

2021 Virginia Construction Code

CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES

SECTION 705 EXTERIOR WALLS

705.1 General.

Exterior walls shall comply with this section.

705.2 Projections.

Cornices, eave overhangs, exterior balconies and similar projections extending beyond the exterior wall shall conform to the requirements of this section and [Section 1405](#). Exterior egress balconies and exterior exit stairways and ramps shall comply with [Sections 1021](#) and [1027](#), respectively. Projections shall not extend any closer to the line used to determine the fire separation distance than shown in [Table 705.2](#).

Exceptions:

1. Buildings on the same lot and considered as portions of one building in accordance with [Section 705.3](#) are not required to comply with this section for projections between the buildings.
2. Decks and open porches of buildings of Groups R-3 and R-4.

**TABLE 705.2
MINIMUM DISTANCE OF PROJECTION**

| FIRE SEPARATION DISTANCE (FSD) (feet) | MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD |
|--|---|
| 0 to less than 2 | Projections not permitted |
| 2 to less than 3 | 24 inches |
| 3 to less than 5 | Two-thirds of FSD |
| 5 or greater | 40 inches |

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm.

705.2.1 Types I and II construction.

Projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials as allowed by [Sections 705.2.3.1](#) and [705.2.4](#).

705.2.2 Type III, IV or V construction.

Projections from walls of Type III, IV or V construction shall be of any approved material.

705.2.3 Projection protection.

Projections extending to within 5 feet (1524 mm) of the line used to determine the fire separation distance shall be one of the following:

1. Noncombustible materials.
2. Combustible materials of not less than 1-hour fire-resistance-rated construction.
3. Heavy timber construction complying with [Section 2304.11](#).
4. Fire-retardant-treated wood.
5. As permitted by [Section 705.2.3.1](#).

Exception: Type VB construction shall be allowed for combustible projections in Group R-3 and U occupancies with a fire separation distance greater than or equal to 5 feet (1524 mm).

705.2.3.1 Balconies and similar projections.

Balconies and similar projections of combustible construction other than fire-retardant-treated wood shall be fire-resistance rated where required by [Table 601](#) for floor construction or shall be of heavy timber construction in accordance with [Section 2304.11](#). The aggregate length of the projections shall not exceed 50 percent of the building's perimeter on each floor.

Exceptions:

1. On buildings of Types I and II construction, three stories or less above grade plane, fire-retardant-treated wood shall be permitted for balconies, porches, decks and exterior stairways not used as required exits.
2. Untreated wood and plastic composites that comply with [ASTM D7032](#) and [Section 2612](#) are permitted for pickets, rails and similar guard components that are limited to 42 inches (1067 mm) in height.
3. Balconies and similar projections on buildings of Types III, IV and V construction shall be permitted to be of

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Type V construction and shall not be required to have a *fire-resistance rating* where sprinkler protection is extended to these areas.

- Where sprinkler protection is extended to the balcony areas, the aggregate length of the balcony on each floor shall not be limited.

705.2.4 Bay and oriel windows.

Bay and oriel windows constructed of combustible materials shall conform to the type of construction required for the building to which they are attached.

Exception: *Fire-retardant-treated wood* shall be permitted on buildings three stories or less above grade plane of Type I, II, III or IV construction.

705.3 Buildings on the same lot.

For the purposes of determining the required wall and opening protection, projections and *roof-covering* requirements, buildings on the same lot shall be assumed to have an imaginary line between them.

Where a new building is to be erected on the same lot as an *existing building*, the location of the assumed imaginary line with relation to the existing building shall be such that the *exterior wall* and opening protection of the *existing building* meet the criteria as set forth in [Sections 705.5](#) and [705.8](#).

Exceptions:

- Two or more buildings on the same lot shall be either regulated as separate buildings or shall be considered as portions of one building if the aggregate area of such buildings is within the limits specified in [Chapter 5](#) for a single building. Where the buildings contain different occupancy groups or are of different types of construction, the area shall be that allowed for the most restrictive occupancy or construction.
- Where an S-2 parking garage of Construction Type I or IIA is erected on the same lot as a Group R-2 building, and there is no *fire separation distance* between these buildings, then the adjoining *exterior walls* between the buildings are permitted to have occupant use openings in accordance with [Section 706.8](#). However, opening protectives in such openings shall only be required in the *exterior wall* of the S-2 parking garage, not in the *exterior wall* openings in the R-2 building, and these opening protectives in the *exterior wall* of the S-2 parking garage shall be not less than 1½-hour *fire protection rating*.

705.4 Materials.

Exterior walls shall be of materials permitted by the building's type of construction.

