

# 2021 Virginia Construction Code

## CHAPTER 4 SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY

### SECTION 403 HIGH-RISE BUILDINGS

#### 403.1 Applicability.

*High-rise buildings* shall comply with [Sections 403.2](#) through [403.6](#).

**Exceptions:** The provisions of [Sections 403.2](#) through [403.6](#) shall not apply to the following buildings and structures:

1. Airport traffic control towers in accordance with [Section 412.2](#).
2. *Open parking garages* in accordance with [Section 406.5](#).
3. The portion of a building containing a Group A-5 occupancy in accordance with [Section 303.6](#).
4. Special industrial occupancies in accordance with [Section 503.1.1](#).
5. Buildings containing any one of the following:
  - 5.1. A Group H-1 occupancy.
  - 5.2. A Group H-2 occupancy in accordance with [Section 415.8](#), [415.9.2](#), [415.9.3](#) or [426.1](#).
  - 5.3. A Group H-3 occupancy in accordance with [Section 415.8](#).

#### 403.2 Construction.

The construction of *high-rise buildings* shall comply with the provisions of [Sections 403.2.1](#) through [403.2.3](#).

##### 403.2.1 Reduction in fire-resistance rating.

The *fire-resistance rating* reductions specified in [Sections 403.2.1.1](#) and [403.2.1.2](#) shall be allowed in buildings that have sprinkler control valves equipped with supervisory initiating devices and water-flow initiating devices for each floor.

##### 403.2.1.1 Type of construction.

The following reductions in the minimum *fire-resistance rating* of the *building elements* in [Table 601](#) shall be permitted as follows:

1. For buildings not greater than 420 feet (128 m) in *building height*, the *fire-resistance rating* of the *building elements* in Type IA construction shall be permitted to be reduced to the minimum *fire-resistance ratings* for the *building elements* in Type IB.

**Exception:** The required *fire-resistance rating* of columns supporting floors shall not be reduced.

2. In other than Group F-1, H-2, H-3, H-5, M and S-1 occupancies, the *fire-resistance rating* of the *building elements* in Type IB construction shall be permitted to be reduced to the *fire-resistance ratings* in Type IIA.
3. The *building height* and *building area* limitations of a building containing *building elements* with reduced *fire-resistance ratings* shall be permitted to be the same as the building without such reductions.

##### 403.2.1.2 Shaft enclosures.

For buildings not greater than 420 feet (128 m) in *building height*, the required *fire-resistance rating* of the *fire barriers* enclosing vertical *shafts*, other than *interior exit stairway* and elevator hoistway enclosures, is permitted to be reduced to 1 hour where *automatic* sprinklers are installed within the *shafts* at the top and at alternate floor levels.

#### [BS] 403.2.2 Structural integrity of interior exit stairways and elevator hoistway enclosures.

For *high-rise buildings* of Risk Category III or IV in accordance with [Section 1604.5](#), and for all buildings that are more than 420 feet (128 m) in *building height*, enclosures for *interior exit stairways* and elevator hoistway enclosures shall comply with [Sections 403.2.2.1](#) through [403.2.2.4](#).

##### [BS] 403.2.2.1 Wall assembly materials—soft body impact.

The [panels](#) making up the enclosures for *interior exit stairways* and elevator hoistway enclosures shall meet or exceed Soft Body Impact Classification Level 2 as measured by the test method described in [ASTM C1629/C1629M](#) when tested from the exterior side of the enclosure.

##### [BS] 403.2.2.2 Wall assembly materials—hard body impact.

The [panels](#) making up the enclosures for *interior exit stairways* and elevator hoistway enclosures that are not exposed to the interior of the enclosure shall be in accordance with one of the following:

1. The wall assembly shall incorporate not fewer than two layers of impact-resistant [panels](#), each of which meets or exceeds Hard Body Impact Classification Level 2 as measured by the test method described in [ASTM C1629/C1629M](#).
2. The wall assembly shall incorporate not fewer than one layer of impact-resistant [panels that meet or exceed](#) Hard Body Impact Classification Level 3 as measured by the test method described in [ASTM C1629/C1629M](#).

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3. The wall assembly incorporates multiple layers of any material, tested in tandem, that meets or exceeds Hard Body Impact Classification Level 3 as measured by the test method described in [ASTM C1629/C1629M](#).

**[BS] 403.2.2.3 Concrete and masonry walls.**

Concrete or masonry walls shall be deemed to satisfy the requirements of [Sections 403.2.2.1](#) and [403.2.2.2](#).

**[BS] 403.2.2.4 Other wall assemblies.**

Any other wall assembly that provides impact resistance equivalent to that required by [Sections 403.2.2.1](#) for Soft Body Impact Classification Level 2 and [403.2.2.2](#) for Hard Body Impact Classification Level 3, as measured by the test method described in [ASTM C1629/C1629M](#), shall be permitted.

