

# 2021 Virginia Construction Code

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

### SECTION 405 UNDERGROUND BUILDINGS

#### 405.1 General.

The provisions of Sections 405.2 through 405.9 apply to building spaces having a floor level used for human occupancy more than 30 feet (9144 mm) below the finished floor of the lowest *level of exit discharge*.

**Exceptions:** The provisions of Section 405 are not applicable to the following buildings or portions of buildings:

1. One- and two-family *dwellings*, sprinklered in accordance with Section 903.3.1.3.
2. Parking garages provided with *automatic sprinkler systems* in compliance with Section 405.3.
3. Fixed guideway transit systems.
4. *Grandstands, bleachers*, stadiums, arenas and similar facilities.
5. Where the lowest *story* is the only *story* that would qualify the building as an underground building and has an area not greater than 1,500 square feet (139 m<sup>2</sup>) and has an *occupant load* less than 10.
6. Pumping stations and other similar mechanical spaces intended only for limited periodic use by service or maintenance personnel.

#### 405.2 Construction requirements.

The underground portion of the building shall be of Type I construction.

#### [F] 405.3 Automatic sprinkler system.

The highest *level of exit discharge* serving the underground portions of the building and all levels below shall be equipped with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1. Water-flow switches and control valves shall be supervised in accordance with Section 903.4.

#### 405.4 Compartmentation.

Compartmentation shall be in accordance with Sections 405.4.1 through 405.4.3.

##### 405.4.1 Number of compartments.

A building having a floor level more than 60 feet (18 288 mm) below the finished floor of the lowest *level of exit discharge* shall be divided into not fewer than two compartments of approximately equal size. Such compartmentation shall extend through the highest *level of exit discharge* serving the underground portions of the building and all levels below.

**Exception:** The lowest *story* need not be compartmented where the area is not greater than 1,500 square feet (139 m<sup>2</sup>) and has an *occupant load* of less than 10.

##### 405.4.2 Smoke barrier penetration.

The compartments shall be separated from each other by a *smoke barrier* in accordance with Section 709. Penetrations between the two compartments shall be limited to plumbing and electrical piping and conduit that are firestopped in accordance with Section 714. Doorways shall be protected by *fire door assemblies* that comply with Section 716, automatic-closing by smoke detection in accordance with Section 716.2.6.6 and installed in accordance with NFPA 105 and Section 716.2.2.1. Where provided, each compartment shall have an air supply and an exhaust system independent of the other compartments.

##### 405.4.3 Elevators.

Where elevators are provided, each compartment shall have direct access to an elevator. Where an elevator serves more than one compartment, an enclosed elevator lobby shall be provided and shall be separated from each compartment by a *smoke barrier* in accordance with Section 709. Doorways in the *smoke barrier* shall be protected by *fire door assemblies* that comply with Section 716, shall comply with the smoke and draft control assembly requirements of Section 716.2.2.1 with the UL 1784 test conducted without an artificial bottom seal, and shall be automatic-closing by smoke detection in accordance with Section 716.2.6.6.

#### 405.5 Smoke control system.

A smoke control system shall be provided in accordance with Sections 405.5.1 and 405.5.2.

##### 405.5.1 Control system.

A smoke control system is required to control the migration of products of combustion in accordance with Section 909 and the provisions of this section. Smoke control shall restrict movement of smoke to the general area of fire origin and maintain *means of egress* in a usable condition.

##### 405.5.2 Compartment smoke control system.

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Where compartmentation is required, each compartment shall have an independent smoke control system. The system shall be automatically activated and capable of manual operation in accordance with [Sections 907.2.18](#) and [907.2.19](#).

**[F] 405.6 Fire alarm systems.**

A *fire alarm* system shall be provided where required by [Sections 907.2.18](#) and [907.2.19](#).

**405.7 Means of egress.**

*Means of egress* shall be in accordance with [Sections 405.7.1](#) and [405.7.2](#).

**405.7.1 Number of exits.**

Each floor level shall be provided with not fewer than two *exits*. Where compartmentation is required by [Section 405.4](#), each compartment shall have not fewer than one *exit* and not fewer than one *exit access* doorway into the adjoining compartment.

**405.7.2 Smokeproof enclosure.**

Every required *stairway* serving floor levels more than 30 feet (9144 mm) below the finished floor of its *level of exit discharge* shall comply with the requirements for a *smokeproof enclosure* as provided in [Section 1023.12](#).

**[F] 405.8 Standby and emergency power.**

A *standby power system* complying with [Section 2702](#) shall be provided for the standby power loads specified in [Section 405.8.1](#). An *emergency power system* complying with [Section 2702](#) shall be provided for the emergency power loads specified in [Section 405.8.2](#).

**[F] 405.8.1 Standby power loads.**

The following are classified as standby power loads:

1. Smoke control system.
2. *Ventilation* and *automatic* fire detection equipment for *smokeproof* enclosures.
3. Elevators, as required in [Section 3003](#).

**[F] 405.8.2 Emergency power loads.**

The following are classified as emergency power loads:

1. *Emergency voice/alarm communications systems*.
2. *Fire alarm systems*.
3. *Automatic* fire detection systems.
4. Elevator car lighting.
5. *Means of egress* and *exit* sign illumination as required by [Chapter 10](#).
6. Fire pumps.

**[F] 405.9 Standpipe system.**

The underground building shall be equipped throughout with a *standpipe system* in accordance with [Section 905](#).