705.5 Fire-resistance ratings.

Exterior walls shall be *fire-resistance* rated in accordance with [Table 601](#), based on the type of construction, and [Table 705.5](#), based on the *fire separation distance*. The required *fire-resistance rating* of *exterior walls* with a *fire separation distance* of greater than 10 feet (3048 mm) shall be rated for exposure to fire from the inside. The required *fire-resistance rating* of *exterior walls* with a *fire separation distance* of less than or equal to 10 feet (3048 mm) shall be rated for exposure to fire from both sides.

TABLE 705.5

FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE ^{a, d,}

| FIRE SEPARATION DISTANCE = X (feet) | TYPE OF CONSTRUCTION | OCCUPANCY GROUP H ^e | OCCUPANCY GROUP F-1, M, S-1 ^f | OCCUPANCY GROUP A, B, E, F-2, I, R ⁱ , S-2, U ^h |
|-------------------------------------|----------------------|--------------------------------|--|---|
| X < 5 ^b | All | 3 | 2 | 1 |
| 5 ≤ X < 10 | IA, IVA | 3 | 2 | 1 |
| | Others | 2 | 1 | 1 |
| 10 ≤ X < 30 | IA, IB, IVA, IVB | 2 | 1 | 1 ^c |
| | IIB, VB | 1 | 0 | 0 |
| | Others | 1 | 1 | 1 ^c |
| X ≥ 30 | All | 0 | 0 | 0 |

For SI: 1 foot = 304.8 mm.

- Load-bearing exterior walls shall also comply with the fire-resistance-rating requirements of [Table 601](#).
- See [Section 706.1.1](#) for party walls.
- Open parking garages complying with [Section 406](#) shall not be required to have a fire-resistance-rating.

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- d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
- e. For special requirements for Group H occupancies, see [Section 415.6](#).
- f. For special requirements for Group S aircraft hangars, see [Section 412.3.1](#).
- g. Where [Table 705.8](#) permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
- h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
- i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.

705.6 Structural stability.

Exterior walls shall extend to the height required by [Section 705.11](#). Interior structural elements that brace the *exterior wall* but that are not located within the plane of the *exterior wall* shall have the minimum *fire-resistance rating* required in [Table 601](#) for that structural element. Structural elements that brace the *exterior wall* but are located outside of the *exterior wall* or within the plane of the *exterior wall* shall have the minimum *fire-resistance rating* required in [Table 601](#) and [Table 705.5](#) for the *exterior wall*.

705.7 Unexposed surface temperature.

Where protected openings are not limited by [Section 705.8](#), the limitation on the rise of temperature on the unexposed surface of *exterior walls* as required by [ASTM E119](#) or [UL 263](#) shall not apply. Where protected openings are limited by [Section 705.8](#), the limitation on the rise of temperature on the unexposed surface of *exterior walls* as required by [ASTM E119](#) or [UL 263](#) shall not apply provided that a correction is made for radiation from the unexposed *exterior wall* surface in accordance with the following formula:

$$A_e = A + (A_f \times F_{eo})$$

where:

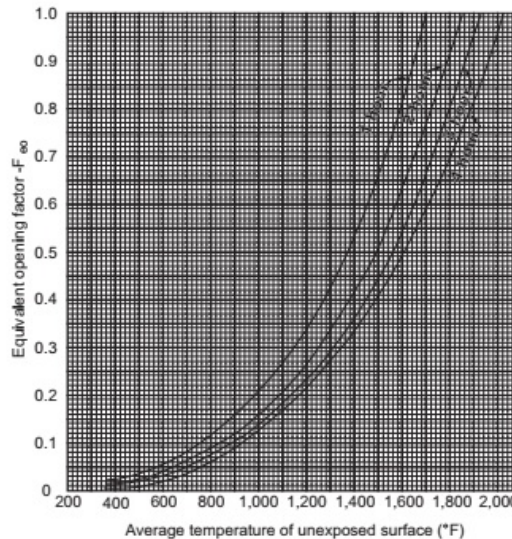
(Equation 7-1)

A_e = Equivalent area of protected openings.

A = Actual area of protected openings.

A_f = Area of exterior wall surface in the story under consideration exclusive of openings, on which the temperature limitations of [ASTM E119](#) or [UL 263](#) for walls are exceeded.

F_{eo} = An "equivalent opening factor" derived from [Figure 705.7](#) based on the average temperature of the unexposed wall surface and the fire-resistance rating of the wall.



For SI: $^{\circ}\text{C} = [(^{\circ}\text{F}) - 32] / 1.8$.

FIGURE 705.7
EQUIVALENT OPENING FACTOR

705.8 Openings.

Openings in exterior walls shall comply with Sections 705.8.1 through 705.8.6.