**403.2.3 Sprayed fire-resistant materials (SFRM).**

The bond strength of the SFRM installed throughout the building shall be in accordance with [Table 403.2.3](#).

**TABLE 403.2.3  
MINIMUM BOND STRENGTH**

HEIGHT OF BUILDING <sup>a</sup>	SFRM MINIMUM BOND STRENGTH
Up to 420 feet	430 psf
Greater than 420 feet	1,000 psf

For SI: 1 foot = 304.8 mm, 1 pound per square foot (psf) = 0.0479 kW/m<sup>2</sup>.

a. Above the lowest level of fire department vehicle access.

**[F] 403.3 Automatic sprinkler system.**

Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#) and a secondary water supply where required by [Section 403.3.3](#).

**Exception:** An *automatic sprinkler system* shall not be required in spaces or areas of [telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines](#), provided that those spaces or areas are equipped throughout with an *automatic fire detection system* in accordance with [Section 907.2](#) and are separated from the remainder of the building by not less than *1-hour fire barriers constructed in accordance with Section 707* or not less than *2-hour horizontal assemblies constructed in accordance with Section 711*, or both.

**[F] 403.3.1 Number of sprinkler risers and system design.**

Each sprinkler system zone in buildings that are more than 420 feet (128 m) in *building height* shall be supplied by not fewer than two risers. Each riser shall supply sprinklers on alternate floors. If more than two risers are provided for a zone, sprinklers on adjacent floors shall not be supplied from the same riser.

**[F] 403.3.1.1 Riser location.**

Sprinkler risers shall be placed in *interior exit stairways* and *ramps* that are remotely located in accordance with [Section 1007.1](#).

**[F] 403.3.2 Water supply to required fire pumps.**

In *all* buildings that are more than 420 feet (128 m) in *building height* and *buildings of Type IV-A and IV-B construction that are more than 120 feet (36 576 mm) in building height*, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

**Exception:** Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.

**[F] 403.3.3 Secondary water supply.**

An *automatic* secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for *high-rise buildings* assigned to *Seismic Design Category C, D, E or F* as determined by [Section 1613](#). An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with [NFPA 13](#).

**[F] 403.3.4 Fire pump room.**

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Fire pumps shall be located in rooms protected in accordance with [Section 913.2.1](#).

**[F] 403.4 Emergency systems.**

The detection, alarm and emergency systems of *high-rise buildings* shall comply with [Sections 403.4.1](#) through [403.4.8](#).

**[F] 403.4.1 Smoke detection.**

Smoke detection shall be provided in accordance with [Section 907.2.13.1](#).

**[F] 403.4.2 Fire alarm system.**

A *fire alarm* system shall be provided in accordance with [Section 907.2.13](#).

**[F] 403.4.3 Standpipe system.**

A *high-rise building* shall be equipped with a *standpipe system* as required by [Section 905.3](#).

**[F] 403.4.4 Emergency voice/alarm communication system.**

An *emergency voice/alarm communication system* shall be provided in accordance with [Section 907.5.2.2](#)

**[F] 403.4.5 Emergency communication coverage.**

(Section deleted.)

**[F] 403.4.6 Fire command.**

A *fire command center* complying with [Section 911](#) shall be provided in a location *approved* by the fire code official.

**[F] 403.4.7 Smoke removal.**

To facilitate smoke removal in post-fire salvage and overhaul operations, buildings and structures shall be equipped with natural or mechanical *ventilation* for removal of products of combustion in accordance with one of the following:

1. Easily identifiable, manually operable windows or panels shall be distributed around the perimeter of each floor at not more than 50-foot (15 240 mm) intervals. The area of operable windows or panels shall be not less than 40 square feet (3.7 m<sup>2</sup>) per 50 linear feet (15 240 mm) of perimeter.

**Exceptions:**

1. In Group R-1 occupancies, each *sleeping unit* or suite having an *exterior wall* shall be permitted to be provided with 2 square feet (0.19 m<sup>2</sup>) of venting area in lieu of the area specified in Item 1.
2. Windows shall be permitted to be fixed provided that glazing can be cleared by fire fighters.
2. Mechanical air-handling equipment providing one exhaust air change every 15 minutes for the area involved. Return and exhaust air shall be moved directly to the outside without recirculation to other portions of the building.
3. Any other *approved* design that will produce equivalent results.

**[F] 403.4.8 Standby and emergency power.**

A *standby power system* complying with [Section 2702](#) and [Section 3003](#) shall be provided for the standby power loads specified in [Section 403.4.8.3](#). An *emergency power system* complying with [Section 2702](#) shall be provided for the emergency power loads specified in [Section 403.4.8.4](#).

