces.

Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining room shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.3 m²). The openable area of the openings to the outdoors shall be based on the total floor area being ventilated.

Exception: Exterior openings required for *ventilation* shall be allowed to open into a *sunroom* with *thermal isolation* or a patio cover provided that the openable area between the *sunroom* addition or patio cover and the interior room

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shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 20 square feet (1.86 m²). The openable area of the openings to the outdoors shall be based on the total floor area being ventilated.

1202.5.1.2 Openings below grade.

Where openings below grade provide required natural *ventilation*, the outside horizontal clear space measured perpendicular to the opening shall be one and one-half times the depth of the opening. The depth of the opening shall be measured from the average adjoining ground level to the bottom of the opening.

1202.5.2 Contaminants exhausted.

Contaminant sources in naturally ventilated spaces shall be removed in accordance with the [International Mechanical Code](#) and the [International Fire Code](#).

1202.5.2.1 Bathrooms.

Rooms containing bathtubs, showers, spas and similar bathing fixtures shall be mechanically ventilated in accordance with the [International Mechanical Code](#).

1202.5.3 Openings on yards or courts.

Where natural *ventilation* is to be provided by openings onto *yards* or *courts*, such *yards* or *courts* shall comply with [Section 1205](#).

1202.5.4 Insect screens in occupancies other than Group R.

Every door, window and other outside opening for natural ventilation serving structures classified as other than a residential group containing habitable rooms, food preparation areas, food service areas, or any areas where products to be included or utilized in food for human consumption are processed, manufactured, packaged, or stored, shall be supplied with approved tightly fitting screens of not less than 16 mesh per inch (16 mesh per 25 mm) and every screen door used for insect control shall have a self-closing device.

Exception: Screen doors shall not be required for out swinging doors or other types of openings which make screening impractical, provided other approved means, such as air curtains or insect repellent fans are provided.

1202.5.5 Insect screens in Group R occupancies.

Every door, window and other outside opening required for natural ventilation purposes that serves a structure classified as a residential group shall be supplied with approved tightly fitted screens of not less than 16 mesh per inch (16 mesh per 25 mm) and every screen door used for insect control shall have a self-closing device.

1202.6 Other ventilation and exhaust systems.

Ventilation and exhaust systems for occupancies and operations involving flammable or combustible hazards or other contaminant sources as covered in the [International Mechanical Code](#) or the [International Fire Code](#) shall be provided as required by both codes.

1202.7 Smoking areas in restaurants.

Smoking areas in restaurants, as defined in § 15.2-2820 of the Code of Virginia, shall comply with the following:

1. The area where smoking may be permitted shall be structurally separated from the portion of the restaurant in which smoking is prohibited. For the purposes of this section, structurally separated means a stud wall covered with drywall or other building material or like barrier, which, when completed, extends from the floor to the ceiling, resulting in a physically separated room. Such wall or barrier may include portions that are glass or other gas-imperious building material and shall be permitted to have a door leading to areas in which smoking is prohibited, provided the door is capable of being closed at all times.
2. The area where smoking may be permitted shall be separately vented to prevent the recirculation of air from such area to the area of the restaurant where smoking is prohibited.

Exception: The above requirements do not apply if a restaurant is exempt from, or meets any of the exceptions to, the Virginia Indoor Clean Air Act (Chapter 28.2 of Title 15.2 (§ 15.2-2820 et seq.) of the Code of Virginia).