TABLE 705.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION

| FIRE SEPARATION DISTANCE (feet) | DEGREE OF OPENING PROTECTION | ALLOWABLE AREA ^a |
|--|---|-----------------------------|
| 0 to less than 3 ^{b, c, k} | Unprotected, Nonsprinklered (UP, NS) | Not Permitted ^k |
| | Unprotected, Sprinklered (UP, S) ^j | Not Permitted ^k |
| | Protected (P) | Not Permitted ^k |
| 3 to less than 5 ^{d, e} | Unprotected, Nonsprinklered (UP, NS) | Not Permitted |
| | Unprotected, Sprinklered (UP, S) ^j | 15% |
| | Protected (P) | 15% |
| 5 to less than 10 ^{e, f, j} | Unprotected, Nonsprinklered (UP, NS) | 10% ^h |
| | Unprotected, Sprinklered (UP, S) ^j | 25% |
| | Protected (P) | 25% |
| 10 to less than 15 ^{e, f, g, j} | Unprotected, Nonsprinklered (UP, NS) | 15% ^h |
| | Unprotected, Sprinklered (UP, S) ^j | 45% |
| | Protected (P) | 45% |
| 15 to less than 20 ^{f, g, j} | Unprotected, Nonsprinklered (UP, NS) | 25% |
| | Unprotected, Sprinklered (UP, S) ^j | 75% |
| | Protected (P) | 75% |
| 20 to less than 25 ^{f, g, j} | Unprotected, Nonsprinklered (UP, NS) | 45% |
| | Unprotected, Sprinklered (UP, S) ^j | No Limit |
| | Protected (P) | No Limit |
| 25 to less than 30 ^{f, g, j} | Unprotected, Nonsprinklered (UP, NS) | 70% |
| | Unprotected, Sprinklered (UP, S) ^j | No Limit |
| | Protected (P) | No Limit |
| 30 or greater | Unprotected, Nonsprinklered (UP, NS) | No Limit |
| | Unprotected, Sprinklered (UP, S) ^j | No Limit |
| | Protected (P) | No Limit |

For SI: 1 foot = 304.8 mm.

UP, NS = Unprotected openings in buildings not equipped throughout with an automatic

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sprinkler system in accordance with [Section 903.3.1.1](#).

UP, S = Unprotected openings in buildings equipped throughout with an automatic sprinkler system in accordance with [Section 903.3.1.1](#).

P = Openings protected with an opening protective assembly in accordance with [Section 705.8.2](#).

- a. Values indicated are the percentage of the area of the exterior wall, per story.
- b. For the requirements for fire walls of buildings with differing heights, see [Section 706.6.1](#).
- c. For openings in a fire wall for buildings on the same lot, see [Section 706.8](#).
- d. The maximum percentage of unprotected and protected openings shall be 25 percent for Group R-3 occupancies.
- e. Unprotected openings shall not be permitted for openings with a fire separation distance of less than 15 feet for Group H-2 and H-3 occupancies.
- f. The area of unprotected and protected openings shall not be limited for Group R-3 occupancies, with a fire separation distance of 5 feet or greater.
- g. The area of openings in an open parking structure with a fire separation distance of 10 feet or greater shall not be limited.
- h. Includes buildings accessory to Group R-3.
- i. Not applicable to Group H-1, H-2 and H-3 occupancies.
- j. The area of openings in a building containing only a Group U occupancy private garage or carport with a fire separation distance of 5 feet or greater shall not be limited.
- k. For openings between S-2 parking garage and Group R-2 building, see [Section 705.3](#), Exception 2.

705.8.1 Allowable area of openings.

The maximum area of unprotected and protected openings permitted in an *exterior wall* in any *story* of a building shall not exceed the percentages specified in [Table 705.8](#) based on the *fire separation distance* of each individual story.

Exceptions:

1. In other than Group H occupancies, unlimited unprotected openings are permitted in the first *story above grade plane* where the wall faces one of the following:
 - 1.1. A street and has a *fire separation distance* of more than 15 feet (4572 mm).
 - 1.2. An unoccupied space. The unoccupied space shall be on the same lot or dedicated for public use, shall be not less than 30 feet (9144 mm) in width and shall have access from a street by a posted fire lane in accordance with the [International Fire Code](#).
2. Buildings whose exterior bearing walls, exterior nonbearing walls and exterior *primary structural frame* are not required to be fire-resistance rated shall be permitted to have unlimited unprotected openings.

705.8.2 Protected openings.

Where openings are required to be protected, opening protectives shall comply with [Section 716](#).

Exception: Opening protectives are not required where the building is equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#) and the exterior openings are protected by a water curtain using automatic sprinklers *approved* for that use.

705.8.3 Unprotected openings.

Where unprotected openings are permitted, windows and doors shall be constructed of any *approved* materials. Glazing shall conform to the requirements of [Chapters 24](#) and [26](#).