**[F] 403.4.8.1 Equipment room.**

If the *standby or emergency power system* includes a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with [Section 707](#) or *horizontal assemblies* constructed in accordance with [Section 711](#), or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.

**Exception:** In Group I-2, Condition 2, manual start and transfer features for the critical branch of the emergency power are not required to be provided at the *fire command center*.

**[F] 403.4.8.2 Fuel line piping protection.**

Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by [one of the following methods](#):

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#), the required rating shall be reduced to 1 hour.
2. An assembly that has a *fire-resistance rating* of not less than 2 hours. Where the building is protected throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) or [903.3.1.2](#), the required fire-resistance rating shall be reduced to 1 hour.
3. Other *approved methods*.

**[F] 403.4.8.3 Standby power loads.**

The following are classified as standby power loads:

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1. Ventilation and automatic fire detection equipment for *smokeproof* enclosures.
2. Elevators.
3. Where elevators are provided in a *high-rise building* for accessible means of egress, fire service access or occupant self-evacuation, the *standby power system* shall also comply with [Sections 1009.4, 3007 or 3008](#), as applicable.

#### **[F] 403.4.8.4 Emergency power loads.**

The following are classified as emergency power loads:

1. Exit signs and *means of egress* illumination required by [Chapter 10](#).
2. Elevator car lighting.
3. *Emergency voice/alarm communications systems*.
4. *Automatic* fire detection systems.
5. *Fire alarm* systems.
6. Electrically powered fire pumps.
7. Power and lighting for the *fire command center* required by [Section 403.4.6](#).

#### **403.5 Means of egress and evacuation.**

The *means of egress* in *high-rise buildings* shall comply with [Sections 403.5.1](#) through [403.5.5](#).

##### **403.5.1 Remoteness of interior exit stairways.**

Required *interior exit stairways* shall be separated by a distance not less than 30 feet (9144 mm) or not less than one-fourth of the length of the maximum overall diagonal dimension of the building or area to be served, whichever is less. The distance shall be measured in a straight line between the nearest points of the enclosure surrounding the *interior exit stairways*. In buildings with three or more *interior exit stairways*, not fewer than two of the *interior exit stairways* shall comply with this section. Interlocking or *scissor stairways* shall be counted as one *interior exit stairway*.

##### **403.5.2 Additional interior exit stairway.**

For buildings other than Group R-2 and their ancillary spaces that are more than 420 feet (128 m) in *building height*, one additional *interior exit stairway* meeting the requirements of [Sections 1011](#) and [1023](#) shall be provided in addition to the minimum number of *exits* required by [Section 1006.3](#). The total capacity of any combination of remaining *interior exit stairways* with one *interior exit stairway* removed shall be not less than the total capacity required by [Section 1005.1](#). *Scissor stairways* shall not be considered the additional *interior exit stairway* required by this section.

##### **Exceptions:**

1. An additional *interior exit stairway* shall not be required to be installed in buildings having elevators used for occupant self-evacuation in accordance with [Section 3008](#).
2. An additional *interior exit stairway* shall not be required for other portions of the building where the highest occupiable floor level in those areas is less than 420 feet (128 m) in *building height*.

##### **403.5.3 Stairway door operation.**

*Stairway* doors other than the exit discharge doors shall be permitted to be locked from the *stairway* side. *Stairway* doors that are locked from the *stairway* side shall be capable of being unlocked simultaneously without unlatching upon a signal from the *fire command center*.

##### **403.5.3.1 Stairway communication system.**

A telephone or other two-way communications system connected to an *approved constantly attended station* shall be provided at not less than every fifth floor in each *stairway* where the doors to the *stairway* are locked.

##### **403.5.4 Smokeproof enclosures.**

Every required *interior exit stairway* serving floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall be a *smokeproof enclosure* in accordance with [Sections 909.20](#) and [1023.12](#).

##### **403.5.5 Luminous egress path markings.**

Luminous egress path markings shall be provided in accordance with [Section 1025](#).

#### **403.6 Elevators.**

Elevator installation and operation in *high-rise buildings* shall comply with [Chapter 30](#) and [Sections 403.6.1](#) and [403.6.2](#).

##### **403.6.1 Fire service access elevator.**

In buildings with an occupied floor more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access, not fewer than two fire service access elevators, or all elevators, whichever is less, shall be provided in accordance with [Section 3007](#). Each fire service access elevator shall have a capacity of not less than 3,500 pounds

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(1588 kg) and shall comply with [Section 3002.4](#).

**403.6.2 Occupant evacuation elevators.**

Where installed in accordance with [Section 3008](#), passenger elevators for general public use shall be permitted to be used for occupant self-evacuation.