705.8.4 Mixed openings.

Where both unprotected and protected openings are located in the *exterior wall* in any *story* of a building, the total area

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of openings shall be determined in accordance with the following:

$$(A_p/a_p) + (A_u/a_u) \leq 1$$

A_p = Actual area of protected openings, or the equivalent area of protected openings, A_e (see [Section 705.7](#)).

a_p = Allowable area of protected openings.

A_u = Actual area of unprotected openings.

a_u = allowable area of unprotected openings.

705.8.5 Vertical separation of openings.

Openings in *exterior walls* in adjacent *stories* shall be separated vertically to protect against fire spread on the exterior of the buildings where the openings are within 5 feet (1524 mm) of each other horizontally and the opening in the lower *story* is not a protected opening with a *fire protection rating* of not less than $3/4$ hour. Such openings shall be separated vertically not less than 3 feet (914 mm) by spandrel girders, *exterior walls* or other similar assemblies that have a *fire-resistance rating* of not less than 1 hour, rated for exposure to fire from both sides, or by flame barriers that extend horizontally not less than 30 inches (762 mm) beyond the *exterior wall*. Flame barriers shall have a *fire-resistance rating* of not less than 1 hour. The unexposed surface temperature limitations specified in [ASTM E119](#) or [UL 263](#) shall not apply to the flame barriers unless otherwise required by the provisions of this code.

Exceptions:

1. This section shall not apply to buildings that are three *stories* or less above *grade plane*.
2. This section shall not apply to buildings equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#) or [903.3.1.2](#).
3. *Open parking garages*.

705.8.6 Vertical exposure.

For buildings on the same lot, opening protectives having a *fire protection rating* of not less than $3/4$ hour shall be provided in every opening that is less than 15 feet (4572 mm) vertically above the roof of an adjacent building or structure based on assuming an imaginary line between them. The opening protectives are required where the *fire separation distances* from the imaginary line to each building or structure are less than 15 feet (4572 mm).

Exceptions:

1. Opening protectives are not required where the *roof assembly* of the adjacent building or structure has a *fire-resistance rating* of not less than 1 hour for a minimum distance of 10 feet (3048 mm) from the *exterior wall* facing the imaginary line and the entire length and span of the supporting elements for the fire-resistance-rated roof assembly has a *fire-resistance rating* of not less than 1 hour.
2. Buildings on the same lot and considered as portions of one building in accordance with [Section 705.3](#) are not required to comply with [Section 705.8.6](#).

705.9 Joints.

Joints made in or between *exterior walls* required by this section to have a *fire-resistance rating* shall comply with [Section 715](#).

Exception: *Joints* in *exterior walls* that are permitted to have unprotected openings.

705.9.1 Voids.

The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with [Section 715.4](#).

705.10 Ducts and air transfer openings.

Penetrations by air ducts and air transfer openings in fire-resistance-rated *exterior walls* required to have protected openings shall comply with [Section 717](#).

Exception: Foundation vents installed in accordance with this code are permitted.

705.11 Parapets.

Parapets shall be provided on *exterior walls* of buildings.

Exceptions: A parapet need not be provided on an *exterior wall* where any of the following conditions exist:

1. The wall is not required to be *fire-resistance rated* in accordance with [Table 705.5](#) because of *fire separation distance*.
2. The building has an area of not more than 1,000 square feet (93 m²) on any floor.
3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof,

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including the deck or slab and supporting construction, is constructed entirely of noncombustible materials.

4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided that:
 - 4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220 mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
 - 4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction.
 - 4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire-resistance-rated *exterior wall* for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
 - 4.4. The entire building shall be provided with not less than a Class B *roof covering*.
5. In Groups R-2 and R-3 where the entire building is provided with a Class C *roof covering*, the *exterior wall* shall be permitted to terminate at the underside of the roof sheathing or deck in Types III, IV and V construction, provided that one or both of the following criteria is met:
 - 5.1. The roof sheathing or deck is constructed of *approved* noncombustible materials or of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm).
 - 5.2. The roof is protected with 0.625-inch (16 mm) Type X *gypsum board* directly beneath the underside of the roof sheathing or deck, supported by not less than nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm).
6. Where the wall is permitted to have not less than 25 percent of the *exterior wall* areas containing unprotected openings based on *fire separation distance* as determined in accordance with [Section 705.8](#).

705.11.1 Parapet construction.

Parapets shall have the same *fire-resistance rating* as that required for the supporting wall, and on any side adjacent to a roof surface, shall have noncombustible faces for the uppermost 18 inches (457 mm), including counterflashing and coping materials. The height of the parapet shall be not less than 30 inches (762 mm) above the point where the roof surface and the wall intersect. Where the roof slopes toward a parapet at a slope greater than 2 units vertical in 12 units horizontal (16.7-percent slope), the parapet shall extend to the same height as any portion of the roof within a *fire separation distance* where protection of wall openings is required, but the height shall be not less than 30 inches (762 mm).